U.S. DEPARTMENT OF ENERGY

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ENERGY CONSERVATION STANDARDS FOR COMMERCIAL AND INDUSTRIAL PUMPS

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PUBLIC MEETING

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WEDNESDAY, FEBRUARY 20, 2013

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The Public Meeting met in Room 8E-089, 1000 Independence Avenue, S.W., Washington, D.C., at 9:00 a.m., Doug Brookman, Meeting Facilitator, presiding.

PRESENT

DOUG BROOKMAN, Meeting Facilitator, Public Solutions, Inc.
JOHN CYMBALSKY, Department of Energy
BETSY KOHL, Department of Energy
CHARLES LLENZA, Department of Energy

ALSO PRESENT

ROBERT ASDAL, Hydraulic Institute
ALEX BOESENBERG, National Electrical Manufacturers Association
ROB BOTELER, Nidec Motor Corporation
DONALD BRUNDAGE, Southern Company
MARK BUBLITZ, The New York Blower Company
KITT BUTLER, Advanced Energy
GREG CASE, Pump Design, Development & Diagnostics
JORDAN DORIA, Ingersoll Rand
TOM ECKMAN, Northwest Power and Conservation Council
NEAL ELLIOTT, American Council for an Energy-

Efficient Economy
RANDAL FERMAN, Ekwestrel Corp
GARY FERNSTROM, California Investor Owned Utilities
AARON GOTHAM, Greenheck
MARK HANDZEL, Xylem, Inc
DAN HARTLEIN, Twin City Fan Companies, Ltd.
JOHN HAZEN WHITE, Jr., Taco, Inc.
SARAH HOWELL, Grundfos
ALBERT HUBER, Patterson Pump Company
MICHAEL IVANOVICH, Air Movement and Control Association International
SANAEE IYAMA, Lawrence Berkeley National Laboratory
TIMOTHY KUSKI, Greenheck
CHRISTOPHER LAU, Navigant Consulting
ALEX LEKOV, Lawrence Berkeley National Laboratory
JON LEMMOND, Air-Conditioning, Heating, and Refrigeration Institute
BRUCE LUNG, Alliance to Save Energy
JANE LUXTON, Pepper Hamilton LLP
JOANNA MAUER, Appliance Standards Awareness Project
DAVID MCKINSTRY, Colfax Fluid Handling
RODNEY MRKVICKA, Smith & Loveless, Inc.
KEN NAPOLITANO, Xylem, Inc.
LAURA PETRILLO-GROH, Air-conditioning, Heating, and Refrigeration Institute
CALLIE REIS, Navigant Consulting
MICHAEL RIVEST, Navigant Consulting
GREGG ROMANYSHYN, Hydraulic Institute
ALLISON ROSE, Artemis Strategies
GREG ROSENQUIST, Lawrence Berkeley National Laboratory
STEVE ROSENSTOCK, Edison Electric Institute
STEVE SCHMITZ, Grundfos
ARNOLD SDANO, Pentair
WADE SMITH, Air movement and Control Association International
LOUIS STARR, Northwest Energy Efficiency Alliance
MARK STEVENS, Air Movement and Control Association International

JOHN STEVENS-GARMON

GREG TOWSLEY, Grundfos

DANIEL TROMBLEY, American Council for an Energy-Efficient Economy

BOB VALBRACHT, Loren Cook Company

MEG WALTNER, Natural Resources Defense Council

DANIEL WEINTRAUB, Navigant Consulting, Inc.

SARAH WIDDER, Pacific Northwest National Laboratory

ALISON WILLIAMS, Lawrence Berkeley National Laboratory

DAVID WINIARSKI, Pacific Northwest National Laboratory

C-O-N-T-E-N-T-S

C-O-N-T-E-N-T-S (CONTINUED)

C-O-N-T-E-N-T-S (CONTINUED)

C-O-N-T-E-N-T-S (CONTINUED)

C-O-N-T-E-N-T-S (CONTINUED)

C-O-N-T-E-N-T-S (CONTINUED)

C-O-N-T-E-N-T-S (CONTINUED)

C-O-N-T-E-N-T-S (CONTINUED)

P-R-O-C-E-E-D-I-N-G-S

9:07 a.m.

MR. BROOKMAN: Good morning, everyone. Welcome.

This is the U.S. Department of Energy's public meeting on Energy Conservation Standards for commercial and industrial pumps. Today is Wednesday, February 20th, 2013, here at the Department of Energy, the Forrestal Building, in Washington, D.C.

My name is Doug Brookman from Public Solutions in Baltimore.

Good to see you here this morning. Thanks for being here on time. We have a full day ahead of us.

We are going to start this morning with welcoming remarks from John Cymbalsky.

MR. CYMBALSKY: Thanks, Doug.

I am John Cymbalsky. I am the Program Manager for Appliance Standards and Building Codes.

I want to be the first to welcome

you here to our framework meeting on pumps.

I note in the room we have a lot of first-timers to the regulatory process. So, hopefully, this isn't too scary an experience. We are going to try to take things slow. We have a lot of material to cover. Much of it is, in my opinion, a little dense, but let's take our time and get through it.

I also want to plant a little seed, prime the pump, however you want to say it, but we have a meeting next Tuesday, so a week from yesterday, for the new Advisory Committee that we formed here at the Department. It would be nice if a few of the pumps guys showed up, guys or gals, whichever it might be, to the meeting. I think pumps might be an area to explore for a negotiated rulemaking, and the ASRAC Committee will be tackling issues in terms of forming working groups to do negotiated rulemakings. We definitely think pumps might be a product to explore in that frame of mind.

So, with that, let me send it back to Doug, and let's have a productive meeting.

MR. BROOKMAN: Thank you.

It is our tradition here to start with doing introductions around the room, and it gives you a chance, also, to get in the habit of turning these microphones on and off.

So, I would like to start to my immediate left. If you would say your name and organizational affiliation, and we will just proceed around the table here. Good job.

MR. HANDZEL: I'm Mark Handzel. I am with Xylem, Incorporated.

MR. BROOKMAN: Okay.

MR. SCHMITZ: Good morning.

Steve Schmitz with Grundfos.

MR. ROSENSTOCK: Steve Rosenstock, Edison Electric Institute.

MR. NAPOLITANO: Ken Napolitano with Xylem, Incorporated.

MR. HUBER: Albert Huber, Patterson Pump Company.

MR. ELLIOTT: Neal Elliott, ACEEE.

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

MR. BOESENBERG: Alex Boesenberg, National Electrical Manufacturers Association.

MR. FERNSTROM: Gary Fernstrom, representing the California Investor Owned Utilities, which would be PG&E, the Southern California Edison Company, San Diego Gas and Electric, and the Southern California Gas Company.

MR. ECKMAN: Tom Eckman, Northwest Power and Conservation Council.

MR. ASDAL: Good morning.

Bob Asdal, Executive Director, from the Hydraulic Institute.

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

MR. LUNG: Bruce Lung, Alliance to Save Energy.

MS. KOHL: Elizabeth Kohl, Department of Energy General Counsel's Office.

MR. LLENZA: Charles Llenza, the Project Manager for the rulemaking.

MR. CYMBALSKY: John Cymbalsky, DOE.

MR. BROOKMAN: Please stand.

MR. WEINTRAUB: Daniel Weintraub, Navigant Consulting, Inc.

MS. WIDDER: Sarah Widder, Pacific Northwest National Laboratory.

MS. WILLIAMS: Alison Williams, Lawrence Berkeley National Laboratory.

MR. ROSENQUIST: Greg Rosenquist, Lawrence Berkeley National Laboratory.

MR. RIVEST: Mike Rivest, Navigant Consulting.

MR. WINIARSKI: David Winiarski, Pacific Northwest National Laboratory.

MR. BROOKMAN: We are going to do the same thing in the back of the room. So, you can stand or sit, whatever, but speak loudly. And we will start in the front.

(Laughter.)

The individuals at the table, we captured all that on the record. And since everybody is signed in, we will have a complete listing of who has attended. But, as a matter of courtesy, I will start with you. Please say your name and organizational affiliation.

(Off-microphone introductions.)

MR. BROOKMAN: Okay. Thank you.

So, thanks to all of you again for being here and for getting us a good start on the day already.

All of you received a packet of information as you checked in this morning, both an agenda and a packet of PowerPoint slides. I am going to run through the agenda briefly.

Immediately following this agenda review, there is an opportunity for anybody that wishes to do so to make brief summary remarks about issues that are important to you, as a precursor, as an early start to the content that will be presented in these PowerPoint slides as we go on through the day.

And immediately following those summary remarks, we will have an introduction and rulemaking process overview by Charles Llenza, as reflected in your agenda, if you are looking at it.

Going from there, the legislative history and scope of coverage.

We will take a break mid-morning about 10:30 or so.

Following that, regulatory regimes and metrics.

Immediately following that, test procedure.

We will have lunch round about noon, whenever we get there.

And returning from lunch, market and technology assessment; screening analysis.

Following that, engineering analysis; manufacturer impact analysis.

Then, markups analysis; energy use

analysis.

We will take a break mid-afternoon.

And then, immediately following the break, life-cycle costs and payback period analysis; shipments analysis; national impact analysis.

Finally, NOPR analyses.

And then, closing out the afternoon, next steps and closing remarks.

At the end of the day today, there is another opportunity for anybody that wants to do so to make comments, things that have been missed, things that haven't been covered efficiently or effectively. So, there is yet another opportunity to do that.

Questions and comments on the agenda?

(No response.)

There is a lot of material here, and some of it is quite new to all of you. We are going to try our very best to make sure that everybody stays with us. And if you have questions as we are going along, please let me know and we will try to make sure they get answered as we go.

I would ask for your consideration. As you see up here on the flipchart, please speak one at a time. Please say your name for the record each time you speak. You can say your organization or affiliation, if you want; just your name is probably sufficient.

There will be a complete transcript of this meeting available, and we will talk about how you can access it.

I am going to be recognizing individuals to speak by name as best I can. So, there will be a queue of individuals.

I also wish to encourage comment back and forth between individuals. Sometimes that follow-on is very, very useful for the Department as it considers this information.

If you would keep the focus here, please turn your cell phones on silent and limit sidebar conversations.

Please make sure to turn these microphones on and off each time you speak. You will get in the habit shortly.

Please be concise. Share the airtime. There is a lot of content here. We will try to make this meeting as effective and efficient as possible.

And for webinar participants, how many do we have joining us via the web? Ten. Welcome to the webinar participants. The Department is trying very hard to make these meetings accessible and successful for the web participants.

Please keep your telephones on mute, so we don't have feedback here in the room. And if you wish to speak, we are going to try to get you that chance. Please raise your hand via the software that you are working in, and our web mistress will pass a note to me, and we will insert you in the conversation.

Questions and comments?

MR. LLENZA: Also, I just want to add there are microphones in the back for the parties that are sitting in the back to come up to the microphone. We would appreciate using the microphones, so you can provide your comments --

MR. BROOKMAN: Okay.

MR. LLENZA: -- and questions.

MR. BROOKMAN: So, then, let's begin. We have done the agenda review. We have reviewed norms.

Let's start off, then, with brief summary remarks by anyone present who wishes to talk about issues that are important to him or her.

Who would like to start? Bob? Please say your name for the record.

MR. ASDAL: Thank you very much.

Bob Asdal. I am Executive Director of the Hydraulic Institute. On behalf of our 100 members, I would like to thank the Department for providing us this opportunity to meet and discuss the framework document and beginning the process of a pump efficiency rulemaking.

The Hydraulic Institute, established in 1917, represents the pump manufacturing industry in North America. We are a recognized authority with regard to pumps and pumping systems, and are an ANSI-accredited standards-developing organization.

HI represents a total of 105 members that are pump manufacturers and the leading suppliers to the industry. We have historically led the pump industry in its approach to energy savings associated with pump systems optimization consistent with the strategic goals of the United States Department of Energy, and particularly the Energy Efficiency and Renewable Energy Group within the Department.

And we come together today to share our members' collective knowledge with the Department and an effort to create a pump efficiency rulemaking that considers the needs of all parties.

In preparation for the meeting, we had read and, of course, discussed the framework document in great detail. The members have focused on several of the framework's key provisions and sections to discuss options, offer alternatives, and to work with the Department to deliver the greatest energy savings that are technologically-feasible and commercially- and economically-justified.

So, today we appreciate the recognition by the Department of the complexity of this issue for the pump industry. And the members that are present here today, all of whom have introduced themselves, will explain our proposed product classifications to be covered, concepts associated with a globally-harmonized Minimum Efficiency Index, or MEI, as well as our recommendations for the adoption of a modified version of existing ANSI HI test standards that could lead, also, to an HI-led labeling scheme and an HI-led pump test lab certification program.

The greatest energy savings potential, as reported in my letters to the Department last year on July 11th and September 16th, deals with what we call an extended product approach with an Energy Efficiency Index, or EEI, for a combination of products, such as a pump, motor, variable speed drive, and control and feedback systems.

And during today's meeting, we expect to have many questions for the Department and DOE consultants that will help us move through this rulemaking process. We will make every attempt to provide available supporting metrics and standards that will be discussed during today's session or by, certainly, the May 2nd deadline.

So, we remain keenly aware of the members, of the needs of pump users in the rulemaking process. We have established standards covering pumps, pump products, applications, installation, operation and maintenance, and applications in testing that are used across a wide selection of American industry and commercial establishments.

HI has provided DOE with significant input on the Institute's standards as the basis of our recommendation. We have also partnered over the last year and a half with the leading energy-efficiency advocates, led by the Appliance Standards Awareness Project, in an effort to develop a consensus that best serves all parties.

We would like to acknowledge the energy-efficiency advocates present today, and confirm that we stand ready to continue to jointly work through this complex rulemaking process that offers significant energy savings potential to the country. And the members and HI look forward to a productive day discussing this issue with the Department.

Thank you.

MR. BROOKMAN: Thank you.

Additional brief remarks here at the outset?

MR. HUBER: My name is Albert Huber. I am President of Patterson Pump Company, and a member of the Board of Directors of the Hydraulic Institute.

The Hydraulic Institute and its members are committed to improved energy usage by pumps and pump systems to deliver optimum energy savings through a balanced approach, considering the impact to the consumer, the industry, and the U.S. economy.

As the Department of Energy is aware, HI has been actively working with the energy efficiency NGO community in this process. The Hydraulic Institute, along with the EE NGOs, recommended to the Department of Energy a two-pronged approach to reduce energy consumption in the United States related to pumping.

These two approaches are extended product, which brings much greater reduction in energy usage than pump efficiency alone, and Minimum Efficiency Index, which eliminates from the marketplace inefficient pumps. They are not presented as options, but two methods which should be utilized together in order to achieve the desired goal of significant energy reduction.

The following is a summary of our recommended scope:

The Hydraulic Institute advocates the pursuit of pump products that will lead to the reduction of --

MR. BROOKMAN: Albert, pardon me. Pardon me for interrupting.

MR. HUBER: Sure.

MR. BROOKMAN: Your recommendations, your content, will it not be covered quite sufficiently by the PowerPoint slides that you have had a chance to look at?

MR. HUBER: Well, not completely,

no.

MR. BROOKMAN: Okay. I am wanting to provide an opportunity for individuals to raise important issues and, also, I am wanting to make sure that the content fits in the flow of the meeting, because it will be easier for the Department and everyone else to comment and stay with it --

MR. HUBER: Sure.

MR. BROOKMAN: -- if you follow my logic here.

MR. HUBER: I follow.

MR. BROOKMAN: I don't want to diminish your capacity to speak about important issues. So, you tell me what you want to do here.

MR. HUBER: Well, we can wait.

MR. BROOKMAN: You could wait?

MR. HUBER: Sure.

MR. BROOKMAN: Okay. I am eager -- there is a lot of content here, and I want to get to it as efficiently as possible. But I don't want to diminish your capacity to say something --

MR. HUBER: As long as we can say it at a later time, I am happy.

MR. LLENZA: This is also Charles Llenza from the Department.

You are more than welcome to enter statements into the record. So, if you have detailed statements, we are more than willing to take your statements.

MR. BROOKMAN: We can take that written statement and just enter it into the record.

MR. HUBER: That's fine.

MR. LLENZA: It goes into the docket.

MR. BROOKMAN: Okay. So, I probably should have been more clear at the outset about the purpose of this introductory overview statement. But thank you for your consideration.

MR. HUBER: Sure.

MR. BROOKMAN: Other brief statements here at the outset?

Gary Fernstrom.

MR. FERNSTROM: Gary Fernstrom speaking on behalf of the California Investor Owned Utilities.

We would like to express our appreciation to the Hydraulic Institute for inviting us and the other advocates to work with them over the past year in preparation for this process.

MR. BROOKMAN: Thank you.

Alex Boesenberg, do you wish to -- I thought you said.

Joanna Mauer.

MS. MAUER: Thanks.

First, we would like to thank DOE for the opportunity to participate in today's meeting. Efficiency standards for pumps represent a significant energy savings opportunity, and we are pleased to see that DOE has already put significant effort into developing a foundation to conduct the analyses for this important rulemaking.

Over the past year, efficiency advocates, including ASAP, ACEEE, Alliance to Save Energy, Earth Justice, NEEA, NRDC, and PG&E, have been working with HI to try to work towards a consensus recommendation regarding pump efficiency standards.

As we have indicated to DOE, our discussions have focused on clean water, commodity-type pumps. And we generally agree with HI's recommended scope of coverage.

However, here at the outset, we wanted to highlight two additional pump types that we think merit consideration. The first is the category that DOE has referred to as double-suction pumps. Our understanding is that these are typically used for clean water applications and are commodity-type pumps, and may, therefore, be good candidates for coverage.

The second category is circulator

pumps, including fractional horsepower circulators. As PG&E will explain in more detail, we believe that there is a significant energy savings opportunity in establishing standards for circulators both in terms of per-unit savings as well as national energy savings.

Finally, we are pleased to see that DOE is considering ways to capture additional energy savings by including categories of pumps sold with motors and/or VSDs. I think a goal that we all share is to increase the market penetration of pumps sold with VSDs, which has the potential to achieve very large energy savings.

As we will explain in more detail later on, we believe that one of the potential regulatory options presented in the framework document, Option 3, may provide a mechanism to help achieve the goal of greater market penetration of pumps sold with VSDs.

We look forward to participating in

today's public meeting and to working with DOE and continuing to work with HI as this rulemaking moves forward.

Thank you.

MR. BROOKMAN: Other comments here at the outset?

Albert, I am looking at you. Do you wish to read that into the record? Okay. Okay.

Then, let's proceed, then, with the content and to Charles. These PowerPoint slides, we will be referring to these specifically as we go through the day, and you will get a chance to see both what we have covered and what lies ahead.

Charles Llenza.

MR. LLENZA: Okay. So, I welcome you to the meeting here at the Department of Energy.

Basically, the purpose of our framework document public meeting is to present our preliminary analytical approach of what we think the rulemaking should encompass and, also, to inform the interested parties of the beginning of the rulemaking and the process.

It also provides a forum for discussion here at the Department, and it provides a process for which the stakeholders can provide comments to the Department of Energy.

So, we encourage everybody here to submit data, information, your comments. And so, one of the important things you see here are these little boxes in green. These are the items that the Department is most interested in receiving comments on.

So, through the presentation, we will highlight the discussion of these comment boxes. There is a comprehensive list of questions in your framework document. We have not provided them all in this presentation. So there are additional questions in the framework document. Please do not forget to answer those that we don't necessarily specifically highlight at this meeting today.

These item numbers correspond to those in the framework document, and we welcome your comments to those specific issues as we go through this presentation.

We have a specific format we would like to have parties to use while submitting comments. Docket and RIN number would be mostly appreciated. We have set up an email address for you to provide comments to the Department. It is the preferred method of delivery for these comments.

In addition to that, we were made aware of the complexity and time elements involved in reviewing what the Department provided in the framework. So, we proactively extended the comment period to May 2nd, 2013, which is a considerable amount of time. Hopefully, that would be sufficient time for all parties to make their comments known to the Department.

The rulemaking process. The Energy Policy and Conservation Act, EPCA, which is Public Law 94-163, established the Energy Conservation Program here at the Department of Energy for certain commercial and industrial equipment.

Part C of Title III of EPCA includes pumps as covered equipment and authorizes DOE to issue standards, test procedures, and labeling requirements, 42 USC 6311(1)(A). That is just a reference to where the Code is, if anybody is interested.

In addition to that, the primary direction that the Department of Energy receives via the Energy Policy and Conservation Act, EPCA, is to develop new and amended standards designed to achieve the maximum improvement in energy efficiency that is technologically-feasible and economically-justified. That is an important key element here in terms of the development of standards for the Department, and we think we have a good rulemaking process which provides a schedule and time for analysis to do this.

Okay. EPCA also directed the Department of Energy to consider seven factors for the analysis. As you can see, the EPCA requirements are in the first column, and the corresponding DOE analysis is on the corresponding column.

Our process and schedule is developed in such a way, so that we can make the maximum use of developing the DOE analysis over the three-year time period for the rulemaking.

So, here is our standard test procedure and standard rulemaking timelines. As you can see, we are at the framework meeting, which is this first chevron. We will, then, continue through a preliminary analysis period. Then there is the NOPR analysis period which is Notice of Proposed Rulemaking, which is a draft of the rule that we are proposing. And finally we have a final rule, hopefully, within a three-year timeframe.

Subsequently, we have a test procedure process that is intimately linked to our Energy Conservation Standard process, and that usually is about half the timeframe involved in developing. We have some flexibility on the movement of how soon or how fast we would like to get the test procedures for the Department out, but what I want to point out about these chevrons is the test procedures moves within the availability timeframe of the rulemaking because there are some requirements that we are mandated to accomplish in terms of having that test procedure finalized and published in The Federal Register in order for the Department to make use of that test procedure to establish Energy Conservation Standards.

I have provided a link at the bottom here for everybody to go to, if those parties that are interested in more detail on our rulemaking process. So, this is just a quick-and-dirty summary of our process timeframe.

I am going to go through a little bit of what each one of these steps involves today. I am not going to focus on the test procedure necessarily, but mostly on the Energy Conservation Standard.

So, today the framework provides an overview of the rulemaking process. We have, hopefully, provided you a good boilerplate as to what we see or where we see this rulemaking going for the Department of Energy. We provided some of our technical thoughts for the industry to review, and we also inviting comments on the proposed approach that the Department has issued. That was executed in The Federal Register framework notice that we published February 1st, 2013.

So, that is this process now. The next step in the energy conservation process would be the preliminary analysis. The preliminary analysis, basically, would take the comments from the framework public meeting. We review those comments and we provide response in the documents that are provided at the preliminary analysis.

Each one of these steps would involve public meetings and issuing Federal Register documents with not only the comments to any of the previous questions that the stakeholders may have or assertions or technical direction that they wished the Department to follow, but also would provide further details on the analysis process the Department uses throughout, based on the seven factors, if you all remember that first slide I showed you back on EPCA.

So, as you can see, the listing of analysis that is provided at the preliminary here, it is basically engineering analysis, manufacturer and user markups, energy use profiles, consumer life-cycle costs, LCC and payback periods. We look at shipments, and one of the important things to note about the shipments is we need to get the shipments right because the shipments determine how much of everything we are going to account for, and that is going to weigh-in in terms of what savings the Department thinks we can achieve.

There is additional analysis, national energy savings, and the NPV, Consumer Net Present Value. And then, there are some manufacturer impacts that we also try to provide.

So, that is the preliminary analysis. This is in a nutshell. There is a little bit more meat to this, but not to panic. Everything gets published in a document, and we go back to having a public meeting and having this similar process go through for the preliminary analysis.

The Department will, then, get comments back from the preliminary analysis and preliminary TSD, which will be provided in the preliminary analysis stage, and we will continue fine-tuning the analysis the Department has presented at the preliminary analysis stage. And we will also weigh-in those impacts.

We will, then, go back and propose standard levels for public comment, which basically it is like a draft rule at that point. And it will be published in The Federal Register and submitted for comments. We will have another meeting about that particular phase where the stakeholders and everybody will have time to come back to the Department and tell us if we are on track.

And the goal, of course, of the Department is to have a final rule which would encompass any of the comments received for the draft notice, the Notice of Proposed Rulemaking. We will revise the analysis to make sure that the impacts to the standards and the way the impacts for the final rule are taken into account, based on stakeholders' comments. And, based on the DOE analysis and our economic analysis, we will be providing standards that to be adopted in the final rule.

Of course, as you can see, we have plenty of time, and we are looking at a planned spring 2016 issuance of the rule.

Okay. So, I am just giving you an outline here of what the DOE plan is. Here is the schedule. This is the important slide.

We had a timeframe to accomplish this. We would like to do this in three years. Sooner would be better, but I know how this process goes and the complexity of things not necessary lends itself to this.

So we are at the framework public meeting. As you can see, that is the first box on the bottom of the slide. And that is after publishing the framework document. So, the next part of the process will be the test procedure NOPR document. And as you can see, this is not going to happen overnight. We are going to go back and look at your comments that are provided by May 2nd, and we will be doing our review and analyses in addition to the test procedure requirements. The DOE Team will, then, be providing a Notice of Proposed Rulemaking based on not only what we have investigated through the rulemaking process, but, hopefully, comments that the stakeholders have provided us on testing and other requirements.

This will be followed by a public meeting, as you can see. That is planned for fall of 2014.

Subsequently, after the test procedure NOPR public meeting, we would also have close to a preliminary analysis document set up, hopefully, before the test procedure public meeting.

That would follow, by it's publication in The Federal Register and a public meeting subsequently. That is the third box on the bottom of the slide.

And then, both are in a parallel

process. They are separate rulemakings, but uniquely tied-in processes here, the test procedure process and the energy conservation standard process. We will finalize the test procedure and, of course, the primary purpose of the test procedure is to have the collection of data points that we need to measure to outline what we need to have collected in terms of data in order for us to establish an energy conservation standard. So, that is why the Test Procedure rule will get published as a final rule before the Energy Conservation Standard is published. These requirements will be rolled at some point into the NOPR of the Energy Conservation Standard, and then, into the final rule.

One thing to note, that the effective date of the standard would be three years after we publish the final rule. So, as you can see, nothing is going to happen overnight. So, one of the things to keep in mind is there is plenty of time and there is also plenty of time for the industry to make adjustments to the standards set by the Department.

Okay. So, that covers how it is supposed to work in this overview process.

MR. BROOKMAN: Alex Boesenberg.

MR. BOESENBERG: Alex Boesenberg, NEMA.

In reviewing the authority, it wasn't clear to me, is a Tier 2 rule intended or authorized by the authority that grants this rule?

MR. BROOKMAN: Betsy?

MS. KOHL: What do you mean -- this is Betsy Kohl -- what do you mean by Tier 2 rule?

MR. BOESENBERG: I work in lighting mostly, and we have a lot of stuff that has a mandatory follow-up.

MS. KOHL: I'm sorry, I am still not understanding.

MR. BOESENBERG: You get a first

rule, and few years later you get a second one for the same things.

MS. KOHL: Oh, sorry. Yes. The Energy Policy and Conservation Act requires us, at least once every six years, to go back and take a look at these things. So, there is nothing specific for pumps. There is just a general go back and take a look at a certain time interval.

MR. LLENZA: So me standards we issued have what is called a look-back provision, and also some test procedures. So, nothing is left static. thisrequires us to look back at the test procedure first. Then, after we complete that, we go back and see if there is additional savings that the Department can achieve by getting a higher standard for pumps. But that is a process that we will have to determine for pumps and it takes another three years to get there. So, it is out in the future.

MR. BROOKMAN: Thanks, Charles.

MR. BOESENBERG: Thank you.

MR. BROOKMAN: Gary?

MR. FERNSTROM: Gary Fernstrom for the California IOUs.

I have a comment about the process. The DOE process is punctuated by these meetings where you tell us what you are going to do and ask for our input. And then, that is followed by a long period of silence.

And I think we would all be better served if there were the opportunity for some sort of dialog with the analysts in the interim, so we can flesh-out any misunderstandings and provide more information on a more continuous, rather than a very sporadic basis.

MR. LLENZA: The only thing I could say about that -- maybe I will take a little liberty; don't panic (laughter) -- is that the Department is not against technical meetings with the industry. So, we are more than amenable to having technical meetings with the industry and parties of interest and with the technical teams to discuss particular issues that might be of value to the Department to get input, additional input from the industry. So, that is something that can happen.

MR. FERNSTROM: So, my feedback is that would be terrific because I think both HI and the efficiency advocates would appreciate the opportunity for a dialog as the analysts may have questions about the best way to proceed.

MR. BROOKMAN: Betsy?

MS. KOHL: This is Betsy Kohl with the General Counsel's Office. You can also request meetings with the Department where we would listen to other things that you have to say about the rulemaking. And those are filed under our ex parte meeting guidelines, so that everyone knows that a meeting occurred and who was there and what was discussed. And those ex parte guidelines were published in The Federal Register, but if you would like them, you can let me know and I will send them to you.

MR. BROOKMAN: John Cymbalsky?

MR. CYMBALSKY: Thanks, Doug. John Cymbalsky, DOE.

I would just like to add that, if this particular product goes the path of a negotiated rulemaking, it would be covered under the FACA guidelines, the meetings, and you would get more of what you are asking for in that process. So, like what we did with distribution transformers, which you were on the Committee, if it is decided that pumps is, again, prime for that type of activity, the Department would like to pursue that. And then, in that space you would get that real-time back-and-forth, again, because it would be covered under the FACA guidelines because ASRAC is a FACA committee.

So, otherwise, we would have to do this ex parte, if there is a fed in the room. If not, I know we have met with HI, our contractors have met with HI to just discuss data, and that's okay. That is a separate meeting.

The other thing we will try to do in these rulemakings -- and we have done it for a couple now -- is posting spreadsheets of information on our website. They are not proposals of any kind. It is just information. And so, that is another way that we can information out quicker than waiting for steps in a public meeting.

MR. FERNSTROM: So, John, how is this determination made regarding which pathway to follow?

MR. CYMBALSKY: So, next week, as I said at the outset, there will be a meeting. The first meeting of ASRAC will be on Tuesday, the 26th, and I encourage the public to participate in this.

The Committee will decide and discuss which products could go that way, and the Committee will vote on that.

MR. FERNSTROM: Thank you.

MR. BROOKMAN: Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock, Edison Electric Institute.

Just in terms of following up, when you were talking about the ex parte meetings -- and for the record, we have had some with the Department -- that is just for the Department. That doesn't cover the analysts. That doesn't cover any analysts doing work for the Department. That is a separate issue, correct?

MR. CYMBALSKY: Yes, I believe I stated that that would be a separate process, yes.

MR. ROSENSTOCK: Okay. And again, Steve Rosenstock.

Yes, I think the issue is that, again, I think if there is meeting with the analysts outside of DOE, I think since there are multiple stakeholders here, I think there should be some information provided to other stakeholders if there is some sort of meeting with the analysts outside of DOE that other stakeholders should be informed, because, obviously, it could impact the analysis.

Thank you.

MR. BROOKMAN: Betsy Kohl?

MS. KOHL: This is Betsy Kohl.

So, meetings with our analysts and technical folks are only to provide technical data and discussion. There is no policy issues discussed. That is what the ex parte rules are for, so that everyone is aware of those.

And any information that we get out of those technical meetings is, obviously, when it becomes part of the rulemaking record, subject to public comment, and it is out there.

MR. LLENZA: Just want to add that the Department enters these meetings, any information, agenda, issues discussed, etc., into the docket, so people would have public access to it.

MR. BROOKMAN: Thank you, Charles.

Other questions here about these issues? These are important, these access-to-communication issues.

(No response.)

Okay, Charles.

MR. LLENZA: Okay. I am going to go to issue 3 on the agenda. This is the legislative history and coverage for pumps, scope of coverage.

So, currently, DOE has no Energy Conservation Standards for commercial and industrial pumps. The authority provided in EPCA provides DOE, Part C, Title III of EPCA, includes pump coverage and authorizes DOE to issue test procedures, standards, labeling requirements, whatever the Department determines through this process that is necessary for this rulemaking.

So, we published back in June 2011 with an RFI and received comments from stakeholders. Those comments were rolled into our framework. We did not provide responses at the time, but we hoped that our framework document has provided, put to the forefront some of these issues and provided some clarity as to what the Department wants to do with the information received from the RFI.

As you were talking about technical meetings, we have had several technical meetings here at the Department, not only technical meetings, but we have had meetings here at the Department with the Appliance Standards Awareness Project and the Hydraulic Institute in December 2011 regarding the potential Energy Conservation Standards for commercial and industrial pumps. And there is a letter, ex parte letter/memo in our pump docket.

Also, as of today, we had a technical meeting, I believe, in Colorado. I believe it was May last year. And so, we have these in the docket, if people might be curious about these.

We like to keep them strictly technical. Let's stick to the technical issues. We are more than willing to attend and think these are a good thing. We are being educated, basically, and you guys are the experts. So, you are more than welcome to tell us the way things are supposed to be.

And so, today this meeting has been called based on the framework notice that went out February 1st.

Okay. So, here we go with some of what we think this rulemaking is going to look like. These are the pumps that DOE is considering for standards. So, we have looked at all sorts of pumps. There is a lot out there. And the Department has now zeroed into a few categories, and I this is what we are asking for you to provide your comments and input.

So, we have clean water pumps. We have looked at the EU regulations, and we define clean water as per what we have seen from the EU, pumps designed for clean water. And part of what we will be doing, also, is trying to provide definitions for these for which we don't have any. So, part of this process is that we have provided drafts on what we think the definitions should be. The input from the stakeholders should be if that is a good definition or not a good definition, and then provide us what they think it should be with examples.

At this time we are not considering covering wastewater, slump, slurry, solids-handling, AP1610 pumps. Possibly consider covering ANSI chemical pumps, pumps for other liquids with no solids that behave similarly to water.

The other type of pumps is rotodynamic, clean water pumps. Again, we have looked at some EU regulation that is out there. I think they have had the lead on this for a while in terms of the regulatory environment. So, we have sort of borrowed from their playbook a little until we get our footing with this rulemaking and thestakeholders input in the U.S. industry.

Clean water pumps represents about 70 percent of sales by value and 90 percent of pump energy use. We are not considering positive displacement pumps at this time.

So, we come to our first chevron. Are there questions first?

MR. BROOKMAN: Yes, questions? Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock.

Yes, a question on the -- well, you are going to get to that. I will wait until you go over your Request for Comments, and then I will have a question on that last slide. Thank you.

MR. LLENZA: Okay. So, these are the Requests for Comments. These are kind of the questions we have. DOE seeks comments on the proposal to cover only clean water pumps in this rulemaking. Important: do we have other things that we want to cover? That is 1-1.

Item 1-2, DOE requests comments on whether it should rely on these definitions for clean water. It could be -- coverage of pumps, as the EU does. Or, if, instead, the definition of clean water pumps should include physical characteristics that distinguish pumps designed to clean water or exclude pumps designed for other purposes. That would be Item 1-2.

Item 1-3, DOE seeks comment on the list of physical differences that may exist between pumps designed for clean water and pumps designed for other substances. That is important if we are going to try to cover other substance-type pumps.

Specifically, on this is the list accurate and exhaustive? Do anydifferences impact energy efficiency? Do the differences increase cost? And other things that you might know of that DOE should be made aware of.

MR. BROOKMAN: You can imagine, since we are creating a complete transcript of this meeting, to make these comments fairly systematic, it makes it much easier for everybody to follow a couple-hundred-page document.

So, I would like to proceed with Item 1-1, and then to 1-2 and 1-3. So, let's receive comments on those.

Yes, please, Steve.

MR. SCHMITZ: Thank you.

Steve Schmitz, Grundfos, representing the Hydraulic Institute.

The Hydraulic Institute believes that, in order to capture the largest population of potential energy savings, HI recommends aligning with the European Union Directive 547, 2012. This Directive focuses on non-engineered, non-specialized pumps and standard design, as you have already mentioned, applied in clean water applications.

Later on, we will get into some of the specifics. So, I won't jump to that, in the essence of time.

I would like to point out that there are two additional areas in the EU Directive that exclude two types of pumps which you did not mention here, which is fire pumps and self-priming pumps. We are recommending that those be excluded as well within part of the EU Directive.

MR. BROOKMAN: Thank you. Thank you.

Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock, Edison Electric Institute.

If you could scroll back to the previous slides, just again, it says DOE may define clean water or use a separate definition. Again, that could be kind of critical in terms of, depending on how you define it, in terms of parts per million of certain particles. That could make a difference in terms of what is covered under that category. And again, I am not familiar with the EU definition, but if they have different standards, that can make quite a difference compared to U.S. standards in terms of, quote, "how it is defined by EPA," for example under the Clean Water Act.

The second thing I wanted, because I am a numbers person, in the second part it says, "Represents 70 percent of sales by value and 90 percent of pump energy use." That is within the Clean Water Pump Category?

MR. BROOKMAN: Alison, I think so, right?

MS. WILLIAMS: Alison Williams, LBNL.

MR. BROOKMAN: Alison, find a microphone. I'm sorry. Alison? Thank you.

MS. WILLIAMS: So, the 70 percent and 90 percent are for rotodynamic pump types that are used for clean water, but they are not all necessarily clean water pumps. They are types that can be used for clean water. And we have further numbers later.

MR. ROSENSTOCK: Okay. And again, Steve Rosenstock.

I appreciate that clarification.

Again, it was just kind of written out there as if it wasn't -- I wasn't clear. This is just under the Clean Water Category? It is not a chemical pump or the other liquid pumps that are out there. It is just 70 percent and 90 percent of the clean water pumps?

MS. WILLIAMS: Yes, I mean, it is a little more. First of all, it is an estimate, just to try to get an overview. But it is also, again, rotodynamic pump types that could be used in clean water. So, it may include some ANSI chemical process pumps because a lot of them can be used in clean water.

There are further slides with a

little bit better desegregation.

MR. ROSENSTOCK: Thank you.

MR. BROOKMAN: Steve, go ahead.

MR. SCHMITZ: Thank you.

Just to clarify, Steve, to your question about clean water, and to jump to the 1-2, there is an ISO 9906 standard out of Europe that defines clean water. There is a difference between clean water and drinking water as defined by the EPA. And we are encouraging the use of the definition from the ISO standard.

MR. BROOKMAN: Okay. Thank you.

Gary Fernstrom?

MR. FERNSTROM: Could we ask HI to clarify what is meant by self-priming? In my view, there are a lot of clean water pumps that are to some extent self-priming. The EU and you would want to exclude those? What exactly do you mean by self-priming?

MR. BROOKMAN: Steve?

MR. SCHMITZ: Thank you.

Well, self-priming pumps are pumps, of course, that have to pull substantial NPSH to pull the water up and recirculate the pumps, to, in essence, energize the pump, so it can begin moving the water. And so, there is a category of pumps specifically applicable to the self-priming that, because of that very nature, the high water recirculation and the NPSH lift, it is by nature very much less efficient.

MR. FERNSTROM: So, to fit into the term "self-priming," there is some significant net suction pressure that these pumps are dealing with. And ones that deal with minimal suction pressure are not deemed self-priming?

MR. BROOKMAN: Steve, please. Go ahead.

MR. SCHMITZ: Thank you.

No, you can have pumps that are low suction pressure that are not necessarily self-priming, pumps as in boiler feed, domestic hot-water-type applications, of course. But there are other pumps that are specifically designed, and the intent and the usage is for self-priming to fill the line and energize it for the system.

MR. FERNSTROM: Okay. Well, my observation is we want to be careful not to exclude an important segment of pumps that may deal with some minimum suction pressure, but are not deemed to be self-priming.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Ken Napolitano, Xylem and the Hydraulic Institute.

I think maybe just a little clarification. Self-priming pump, as we are defining it, is not an application. It is a specifically-designed machine for certain types of applications; namely, when water is below the surface of the pump.

And so, because it is designed specifically to draw water from below, there are certain design characteristics that have to be met to make it function as it is intended, which don't necessarily correspond with efficiency. So, in other words, you make some tradeoffs between the ability to suck from below the ground and the efficiency. Otherwise, they don't work properly. And it is a relatively-small -- I don't know the number off the top of my head -- but it is a relatively-small portion of the population. So, that was the thought process.

MR. FERNSTROM: Thank you.

MR. BROOKMAN: Thank you.

I would like to proceed with these question box items, 1-1, 1-2, and 1-3. So, maybe look at what is there on your PowerPoint slide and let's respond to those.

Neal?

MR. ELLIOTT: Neal Elliott, ACEEE.

With respect to the question about coverage, this 1-3, coverage beyond clean water, including chemical pumps, from ACEEE's perspective, it would be I would prefer to see us at this point focus on clean water and not introduce in the additional issues associated with chemical pumps.

We run into both material with respect to the pump itself, but also seal considerations that could have significant impact on the pump efficiency. I think we are dealing with what is initially a very complex rulemaking. And I think simplifying it for this initial phase and focusing on clean water would be better than additional complexities of trying to deal with non-water fluids.

MR. BROOKMAN: Steve?

MR. SCHMITZ: Yes, I would support what Neal is saying and reiterate that what we are proposing as part of the EU Directive does provide the greatest breadth of unit volume in the marketplace for the greatest energy savings. It is the most expeditious path forward for implementation. It offers the greatest global alignment with the EU Directive, as previously noted, and it does support the Executive Order 13-609 from May of this last year for international regulatory cooperation.

And then, it aligns and supports the Energy Independence and Security Act for motor ranges that are already defined by the DOE.

MR. BROOKMAN: Is there someone to specifically just answer the questions that are listed in 1-3.

MR. HANDZEL: Obviously, HI's position is to support clean water and to follow the European standard that already exists.

MR. BROOKMAN: Are you speaking on behalf of your company or --

MR. HANDZEL: I am speaking on behalf of the Hydraulic Institute --

MR. BROOKMAN: Okay.

MR. HANDZEL: -- and my company.

MR. BROOKMAN: Both?

MR. HANDZEL: Okay?

So, just to answer the question, in

1-3, there is a list of some features of pumps that are listed. And so, just to answer, no, the list is not accurate and exhaustive. Yes, the differences definitely impact efficiencies. So, the second point of does these differences impact efficiencies, yes, they definitely do.

And the third point, yes, the differences will definitely lead to an increased cost.

There are further questions in the document that we will go into more detail that will provide some additional detail around these answers.

MR. BROOKMAN: Good.

MR. HANDZEL: Okay?

MR. BROOKMAN: Okay. And just to be clear, especially for those of you that are new to the proceedings, anything that you haven't covered sufficiently in this meeting today, the Department welcomes your exhaustive and detailed comments in writing. Okay?

Gary Fernstrom?

MR. FERNSTROM: One more quick comment. Gary Fernstrom.

We are interested in asking the DOE to consider including circulator pumps. If I understand it, none of these issues on the screen expressly exclude circulator pumps because they are clean water pumps.

MR. BROOKMAN: Okay. Thank you.

Have we covered sufficiently 1-1, 1-2, and 1-3?

(No response.)

I think for now.

Okay. Now so, Charles, walk us through 1-4 and 1-5, please.

MR. LLENZA: Okay. So, 1-4, DOE seeks comments on whether it should consider standards for pump design for non-water liquids -- we are repeating ourselves a little bit -- that contain limited solids in this rulemaking. It is important, if we are going to stick to one type or the other, or if we want both.

DOE is specifically interested in ANSI chemical process pumps, API 610 pumps, sealless, if I am pronouncing that right, magnetic drive, canned, and cantilever pumps, sanitary pumps, refrigerant pumps, general industrial pumps. And when suggesting pump types for which standards should not be considered, please be specific as to the reason why.

So, tell us what you want covered and tell us what you don't want covered. And we would appreciate, also, reasons why, pros and cons.

Item 1-5, DOE requests comments on whether any design changes made to the standard clean water pumps would carry through to pumps designed for other applications. So, this is basically, if we go with the clean water pumps, what are some of the design changes that would carry over to the non-clean water pump types?

MR. BROOKMAN: And it looks like Mark is ready, and that is on behalf of HI, right?

MR. HANDZEL: Yes, that is correct.

Mark Handzel, Xylem, Incorporated, and a member of the Hydraulic Institute.

The members of the Hydraulic Institute feel that pumps designed for non-water liquids should be exempt from the efficiency regulations because they are typically designed to comply with other key requirements, such as safety and reliability.

For example, to assure better safety and reliability, these pumps could be designed with wider internal clearances, oversized shafts, and oversized bearings. All of these could lead to reduced efficiencies.

I have a long description of ANSI pumps and API pumps that I will provide instead of reading to you. But, basically, it goes through and designs how these criteria lead to compromising the efficiency of the pumps in order to be more reliable and more safe. So, particularly when you are handling fluids like petroleum products or higher temperatures that go well beyond the scope of what has been proposed in the framework document.

MR. BROOKMAN: Okay. And does that, then, address fairly completely what should be covered and not covered?

MR. HANDZEL: So, the two specific areas that we are addressing is ANSI chemical process pumps and API 610 pumps as well as the variations that are listed after it.

MR. BROOKMAN: Okay.

MR. HANDZEL: Okay?

MR. BROOKMAN: Okay. Thank you.

Other comments on that?

And then, moving to 1-5, design changes made to standard clean water pumps would carry through pumps designed for other applications.

Steve Rosenstock?

MR. ROSENSTOCK: Just a quick question here. And again, I didn't know the definition, but if it is an industrial pump that is a clean water pump, an industrial facility for an industrial process, what would that qualify as a clean water pump if it is also classified as an industrial pump?

MR. BROOKMAN: Alison?

MS. WILLIAMS: Alison Williams, LBNL.

So, DOE is just considering some different definitions here. So, I think the answer to that depends on the final definitions that are decided.

MR. LLENZA: So, that is subject to further modifications from your interpretation or to our interpretation of your interpretation.

MR. BROOKMAN: I am wondering if anybody from the industry -- Mark, do you want to try with that?

MR. HANDZEL: So, we struggle with

this question as well. Primarily because we manufacture pumps, we don't necessarily always know the applications that they are going to be used in.

So, Alison is definitely right that there could be pumps in these classifications that could be used on clean water. So, there is that possibility.

Obviously, the point we are making is that there are many compromises that are made to handle the more aggressive applications that these pumps are typically designed for. So, it makes it very difficult to apply efficiency rules to them specifically.

MR. BROOKMAN: Thank you.

Ken first, and then, to Steve.

MR. NAPOLITANO: Ken Napolitano, Xylem and HI.

I think the position that we are taking is that, first of all, agreeing to clean water, what that means, and I don't think we are that far off there.

And then, using that to determine a scope of products that are primarily designed for that application. So, ultimately, it leads you to a definition of XYZ products, so that you get away from the application, because it is virtually certain that you could take almost any pump, even though it may be designed for benzene or hydrochloric acid or heavy slurry, and pump water with it, because that is easier than the application, if you will, that it was intended for.

So, I think we are making is define what clean water is. We agree on that, what pumps are primarily designed for clean water, and then create the scope that way.

MR. BROOKMAN: Okay. Steve Schmitz?

MR. SCHMITZ: Steve Schmitz.

To reiterate what Ken said, yes, pumps in those types of applications could be used in clean water. Typically, they are going to be two to four times more expensive than just a clean water pump. So, the likelihood of that being done on a purposeful, consistent basis is very remote.

MR. BROOKMAN: Okay. So, then, have we addressed 1-5?

(No response.)

Okay.

MR. SCHMITZ: Just to reiterate that HI does not believe any design changes for clean water pumps would carry through to other applications.

MR. BROOKMAN: I would like to say the quality of the comment is excellent. This really helps the Department. So, let's keep on with that.

Charles Llenza?

MR. LLENZA: Okay. So, we are Item 1-6. DOE seeks comments on its proposal to consider standards for rotodynamic pumps -- somebody asked about that; -- and not positive displacement pumps.

In particular, DOE requests comments on the extent of the overlap between rotodynamic and positive displacement pumps and whether there are certain categories of rotodynamic pumps, pump types and ranges of flow and specific speed, et cetera, for which positive displacement pumps could not be a direct replacement.

MR. BROOKMAN: Yes, Mark?

MR. HANDZEL: Mark Handzel of Xylem and the Hydraulic Institute.

The members of the Hydraulic Institute wish to confirm that positive displacement pumps represent a small percentage of the overall pump market and are generally used in niche applications such as pumping viscous or shear sensitive fluids. Because positive displacement and rotodynamic pumps provide different application solutions, economic issues generally prevent overlap of these two pump designs.

MR. BROOKMAN: Okay. Thank you.

Are there other comments on this one?

(No response.)

Then, we are going to move on.

MR. LLENZA: Okay. So, for the pump type for which DOE is considering standards here is what DOE has proposed for terminology. So, this table basically provides a matrix of that.

And I will just go over the terminology, and request your better terminology,: End Suction Close Coupled, End Suction Frame Mounted, In-Line, Double Suction, Axial Split Multi-Stage, Radially Split Multi-Stage, Vertical Turbine, Submersible, and Axial/Propeller and Mixed. As you can see, it is specific to the pump type.

MR. BROOKMAN: So, this classification here, you would like confirmation on those listed here in yellow --

MR. LLENZA: Right.

MR. BROOKMAN: -- or corrections, whatever.

MR. LLENZA: Based on the pump type.

MR. BROOKMAN: Yes. Albert, please.

MR. HUBER: HI proposes that we or our proposal is that we stick with the ANSI/HI nomenclature as we have presented to the Department, along with the corresponding descriptions. These are nomenclature and descriptions that are widely used in the industry and known by the industry and, also, by the users in the marketplace.

MR. BROOKMAN: And are those consistent with what is listed here in yellow?

MR. HUBER: No. The descriptions are not, no, they are not.

MR. BROOKMAN: Okay.

MR. LLENZA: So, the Department would appreciate great detail on that.

MR. BROOKMAN: I see Alison.

Please.

MS. WILLIAMS: Alison Williams, LBNL.

One of the subsequent comments specifically asked for the ANSI/HI nomenclature that would go along with these because what has been provided so far was not comprehensive of the categories DOE is considering. So, DOE is definitely open to that and is requesting specific comment on matching those things up.

MR. BROOKMAN: Okay. Alex, yes? Pardon me. Albert, yes, okay?

Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock, EEI.

Yes, clarification on the table. Where everything is totally blocked out, you know, again, does that mean you are not covering those and DOE is not thinking about covering those? I just wanted to get a double-check on that.

MS. WILLIAMS: Alison Williams, LBNL.

Yes, that is correct. Those are not currently considered for coverage and, as far as we understand, are not covered in the EU, either.

MR. ROSENSTOCK: Thank you. That helps.

MR. BROOKMAN: I am looking for additional input from industry here. Mark?

MR. HANDZEL: Mark Handzel with Xylem and a member of the Hydraulic Institute.

So, this is specifically in regard to Question 1-7. So, I am not sure if we are ready to go to that.

MR. BROOKMAN: I think we are ready to do that.

MR. LLENZA: Yes, we are ready to go to that one.

MR. HANDZEL: So, as you have heard from a number of our speakers, you know, we are pretty firmly behind supporting staying in line with the current EU standards. So, a prepared statement analysis of the U.S. pump market confirms that the variety of existing products in numerous market segments, each with unique requirements, is too wide and complex, as similar design across multiple market segments are applied differently, resulting in a large number of unique product variations.

In order to capture the largest population of potential energy savings, the Hydraulic Institute recommends aligning with the European Directive EU No. 547-2012. The EU Directive focuses on non-engineered, non-specialized pumps and standard design applied in clean-water-only applications for the broadest scope.

Expansion beyond the EU Directive parameters will add complexity and cost to the tasks of the manufacturers and create a significant financial burden for us to gain compliance.

Specifically related to double-suction pumps and vertical turbines beyond 6-inch bowl assemblies, HI recommends that these products be excluded from the first version of the DOE ruling to stay in alignment with the EU specifications and, further, avoid this financial burden on pump manufacturers. Double-suction pumps and vertical turbines beyond 6-inch bowl assemblies could be added in subsequent Phase 2 addition to capture additional energy savings.

MR. BROOKMAN: Okay. You are going to let us know if you are not speaking on behalf of HI, correct? I am noticing, as I sit here and observe, that you have got well-crafted responses there in front of you. So, let us know if you are not speaking on behalf of --

MR. HANDZEL: I will.

MR. BROOKMAN: -- HI.

Gary?

MR. FERNSTROM: We are interested

in circulator pumps. So, I just hope they are still on the table.

MR. BROOKMAN: Thank you.

John Cymbalsky?

MR. CYMBALSKY: John Cymbalsky, DOE.

So, in your experience in working with the EU, is there a succinct answer for why the EU did not cover certain types? Is it just the market scope is small or it was too expensive to do anything with? If you have a short answer for that, that would be helpful.

MR. HANDZEL: They focused on where they felt the largest possible was -- sorry, Mark Handzel, speaking for Xylem and Hydraulic Institute -- they focused on where the largest potential energy savings were. So, specifically double-suction pumps, for example, there is not a broad market in the EU for double-suction pumps.

MR. BROOKMAN: Albert?

MR. HUBER: Albert Huber speaking

on behalf of the Hydraulic Institute and Patterson Pump Company.

Particularly double-suction pumps in the market in the U.S., 50 percent, or slightly more than that, are used for fire protection, which should not be considered by the Department of Energy for regulation.

Therefore, the total amount of double-suction pumps used is fairly small unit-wise as compared to the ones that we have proposed. And that is why we do not recommend double-suction pumps at this time.

MR. BROOKMAN: Okay. Steve Rosenstock?

MR. ROSENSTOCK: Steven Rosenstock, EEI.

As a clarification, in the table where it says EU coverage is partial and the DOE coverage is -- would that be all categories, not just a partial EU?

MR. BROOKMAN: Alison?

MS. WILLIAMS: Alison Williams,

LBNL.

Yes, in the categories where it says partial for the EU, it is currently noting that DOE is considering a wider selection of pumps than then the EU seems to be covering.

MR. ROSENSTOCK: Yes. Thank you for that clarification.

MR. BROOKMAN: So, let's go to the comment boxes and make sure that we have covered these.

Yes, please, Ken.

MR. NAPOLITANO: Just back on that last slide, I just want to make sure I understand. So, when you say -- because I read that as the EU covered greater than one stage of the vertical turbine submersible. Was that the question? And when you say "wider," that would include one stage?

MR. BROOKMAN: Alison?

MS. WILLIAMS: That is correct, and, also, with regard to the radially split multi-stage pumps, DOE is considering a wider variety of those than the vertical in-line type considered in the EU.

MR. BROOKMAN: Okay.

MR. LLENZA: So, I just want to add again, this was the framework. So, everything is subject to change, hopefully -- hopefully, not much. Just provide us what you really think, and we would like supporting data for any changes in direction.

MR. BROOKMAN: So, you can see the comment boxes listed there on the screen, 1-7, 1-8, and 1-9. You all see quite well-prepared. Let's make sure you get a chance to speak to those issues.

Joanna Mauer?

MS. MAUER: So, regarding the proposal to consider standards for pumps not covered in the EU, based on our kind of initial review, as I mentioned earlier, the one category that we think is at least worth considering for standards is the double-suction pumps.

MR. BROOKMAN: Okay. Thank you.

And, of course, the Department welcomes counterpoint as well, if there is such a thing.

MR. LLENZA: So, let's move on to the next section.

MR. HANDZEL: So, I have one more thing on 1-9, just to -- Mark Handzel speaking on behalf of Xylem and the Hydraulic Institute.

On 1-9, the members of the Hydraulic Institute wish to clarify that there are areas with potential categories, but many are due to economic constraints. This approach is meant to generally align with the EU scope and it is designed to focus on off-the-shelf pumps and to exempt pumps with low flow and fractional horsepowers that have little opportunity for efficiency improvement and energy savings.

MR. BROOKMAN: Okay. Thank you.

Are we finished with this section?

John Cymbalsky?

MR. CYMBALSKY: Yes, I just want to make a point here, since some of us are new to this process.

So, coverage does not necessarily mean that a standard would be set at a higher level than is already in the market. So, we could have coverage for a certain type of pump. Yet, at the same time, that doesn't necessarily mean our analysis will point to a standard that you guys already don't meet. Economic criteria is later in the analysis. So, coverage could be there, but not necessarily have a standard that you couldn't already meet, just to point that out.

MR. LLENZA: Right. And to add to that -- this is Charles Llenza, the Department of Energy -- we could end up base lining what the industry has available.

MR. BROOKMAN: Thank you, Charles.

Neal?

MR. ELLIOTT: Neal Elliott, ACEEE.

I think one of the important points -- and this has been mentioned by my colleagues from industry -- as I had indicated earlier, we are dealing with a very complex marketplace for a very complex product.

To your point, John, I think initially focusing on the standards for products which represent the largest opportunity and the biggest consistency represents the target. Considering extending this standards, actually extending standards to additional products in subsequent rulemakings, we think makes a lot of sense. Let's get our feet wet. Let's get some standards under our belts before we attempt to expand the impacts potentially on the manufacturers from covering a wide range of products with standards which initially is a significant liability to the industry. So, I think moving with deliberateness is an appropriate approach.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Ken Napolitano, Hydraulic Institute.

On that point, and on the whole basic point of harmonizing with the EU and, additionally, why we favor that, beyond the fact that it is aligned with President Obama's recent executive action to attempt harmonization, where possible, if I could state it that way, the vast majority of Hydraulic Institute members and companies that would be subject to any DOE rulemaking are multinational and/or global players in the marketplace.

So, to the extent to which we can keep as harmonized as possible with what is out there, so that, one, we can work on the same products in a concerted, coordinated way in terms of meeting the regulations. There is substantial cost to redesign. And then, also, be designing for the same targets or close to the same targets.

MR. BROOKMAN: Okay. Any additional on this? We are going to, yes, move on.

MR. LLENZA: Let's move on. Okay. So. 1-10. DOE seeks comments on pump types as described by ANSI/HI nomenclature that fall into equipment categories set forth in Table 1.1, Slide 28.

For example, type OH1 would be classified as end suction frame mounted pump. For ANSI/HI pump types that would not fall into the categories of Table 1.1, please provide specific reasons, such as solids-handling-only or other descriptors of that sort.

MR. BROOKMAN: Steve Schmitz?

MR. SCHMITZ: Thank you.

Steve Schmitz, Hydraulic Institute.

Again, the pump type categories defined by HI as recommended for inclusion in this efficiency standard present the greatest opportunity for implementation. And there are other subsegments specific to ANSI chemical-type applications that can be well-defined that would be applicable here.

MR. BROOKMAN: Okay.

MR. LLENZA: Okay, 1-11. DOE seeks comments on whether wet-running circulator-type pumps should be covered under this rulemaking. It is pretty straightforward.

MR. BROOKMAN: Mark?

MR. HANDZEL: Mark Handzel for the Hydraulic Institute.

The Hydraulic Institute does not recommend that circulators be included in this rulemaking. I have a long definition of what a circulator pump is that I will provide you in our written comments.

But the key thing that we want to point out is that this question specifically asked about wet-running circulator types. In the U.S. market, there are other types besides wet rotor pumps or wet-running. In particular, there are standard mechanical seal pumps that are either close coupled directly to a motor -- we call those compact circulators -- and there are also mechanical seal pumps with a flexible coupled to a motor. We call those 3P circulators.

So, there is a difference in the market. There are other products being sold here that are not wet-running as described in this question.

So, just to give you some further explanation on HI's position, comparative to the European market, the U.S. market for circulators is very small. Thus, it is not a large opportunity to save energy.

Secondly, the EU methodology being recommended, the MEI specifically, is not applicable to circulators because the pump and specialty motor are integral to each other.

The third thing, the investment required by U.S. circulator manufacturers will be large to develop high-efficiency levels with very limited possibility for a solid return on investment.

And fourth, in most situations, due to the higher cost of the high-efficiency product and the relatively low cost of energy in the U.S., the return on investments to consumers would also be very extended.

MR. BROOKMAN: Okay. Gary Fernstrom?

MR. FERNSTROM: The California Investor Owned Utilities are disappointed that the Hydraulic Institute doesn't recommend including circulator pumps. The cost of energy in the United States is now low, particularly in California. These products typically have an annual energy use exceeding 550 kilowatt hours. They have a total market energy use of 10,400 kilowatt hours and a sales volume of $1.9 million shipped annually.

We will be providing additional information on the significance of this and highly recommend that circulator pumps be included because the manufacturers do have efficient models available, and they represent a significant energy-saving opportunity for low cost.

MR. BROOKMAN: Thank you.

Ken?

MR. NAPOLITANO: I would just ask for clarification from Gary. Do your figures in terms of energy consumption, number of units, and so forth, include those installed in residential applications?

MR. FERNSTROM: They include those installed in multi-family applications, which we consider to be commercial in accordance with utility tariffs.

MR. NAPOLITANO: But exclude single-family homes?

MR. FERNSTROM: Yes.

MR. BROOKMAN: Neal, to further expand the record here, I was wondering, did you say before -- maybe I lost track -- what those of you who have been negotiating or meeting, what your posture is on circulator-type pumps?

MR. ELLIOTT: I didn't make any comments about circulators.

MR. BROOKMAN: Do you wish to do that now?

MR. ELLIOTT: I do not.

MR. BROOKMAN: Okay. Ken?

MR. NAPOLITANO: I would just make one more comment relative to the EU. As Mark stated, we can get more specific numbers. Because of the type or the propensity to use hot water for heating in Europe, which is the norm, and the exception in the United States, there are over 150 million small circulators installed in Europe in single- and two-family townhouse, that type of three-four flat-type properties.

And so, it was a substantial number for the EU because hot water is how buildings, especially single-family homes, are heated in the EU. And so, that was the driver for them doing it. So, there is a much smaller population in the U.S. And then, of course, it is our understanding that residential is not in the purview of this discussion.

MR. BROOKMAN: Okay. Thank you.

Yes, Mark?

MR. HANDZEL: And just to further add to Ken's statements, not only are those homes in Europe heated with hot water, but they also use the same device to heat potable water, which means the circulators are typically running year-round. And that is not typically the most common application in the U.S. So, they would only operate partially for the year.

MR. BROOKMAN: Okay. I got it.

We are going to move on.

MR. LLENZA: Yes, I just want to emphasize 1-12, and that is about market size. You should read the question and provide us with as much informationpossible for this one.

MR. HANDZEL: Yes. So, Mark

Handzel, speaking for the Hydraulic Institute.

The Hydraulic Institute does not have specific detail on the market size for wet-running circulators in the U.S. So, that is something that we will work to try to develop some more information to share that with the DOE.

The additional question here where it asked, you know, how is the market split, this is kind of a consensus shell vote between the HI members who manufacture circulators, and we felt -- this is covering all types of circulators -- that roughly 70 percent are used in residential applications and 30 percent go into commercial applications.

MR. BROOKMAN: You say that was a "shell vote"?

MR. HANDZEL: Well, it was sitting around a room with a group of manufacturers in a committee meeting, and we threw out some numbers and generally agreed on 70/30 was the split.

MR. BROOKMAN: And the Hydraulic Institute doesn't collect this data systematically at this point?

MR. HANDZEL: Yes, we do not.

MR. BROOKMAN: Gary Fernstrom?

MR. FERNSTROM: I would like to ask for a clarification on the difference between residential and commercial. As I understand it, these pumps are manufactured and may go into either application.

In general, where DOE has had commercial rulemakings and commercial products have coincidentally gone into residential applications, they are still being commercial products. It should not matter what the market share is.

MR. BROOKMAN: Comments? Neal, please. No? Yes, I am looking over here, this side of the room, if you wish to respond to that. I am going to Meg next after that.

MR. HANDZEL: It sounded like a question to me to DOE, asking on regulating residential products. Our point was they are predominantly a residential product. Circulators are predominantly a residential product. So, that is the point that we were making --

MR. BROOKMAN: Got you.

MR. HANDZEL: -- just because DOE specifically says that they can't regulate residential products.

MS. KOHL: Just real quick as a point of clarification, so this is, again, the issue that John was talking about earlier as far as what would be considered a pump that is a type of covered equipment as set forth in EPCA and what we are looking at standards for in this rulemaking. I think that is kind of where the split is coming down.

MR. BROOKMAN: Betsy, thank you.

Go ahead, Gary.

MR. FERNSTROM: Well, I am not sure I understood that response.

MS. KOHL: So, this is Betsy Kohl

again.

The pump is the covered type of equipment, right? But what we are looking at setting standards for in this framework document at this time is pumps for commercial applications.

MR. FERNSTROM: Well, but my comment was these pumps are sold into commercial applications.

MS. KOHL: We will need to take a look at that then.

MR. LLENZA: I think it is a little bit more complicated-- it depends on how they come off the ‘‘assembly line.’’ There is a lot more that is involved. If it is installed on the same assembly line for the same pump, we don't care where you put it. It is going to be covered.

MR. FERNSTROM: Okay. That is an excellent response to my question. Thank you.

MR. BROOKMAN: Okay. Meg, please.

MS. WALTNER: Yes, my question is a

follow-up question to Mark's, whether your residential included multi-family or was it just single-family residential?

MR. HANDZEL: So, the best way that we would break it down is that multi-family has different classes. If you were in a two-or-three-flat building, that would still fall in a residential class. But when you get into a multi-family high-rise building, that would be on the commercial side.

MS. WALTNER: Okay. Thank you.

MR. BROOKMAN: Okay. That was Mark. Thank you.

Neal?

MR. ELLIOTT: Related to sort of a different question -- and this is directed to the DOE -- is multi-family, how does the Department view multi-family, commercial, residential? And do you have a definition that you can direct us to?

MR. LLENZA: Again, I just want to point out, this is part of what we are trying to do here. Part of what we are asking industry is to help us define the scope of covered products. And so, there will be a section here on definitions. We will go over that. And the Department is open to input from the industry.

MR. ELLIOTT: Neal Elliott.

And I guess a clarification on that is, my question was, you know, has the Department in other rulemakings made a determination of multi-family, as to whether it is commercial or residential? And it was just a point of clarification, not with respect to this rulemaking, but more general.

MR. BROOKMAN: John Cymbalsky?

MR. CYMBALSKY: So, I am not a lawyer, but I think I am going to get this right.

(Laughter.)

So, the covered product is what determines. So, for furnaces, for example, the covered product is the furnace. Whether it goes into an apartment in a multi-family building or a single-family house, it is still a furnace.

Now, with pumps, we are here to define the scope of coverage. So, I think we are asking questions about this, and we are not going to go on the record to say one way or another at this point.

MR. BROOKMAN: Okay. Louis? And then, to Tom.

MR. STARR: Louis Starr with Northwest Energy Efficiency Alliance.

Might I suggest that you align what the definition of commercial and residential with the International Conservation Code or even some other, maybe 90.1, ASHRAE 90.1. But they clearly define what commercial is, and it is kind of this discussion you are having as to whether a multi-story flat or an apartment building is commercial or residential. And it makes a clear definition of what those are.

MR. BROOKMAN: Okay. That is worth

considering.

Tom Eckman?

MR. ECKMAN: Yes, I am not sure, but I suspect that there is a fair amount of imperfect information about where that pump ends up, once it is manufactured, if it is a circulator pump. And it certainly was the case when we had other appliances like air conditions that were single-phased air conditioners that ended up in commercial buildings, not three-phase air conditioners.

And so, we, basically, did the analysis on the presumption that some fraction would end up in that usage level as opposed to a commercial building. And I think that is probably the likely outcome here, is that we won't know where most of those pumps go, but we will have some idea where the fraction might go. And they will have a duty cycle that is different because they are in an X application as opposed to a Y application. That is going to change the economics of where you might set the standard. But it is a covered product, and the distributor and the manufacturer have no idea where it is going to end up when someone buys it for installation. So, we might know the market channel that it is going to go to, but that is about it.

MR. BROOKMAN: Gary Fernstrom?

MR. FERNSTROM: I would just like to make the point that we are having a discussion here whether these things are commercial or residential. This is the Department of Energy. And regardless of where they go, they have a large energy-saving opportunity for a low cost. And therefore, we ought to take advantage of that opportunity, not quibble over whether they are residential or commercial.

MR. BROOKMAN: Okay. Ken?

MR. NAPOLITANO: Ken Napolitano from the Hydraulic Institute.

I don't think our point is -- maybe we are misstating our point. Our issue is not around commercial or residential. I was simply making a point that in Europe there is over 150 million in residential applications, and that is why the EU chose to regulate it. There are a lot of them.

I think the salient point is, in fact, what you just said, which is there is a lot of energy savings at stake and a very low cost to achieve it. And I would say that we differ in that opinion. And so, it probably is useful to ultimately drive to the facts around that question.

MR. FERNSTROM: Thank you. I would like -- Gary Fernstrom -- to point out that there is a significant market share, and data we will supply will show that.

MR. BROOKMAN: Thank you.

MR. LLENZA: This is Charles Llenza from the Department.

I just want to add that, statutorily, pumps are not defined. So, it will be up to this process to define what is a pump, commercial, industrial, whatever you want to call it, under this rulemaking. And as part of this process we will try to cast/cover the largest amount of pumpspossible based on the information provided during this rulemaking.

MR. FERNSTROM: Gary Fernstrom.

Thank you. That is great news. I have confidence in DOE.

MR. BROOKMAN: So, let's move on.

MR. LLENZA: Okay. So, again, DOE is considering excluding self-priming pumps and pumps designed for firefighting applications. This has been mentioned before. So, we Request for Comments on this issue, 1-15. DOE requests comments on the technical features and applications for firefighting pumps, self-priming pumps, that would allow it to determine whether these pumps should be covered or not covered.

MR. BROOKMAN: We have touched on this, but I don't think we got into the details yet.

Steve Schmitz?

MR. SCHMITZ: Thank you.

Steve Schmitz, Hydraulic Institute.

I have a longer statement that I will submit later.

MR. BROOKMAN: Thank you.

MR. SCHMITZ: But I will give you a few brief words here.

Technical features for fire pumps are typically not conducive to do optimal pump efficiency. However, because of minimal operating times for pumps in this category, they offer minimal potential energy savings by requiring optimal design efficiency. And there is, therefore, no compelling case for change.

To the contrary, requiring efficiency optimized fire pumps would actually increase the pump horsepower required, increasing the size of the motor, controller, and the wiring. This results in increased costs and power consumption, and increases the energy consumption for this category. This defeats the intent of the DOE energy-savings initiative.

Finally, a requirement for fire pumps to be optimized for efficiency is projected to have a significant negative impact due to the approval testing and approval process cost of approximately $100,000 per pump model, exclusive of the design development cost, in order to replace existing models.

MR. BROOKMAN: Okay. Thank you.

Additional comments, the specifics related to firefighting pumps? Yes, Steve Rosenstock.

MR. ROSENSTOCK: Steve Rosenstock, EEI.

Again, in my mind, it is a clarification. Are we talking about high-rise buildings that have fire pumps that are specifically for the fire prevention systems?

Are we talking about the pumps that are on the back of a fire truck that are connected to a fire hydrant to fight a fire? Or both?

MR. BROOKMAN: Albert?

MR. HUBER: Albert Huber, Hydraulic Institute.

We are talking about pumps in buildings, not fire trucks.

MR. ROSENSTOCK: Okay. Steven Rosenstock, EEI.

Thank you, and I would just like to note for the record that, under Federal Regulation Notice that was put out, I think it was last year or the year before, that for the fire pump motors there are now minimum energy-efficiency requirements for fire pump motors that have been published and are now in the Code of Federal Regulations.

Thank you.

MR. BROOKMAN: Joanna Mauer?

MS. MAUER: Joanna Mauer.

We agreed that it makes sense to

exclude fire pumps. I think it is just a question of how do we define them, so that they are not used in other clean water applications. I think a similar issue has come up in the motors docket, and it is just a question of, you know, is there a certification or something that we can use just to make sure that they are used for that purpose only?

MR. BROOKMAN: Thank you.

Albert?

MR. HUBER: Albert Huber, Hydraulic Institute.

Fire pumps are specifically designed for fire protection. They do not operate at its best efficiency point. They are not designed to operate there. They are actually designed to operate to the left-hand side of the best efficiency point because they are required by Code to be able to pump at 150 percent, and they are required to lift water at 15 feet at 150 percent. They also have requirements that the shutoff head has to be maintained at a certain point.

Technically, it is used for -- it could be used for clean water, but it is not normally used because it is expensive. It can't have seals in it. It has to have packing. That is done because the fire protection people don't want to a failure during a fire. So, they let the water leak, which, if you let the water leak, you are losing water, and therefore, it is not efficient.

So, they are not designed for that, never were intended to be used for that. They are intended to be used for fire protection only. They are regulated by the National Fire Protection Association, and they are certified as meeting that NFPA 20 certification by the Underwriters Laboratory and Factory Mutual.

MR. BROOKMAN: Thank you.

MR. HUBER: And so, they carry a stamp to that effect.

MR. BROOKMAN: Steve Schmitz?

MR. SCHMITZ: Al actually just made my point.

MR. BROOKMAN: Okay.

MR. CYMBALSKY: Okay. So, just to be clear, there is a different certification process for these pumps.

Okay. Thank you.

MR. BROOKMAN: Okay. Neal?

MR. ELLIOTT: Just to go back to the motor rule, I would note that the inclusion of fire pump motors within the motor rule was a specific category that was set out, had a lower efficiency than other products, and it was explicitly included because of the unique nature of those motors and the requirement that those motors receive UL and Fire Certification.

So, again, it is a special product, and it should be treated specially. And just to reiterate what Joanna said, we do not think it should be covered in this rulemaking.

MR. BROOKMAN: Okay. The question is whether we take a break now. I think probably we are about due. We have got a little bit more to cover here, right?

MR. LLENZA: Yes.

MR. BROOKMAN: Okay. Let's do take a break now. It is 10:45. We typically break for 15 minutes.

For those of you who are new to the building, or those of you who are not new, you must wear your visitor's badge visible above your waist. They are very serious about security around here.

There are restrooms at both ends of the hall. There is a coffee shop on the ground floor. If you take the elevators, there is a coffee shop on the ground floor just about directly beneath us; off the elevator and hang a left.

Please go quickly. Sometimes they are not very efficient at Dunkin' Donuts.

(Laughter.)

And we will resume at 11:00.

So, thanks. Hey, listen, we have got a really good start on the day. The quality of the comments has been excellent. Let's keep that going.

Thank you.

(Whereupon, the foregoing matter went off the record at 10:45 a.m. and went back on the record at 11:05 a.m.)

MR. BROOKMAN: Okay. And once again, the quality of the comment has been excellent, and I am very eager for that continue. And so, we are going to proceed where we left off, and Alison is going to be at the podium.

Alison?

MS. WILLIAMS: Thank you.

So, the last slide, we were just talking about possible exclusions for firefighting and self-priming pumps. Anyhow, there are coverage parameters that DOE is considering. DOE is interested in specific reasons for why they should be in place.

And here, we are just acknowledging the parameters that the stakeholders have suggested in some of the meetings with DOE. So, those are listed here related to flow head, horsepower, and temperature. And the stakeholders say they have presented these to generally align with the EU scope, although I want to note that they are not exactly the same.

So, we did a little bit of estimate on how many pumps these would exclude. And so, those numbers are shown on the bottom here. We think it is about 48 percent of pumps by model availability and about two-thirds by shipment.

MR. BROOKMAN: Okay. Yes, Steve first.

MR. SCHMITZ: Steve Schmitz, Hydraulic Institute.

If we could go back one slide, please, Alison? Thank you.

There is a typographical error on this slide. The second point of 295 feet should say 459 feet. The 295 feet represents the max head from the EU standard for four-pole operation, and at two-pole it is 459 feet.

MS. WILLIAMS: Okay.

MS. MAUER: This is Joanna Mauer.

I just want to clarify, that is a clarification from what was presented earlier. So, I think that is why there is some confusion. I think right now we are suggesting 459. There may have been something previously --

MR. SCHMITZ: Right, which aligns with the EU standard, yes.

MS. MAUER: And the EU standard has separate maximum head for two-pole and four-pole motors. I think what we are suggesting now is a single maximum head regardless of speed. Is that right, Steve?

MR. SCHMITZ: That is what you are

suggesting or we --

MS. MAUER: That is what I thought we were --

MR. SCHMITZ: We are saying the hydraulic picket fence, if we call it that, the max head that would be involved, no matter what the speed, would be 459 feet.

MS. MAUER: Yes. And I am just clarifying that that is different than what we may have presented previously to DOE and a little bit different than the EU.

MR. SCHMITZ: It aligns with EU, yes.

MS. WILLIAMS: So, just to clarify, this is the only information I have seen before. And so, we certainly don't have any numbers involving the 495 that you -- 459, sorry.

MR. BROOKMAN: So, just to confirm, Steve, make the point again about 459.

MR. SCHMITZ: Four hundred fifty-nine is the max head, as defined by the EU standard.

MR. BROOKMAN: Okay. Okay. Got it.

MS. WALTNER: Sorry. Just a clarification on --

MR. BROOKMAN: Yes, Meg, please.

MS. WALTNER: And so, in the EU standard is it max head regardless of speed as well? Or I think that is part of the confusion.

MR. SCHMITZ: It was max head at two-pole speed.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Maybe I could just get a little -- two-pole, four-pole, right? Two-pole run twice as fast as four-pole motors. So, it is kind of inconsequential once you say 495 feet because you are not going to get there with running at half-speed. You won't be able to generate that much.

So, I think the EU had some subcategories that said, if it was four-pole, you could get up to here, and if it was two-pole, you could get up to here. But, once you define the max, it becomes inconsequential.

MR. BROOKMAN: Okay. Got it. Okay. Have we clarified that one? I think we did.

So, Steve Rosenstock, go ahead.

MR. ROSENSTOCK: Just quickly, when you say "stakeholders," are you saying both the Hydraulic Institute and the energy efficiency advocates? Is this a joint --

MS. WILLIAMS: Yes. So, this is made in one of the ex parte meetings with DOE and, also, in the technical meeting between HI, the stakeholders, and the technical consultant.

MR. ROSENSTOCK: Okay. And then, just a quick followup. With the parameter of greater -- so, it is greater than and equal to 1 horsepower and, then, less than or equal to 200 horsepower, correct?

MS. WILLIAMS: That is my

understanding.

MR. ROSENSTOCK: Okay. Because, just as a quick thought there, by having a 1-horsepower minimum, doesn't that exclude a lot of circulator pumps?

MR. BROOKMAN: That is an interesting question.

Okay. Gary Fernstrom?

MR. FERNSTROM: Seemingly, it would. So, as we consider wanting to include circulator pumps, we should make sure that the horsepower minimum coincides with however we come out on that.

MR. BROOKMAN: Okay. Thank you.

I am eager for us to keep going.

MS. WILLIAMS: Sure.

MR. BROOKMAN: Oh, well, no, we are not done yet. Steve? And perhaps Albert. Steve Schmitz?

MR. SCHMITZ: Steve Schmitz, Hydraulic Institute.

Sorry. Thank you.

MR. BROOKMAN: No, no, we want this. This is good. Keep going.

MR. SCHMITZ: The Hydraulic Institute would appreciate better understanding how the numbers in the graph here, in the chart here, were reached, how they were calculated and how you got to that.

MS. WILLIAMS: Sure. So, quickly, as was demonstrated in the framework, we pulled about 115 manufacturer catalogs from the PUMP-FLO desktop software and pulled in pump models out of those. And then, we had to do some individual work with these. We excluded 50-hertz pumps, excluded wastewater pumps, went to the manufacturers' websites and tried to identify pump categories.

And so, we actually have head flow, horsepower, and temperature from the pump flow information that we used for the model availability estimates. And the shipment estimates were done by a market research consultant, based on 2010 Census data. So, these are all strictly estimates, and, you know, they might change if we receive additional information on them.

MR. BROOKMAN: Albert first.

MR. HUBER: Albert Huber, Hydraulic Institute.

Alison, since this parameter has now changed to 459 feet of head, would it change this chart?

MS. WILLIAMS: Yes, it would change this chart probably significantly. As it states in the framework document, a lot of pump models were excluded here because of head, especially the multi-stage pumps, which naturally have higher head.

So, I would suspect, yes, these numbers would change. And we do have some discussion in the framework document about how that head effect would work. As will go farther with the EU, if you are only testing on certain stages, the head limit might have some different impacts than it would if you are actually looking at all stage versions.

MR. BROOKMAN: Mark?

MR. HANDZEL: Mark Handzel for the Hydraulic Institute.

Alison, did you guys account for pump manufacturers that aren't in PUMP-FLO?

MS. WILLIAMS: No, we have not done that. So, this is just an estimate about 50 percent of the market that we have. So, this, again, would change with any additional information we receive.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: And ultimately, of course, we can hone these numbers. But, even at the 295 (sic) feet, if I looked at the first two categories, end suction close coupled and end suction frame mounted, which are the largest-volume pumps, I believe, or at least from an energy consumption standpoint, in the mix.

Just inside those parameters, the number of 43 and 41 percent just don't seem to make sense. You know, it would seem like it would be more like 80 percent. So, you have got to refine those?

MS. WILLIAMS: Okay. Yes, I mean, we are certainly open to refining these estimates. They were basically done just to give a quick understanding of what these parameters might do in terms of the market. Yes, again, we only have part of the market.

It is also not necessarily all clean water pumps in here because we did have to do the filtering on that, you know, kind of manually looking at all catalogs. So, it is possible there are other pump types in here that are kind of skewing.

MR. BROOKMAN: So, individuals who attend these meetings on a consistent basis, it is a constant refrain that the Department of Energy is asking for data. And so, the question is, does the Hydraulic Institute, do you gather this kind of data right now? Ken?

MR. NAPOLITANO: Yes, we could

assist in this particular discussion around this model availability in terms of what percentage of the products fit in the parameters of the scope. We would be able to assist with hard data on that.

MR. BROOKMAN: That would be very helpful and the Department would really appreciate that, and the earlier, the better.

These two gentlemen, I didn't get your names earlier.

MR. CASE: Greg Case with Pump Design, Development & Diagnostics.

MR. BROOKMAN: Okay. And?

MR. MRKVICKA: Rodney Mrkvicka from Smith & Loveless.

MR. BROOKMAN: Thank you.

MR. MRKVICKA: And we are both members of the Hydraulic Institute.

MR. BROOKMAN: So, Greg, you are next in the queue.

MR. CASE: Alison, my question was, does this also include the ANSI pump models in this?

MS. WILLIAMS: It does.

MR. CASE: Okay.

MS. WILLIAMS: So, the framework also states that the temperature exclusions would be lower if we took out the ANSI chemical process pump.

MR. BROOKMAN: Okay. Yes? Okay, Alison.

MS. WILLIAMS: Okay. So, this was basically just requesting comment on this. Again, DOE is not necessarily considering the parameters proposed. So, we would like more information on those parameters that were proposed, either that were up there or any others that people would like to suggest. And DOE especially seeks comment on -- sorry -- the estimates of pumps. We would like more data on pumps that could be excluded from this.

MR. BROOKMAN: And the Hydraulic Institute will supply some of that, right?

MS. WILLIAMS: Likely.

MR. BROOKMAN: Other sources that come to mind before we move on?

(No response.)

MS. WILLIAMS: So, next we are going to talk about the definitions that DOE is considering for pumps. And so, currently, these definitions are based on the equipment categories that you saw earlier that DOE is considering for coverage.

Most of them have been developed after reviewing the definitions in the EU clean water pump regulation. And we have also developed some additional definitions based on other categories that the EU did not consider.

So, again, these may change. Right now, they don't have any parameters in them, as the EU does, because those are not being considered at the moment. So, eventually, the specific parameters, like head and flow, if there are any, could be added to these.

So, I am not going to read all of

these individually. We will just look at them and have some comments at the end.

So, again, we are starting with pump, rotodynamic water pump, and then, after that, it starts with the individual categories that we looked at earlier. So, these are just the categories that we saw.

So, DOE would like comment on any of the suggested definitions for pumps, whether they are sufficient to allow determination of what is covered and in what category your equipment might fit, and just a rather specific note on what could be used to define the axial/propeller mixed flow pumps in terms of specific speed or other parameters.

MR. BROOKMAN: Okay. Let's start with the definitions on slide 32. That is where we are right now. Mark?

MR. HANDZEL: Mark Handzel, speaking for the Hydraulic Institute.

The Hydraulic Institute has clearly-defined HI/ANSI definitions of pumps that are considered standards in the industry by the pump manufacturers and their constituents. We do not feel that the DOE should initiate the use of another set of definitions for this rulemaking, primarily because we have these standards. They have been in the industry for a long time, and we feel that they are the way that products should be defined.

MR. BROOKMAN: Okay. Thank you.

Joanna?

MS. MAUER: Joanna Mauer.

So, we recognize the benefits of ANSI/HI definitions in the marketplace and for the industry, but we are concerned that in a regulatory environment that the ANSI/HI definitions could present some potential loopholes and, in particular, because the ANSI/HI definitions are very specific. You know, we see the possibility for making very minor alterations to a pump, such that it no longer meets that ANSI/HI definition.

And so, our current thinking is that it would be better to define pump categories more broadly and, then, to define any necessary exclusions to reach the scope of coverage that we would like. We may have some suggested tweaks to the DOE definitions, but we think they are a good starting point.

MR. BROOKMAN: Okay. Thank you.

Additional thoughts? We are going to keep -- so, the Hydraulic Institute does not wish to comment specifically on these definitions?

MR. HANDZEL: We didn't develop -- Mark Handzel for the Hydraulic Institute -- we didn't develop specific responses, just because we feel that it is going the wrong direction.

MR. BROOKMAN: Okay. Okay. Then, let's look at, scan through 32, 33, and 34. And as would be reflected in the comment box on 35, let's see if anybody wishes to make specific additions, corrections, amplifications to these definitions.

(No response.)

And, of course, definitions are a complicated bit of business. So, written comments might be the best avenue here.

Okay. Then, I am seeing none as I scan the room. So, we are going to move on.

MS. WILLIAMS: So, these definitions are related to the definition of clean water, which we touched on earlier, and the framework document we presented that used the EU definition for clean water. And we are seeking comment on how best to translate the wording and units of that to the U.S. The definition seems a little vague. So, any comments to help improve that definition, as well as whether any other parameters, such as maximum solids diameter, could be added to that.

And again, as we discussed before, we could alternatively do some different definitions, such as defining physical characteristics of the pumps themselves as opposed to the water. So, these are just things out for comment.

MR. BROOKMAN: Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock, EEI.

I didn't look in that section of the framework document, so please forgive me. But I am just kind of curious if you had a chance to look at the EU definition compared to any EPA definitions and if they are aligned at all.

MS. WILLIAMS: I have not looked at that. I am not sure if -- it is something we can certainly note down.

MR. BROOKMAN: Okay. Thank you.

Steve Schmitz?

MR. SCHMITZ: Steve Schmitz, Hydraulic Institute.

We are just going to reiterate the prior comment about the use and definition of the ISO 9906 standard for definition of clean water.

MR. BROOKMAN: Excellent. Okay. Thank you.

Yes, Mark?

MR. HANDZEL: Mark Handzel for Hydraulic Institute.

Regarding 127, the question really has to do with whether the use of the words "solid diameter" should be used in a definition of clean water. So, the members of the Hydraulic Institute wish to clarify that consideration for solids diameter is not used in any definition of clean water pumping. No solids are allowed.

MR. BROOKMAN: Oh, okay. Thank you.

MS. WILLIAMS: Okay. So, we are going to switch to another section. Until now, we have been focusing basically on the pump itself, and DOE has also been considering a more expansive version of pump. So, the EU has started an exploration of the pump inclusive of motor and controls, and stakeholders in this room have also suggested following such an approach. The primary reason for this approach is to capture the benefits of variable speed drives, primarily in variable-load applications with low static head.

However, DOE realizes that manufacturers can't control how a pump or a VSD is used. In some cases, the same pump will be used in both constant and variable-load applications. So, any analysis that will be done will look at all the applications out there, including the baseline conditions, whether they are currently throttled, constant load, whatever, to determine whether or not the VSDs would save energy in the field.

So, just kind of a background review, and we are looking at pumps a little more broadly. DOE believes that most pump types are generally sold without motors. However, some of the most common pump types, including end suction close coupled, most of the time are shipped with a motor by the manufacturer.

DOE believes that a number of pumps sold with motors and VSDs by the pump manufacturer is much smaller, at approximately 2 percent, although there may be some application categories, such as circulators or water pressure booster pumps, where there is more of those sold in a package.

So, DOE is interested in data on how pumps are sold, including whether they are sold alone, with a motor, with a motor and VSD, and whether they are actually integrated or they are just kind of priced together and shipped, you know, maybe separate boxes, the same box, whatever; basically, interested in data on this by equipment category, size, application, whatever is available.

MR. BROOKMAN: So, I am looking over there to Ken or someone first because this is back to that constant refrain: DOE looking for data. And I was wondering if the Hydraulic Institute has that information, can supply that information. Or, Neal, do you wish to comment here?

MR. ELLIOTT: Neal Elliott, ACEEE.

I wanted to get on the record indicating that, as we have suggested to the Department several times, it is probably timely to do an update on motor and motor-driven equipment, energy use in the United States. The most recent comprehensive study was the 1999 study, the so-called "Xenergy Motor Market Study". We think it would be very useful -- and I am speaking on behalf, I think, of the motor industry and the motor-driven equipment industry as well as many in the energy-efficiency, that a comprehensive study would benefit substantially in moving forward with these issues.

MR. BROOKMAN: So, I lost track of that. Are you suggesting the Department of Energy does that or does that in cooperation with the stakeholders?

MR. ELLIOTT: Yes, the Department did a study, EERE. There is actually pending legislation before the Congress which would actually direct the Department to undertake such a study.

MR. BROOKMAN: I see.

MR. ELLIOTT: Understand the cost is an issue here. We think this is a priority, though, in addressing many of these issues because we revisit them --

MR. BROOKMAN: Yes, yes.

MR. ELLIOTT: -- every time we do one of these rulemakings.

MR. BROOKMAN: Bruce, follow-on?

MR. LUNG: Bruce Lung, Alliance to Save Energy.

I would echo that request by Dr. Elliott.

I would also like to point out, and perhaps ask the technical advisors, there is actually a rich portfolio of information related to energy efficiency in industrial-scale pumping systems that was produced by EERE's Advanced Manufacturing Office, including case studies, fact sheets, and source books. And if those resources have not been used, I would invite them to use them to inform particularly this discussion around variable-speed control of industrial pumping systems.

MR. BROOKMAN: Okay. Thank you.

Rodney, thank you for being patient.

MR. MRKVICKA: Rodney Mrkvicka of Smith & Loveless, and representing the Hydraulic Institute.

With respect to your Items 1-16 and 1-17, the Hydraulic Institute does not have any of that data available to provide in those categories, and we believe acquiring that would be a pretty extensive market survey because of the wide range of categories you have.

That being said, through our members that we have, we have an opinion on both those. And our opinion is that the pump with the motor combination would be the substantially largest market segment.

Alison, on your slide 39, which was just above your first bullet point, it stated that most pump types are generally sold without motors. So, the Hydraulic Institute would like to request some additional information or background of that data, as it differs from our opinion, from that table.

MS. WILLIAMS: Yes, I mean, just to clarify, these are estimates by a pumps market research consultant, and we are certainly welcome to any information that is different from this.

MR. BROOKMAN: Rodney, from your comment, I couldn't understand. Do you have the capacity to gather this data?

MR. MRKVICKA: Not at this moment, no.

MR. BROOKMAN: Okay. Okay. Alex Boesenberg?

MR. BOESENBERG: Since I won't be here after lunch, I beg the indulgence to comment on Item 12-2, in followup to Neal Elliott's statement.

When addressing cumulative regulatory burden, it is often what other things are going on that will affect the industry. I would submit that the issue of the motor study is one where the DOE is under a cumulative burden, where several rulemakings could be positively influenced by that study; ergo, better data. So, again, NEMA will echo Neal's statement to please find a way to fold that study in somehow.

MR. BROOKMAN: Okay. Thank you.

Yes, Tom Eckman.

MR. ECKMAN: Tom Eckman, Northwest Power and Conservation Council.

This is mostly for the manufacturers in the room. It seems to me that, given this standard isn't scheduled to take effect until 2019 or thereabouts, it would be interesting to know what you think the trendline looks like with respect to the sales of these units with the motor set connected to them compared to just the pump alone, and whether or not there is a trend that is moving that direction or away from it.

Since, if we are thinking about a regulatory regime that might include the whole drive and motor set, knowing that that is more likely to be the case in the future than less likely to be the case in the future would be of interest in setting up which policy option you want to pursue here.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Ken Napolitano, the Hydraulic Institute.

I think a couple of things. Just first to kind of expound on Rodney's point, while it is true that the Hydraulic Institute does not have this exact data definitively as specifically how many pumps are sold with motors, first, I want to point out that we are generally eager to share as much data as possible with everyone, so that we can get to the right answer.

Secondly, we certainly can work towards, albeit maybe not precise, but working towards polling of the manufacturers to at least get some aggregated look of an estimate toward those data.

To answer your question, first of all, we believe just notionally that the number of pumps sold with motors is higher than what was displayed there.

Secondly, generally, the trend, although I wouldn't attempt to quantify the rate, is for that to increase and for the integration of speed control, whether it be a variable-speed drive or other type device, to increase as well. Certainly, it depends a lot on which pump type and category and size horsepower you are talking about. But I would say that the general direction is for more integration rather than less.

MR. BROOKMAN: Thank you.

John Cymbalsky?

MR. CYMBALSKY: John Cymbalsky, DOE.

I just want to point out that, for the manufacturers, you can enter into some agreement with our consultants to sign a confidentiality agreement, where the information that you provide to them would not be divulged to the federal government --

MR. BROOKMAN: Or anyone.

MR. CYMBALSKY: -- if that makes you feel more comfortable moving this process along.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Yes, it is Ken Napolitano.

I think, for certain types of data, that would be something that would probably be required, and therefore, discussed. Other types of data we are ready to put in the public record.

MR. BROOKMAN: There will be more said later in the day about how that gets done.

Okay. Keep going, Alison.

MS. WILLIAMS: So, just a few more questions on the system. DOE requests information on how often and what circumstances the intended application of the pump is known when it is sold, and is also interested in further comment on including feedback in any definition for pumps that includes motors and controls.

MR. BROOKMAN: Yes, Rodney?

MR. MRKVICKA: Rodney Mrkvicka, Smith & Loveless, representing the Hydraulic Institute.

To your Item 1-18, again, we don't have hard data to provide, but our opinion, a substantial majority of the time the manufacturer knows what the application of the pump is for, not all the times, but a majority of the time. The end-user is the person who knows where it is all the time.

So, again, in feeding off of what Ken mentioned earlier, as we start to package these and the trend is going up, incorporating an extended product approach on this would help the end-user supply this pump in a better situation to be more energy efficient. And in doing this, you remove the fragmentation that you mentioned on the earlier slide about how pumps are supplied, where various people have the different points. Bringing this all together will help optimize the pump operation.

And if I may, on 1-19, it is very simple. The Hydraulic Institute agrees that feedback control is necessary to effectively operate these units.

MR. BROOKMAN: Thank you.

Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock,

EEI.

Just, again, in terms of variable-speed drives, they are a great technology for saving energy, but I guess my thought is any sort of regulation -- the only similarity, in terms of other products, the only similar type of efficiency requirement, I will say, is with residential boilers have to have the automatic temperature resets. That is a requirement under federal law. Not only there is an AFUE for them, but there is also they have to have the temperature reset to modulate the usage to save more energy.

I guess I am a little concerned that variable-speed drives are a control technology. They are using energy themselves, but, really, they are saving energy for the other product, the motor, which is a pump motor. That is what they are doing.

I guess I am a little worried about, as we go down this road, are we going to try to also, are we also looking at certain specifications for the variable-speed drive that might go on the motor that is attached to the pump? Again, it is a matter of where is this going in terms of, does the variable-speed drive have specific design requirements itself before it would be considered to comply with any sort of regulation?

MR. BROOKMAN: Charles? Betsy? Betsy?

MS. KOHL: Just real quick, so when we set efficiency standards, it is we don't set design requirements for specific pieces. We might look at more efficient VSDs in setting the standard, but how you get to the ultimate standard level is up to you. We don't set specific design requirements for a VSD.

MR. BROOKMAN: Don Brundage?

MR. BRUNDAGE: Don Brundage, Southern Company.

In the context of a manufacturer's standard, I am not necessarily opposed to this. I am not sure how well it would work. I have some misgivings about trying to require variable-speed/drive speed package into pumps because, for one thing, if it is a pump that is designed by its operation to only operate at one speed when something else is operating, adding a variable-speed drive in that situation is going to increase energy use because of the energy use of the variable-speed drive itself.

So, I realize we are early in the process, but I am not sure how this could really be done in the context of --

MR. BROOKMAN: Right.

MR. BRUNDAGE: -- this rulemaking.

MR. BROOKMAN: We just want to gather any useful information at the stage we are in now.

Gary? And then, we are going to keep moving on.

MR. FERNSTROM: Okay. So, excuse me. Going to Don's point first, oftentimes, engineers oversize this equipment. So, whether it is a fixed application or not, many times there are opportunities for a variable-speed drive to better match the pump to the desired operating condition. And you save energy that way, even though it is a fixed-speed application.

And going to Steve's point, I think whatever measurement and test algorithm we come up with, it needs to include the energy use of the variable-speed drive itself, which may include a standby energy use, in order to properly capture the energy use of the integrated piece of equipment that is being represented as an extended product, category/product.

MR. BROOKMAN: Okay. Ken?

MR. NAPOLITANO: Ken Napolitano of the Hydraulic Institute.

Of course, we proposed the use of what we refer to as extended product. And I would like to make just a couple of comments about extended product because this is a very important part of the discussion when you consider the amount of energy savings potential from this approach as compared to looking at just the pump component efficiency.

The extended product approach is a methodology to calculate the Energy Efficiency Index of an extended product, incorporating load profiles. And it consists of a physical product. It doesn't just need to be a variable-speed drive, but it is a pump and a motor and some control feedback or a pump, motor, speed control, and a feedback loop. So, yes, you need a feedback mechanism to, then, adjust the pump to the demand.

And we have identified two categories. One is pump with a variable-speed drive for load profiles and applications that are conducive to that, but there is also constant-speed operation, where you don't have a highly-variable load profile, and it could be as simple as an on/off control. Because, believe it or not, there are a lot of pumps that run out there and they just run and run and run, whether there is a demand or load or not. And simply by having a feedback loop that turns them off, it could have a substantial energy savings.

And so, by defining the extended product in those two potential categories, that approach can be used on virtually any application.

And then, lastly, we did an estimate, which we submitted a long time ago, that conservatively estimated the energy saved by incorporating the extended product approach in the scheme would represent 11.6-terawatt hours per year of energy savings potential. So, far and away, the largest piece.

So, it is more complex than just the pump efficiency. I think we are benefitting from the fact that we are behind the EU because the EU plowed a lot of ground, and they went first with Minimum Efficiency

Index on the pump itself because it is simpler to get at, but they are now writing regulations around the extended product approach. So, there is a methodology to get at that.

Thank you.

MR. BROOKMAN: Mike Rivest?

MR. RIVEST: Mike Rivest, Navigant Consulting.

Just sort of following up on Steve's comment about how one might incorporate standards that take into account variable-speed drives, and you mentioned the prescriptive standard for boilers, the idea here in this product would not be to have a prescriptive standard, but to develop a test method at different loading points which, then, combined with a load profile, would allow you to look at the consumption or the efficiency, sort of like an SEER value, if you will, for air conditioning, that would combine all the load profile, the test procedure at different loading, and together you could develop the economic payback, if you will, of different load profiles, even for a customer that has a single speed. So, it is a little bit more complicated of an analysis, but there are certainly multiple rulemakings that have used this approach.

MR. BROOKMAN: Okay. Thanks, Mike.

Yes, Albert?

MR. HUBER: This is Albert Huber with the Hydraulic Institute.

I just want to comment that the Hydraulic Institute is currently working on standards for tests to test this extended product and an EEI, which is the Energy Efficiency Index that you would judge the product by and label it by. So, we are already in the process of doing that.

MR. BROOKMAN: Do you have a timetable?

MR. HUBER: No, not at this time, but we are very close at this point.

MR. BROOKMAN: But you are close?

MR. HUBER: Yes.

MR. BROOKMAN: Okay.

MR. HUBER: Certainly within the timeframe -- (laughter) -- as close as any timetable that the DOE has in regulation, more like 2015.

MR. BROOKMAN: There is another constant refrain in these meetings, and that is, how soon can you get it to us, right?

(Laughter.)

To the Department. It is always beneficial.

Okay. Yes, please.

MR. HUBER: Excuse me.

MR. BROOKMAN: Yes.

MR. HUBER: We can get it, we believe we will have it to you this year.

MR. BROOKMAN: Great. Thank you, Albert. That is great.

Okay. Please say your name. Leave that thing on, okay (referring to microphone)?

MR. BUTLER: Kitt Butler with Advanced Energy.

I would just like to bring up that there is a test standard out there for VSD performance. It is AHRI 1210, and it does get at the points that were made earlier about different speeds and matrix between motor and drive.

MR. BROOKMAN: AHRI 1210? Okay. Thanks.

Alison, let's keep going.

MS. WILLIAMS: So, just to describe a little bit more about what we have been talking about --

MR. BROOKMAN: Well, wait.

Go ahead. Your name?

MR. LEMMOND: Jon Lemmond from AHRI.

I just want to add that that AHRI standard that was 1210 is an ANSI standard as well.

MR. BROOKMAN: Okay. Thank you.

Alison?

MS. WILLIAMS: So, in the first regulatory regime that DOE could follow, they would regulate just pumps alone, regardless of how they are sold, which is consistent with the current EU approach for clean water pumps, although, as noted, they have been exploring some additional options.

DOE could also consider looking at combined pump equipment. So, in Regulatory Regime 2, it would define pumps as inclusive of the motor and VSD if sold together.

So, we would end up with two equipment class sets, which we will talk about these a little bit later, one for pumps without VSDs and one for pumps with VSDs.

In the third option, we define pumps as inclusive of the motor if sold together. So, you are going to have two equipment class sets, one for pumps with motors and one for pumps without motors.

For the pumps with motors, VSDs

would be considered a design option to increase efficiency. So, it is kind of like what happened in the EU circulator regulation where some of the efficiency levels considered basically included a VSD. So, it would be something similar to that.

And just to note that in Regimes 2 and 3, it is possible that the same pump could be placed into two equipment classes if it is sold both alone or with a motor or VSD.

This is just a visual description of what I just discussed. So, the first row is Regulatory Regime 1, where only the pump itself is regulated, regardless of how it is sold. In the second row, the pump itself is regulated unless it comes with both a motor and a VSD. And in the third row, it is regulated based on how it is sold. So, pump alone if sold alone; pump with a motor and consider a VSD as a design option for pump-sold motors, and then, again, the whole set for the third.

MR. BROOKMAN: Yes, Steve Rosenstock.

MR. ROSENSTOCK: Steven Rosenstock, EEI.

I don't have problems with this conceptually, and I think it is a really, really good chart. My only concern is on the far right side it says, "Pumps sold with VSD". I would hate to limit any technology. What is there is some other technology that is -- I will just say maybe it is a step function rather than a continuous variable-speed drive. What if it is an on/off switch for certain motors? That saves the most energy.

So, in terms of regulatory function, if you are going to add in the pump, the motor, and some sort of, I will say, energy control, it might be better to have a more inclusive type of language to say we are not just looking at variable-speed drives; we are looking at, if we can do it under certain test procedures, other technologies that might control the energy usage of the motor that is a standalone product.

MR. BROOKMAN: Okay.

MR. ROSENSTOCK: Thank you.

MR. BROOKMAN: So, you now see the Request for Comment, Item 1-20 and -21. Do you want to just --

MS. WILLIAMS: Sure. The first is basically asking whether Regimes 2 or 3 could generate energy use by increasing the beneficial use of VSDs in the field or whether they might have any drawbacks. And we are also interested in the market share of pumps by category that would be used in an application that would benefit from a VSD.

MR. BROOKMAN: Rodney?

MR. MRKVICKA: Rodney Mrkvicka, Smith & Loveless and the Hydraulic Institute.

In response to your 1-20, the extended product proposal that HI has presented for a variable-load profile, VFDs or variable-speed drives in whatever category they would vary the speed of the pump, yes, that would increase the beneficial use of them.

As Gary had mentioned earlier about pump applications, normal pump applications -- or I shouldn't say "normal" -- many pump applications can be oversized, and you have to throttle back, so your motor is running full speed and you are throttling back. The use of VFDs can benefit by moving the pump more towards it Best Efficiency Point, or BEP, on its pump curve versus moving it away from it, if you are running at a constant speed.

So, in those variable-speed applications, yes, VFDs will be a beneficial use of them. In addition, using extended product in an EEI approach should move the market to a more optimum use of these products. Again, when you have a fragmented market and people put things together or are trying to design stuff, you may not get the most optimum energy-efficient unit at the end.

Using the extended product, we believe that you are going to end up with more proper applications in the market than improper applications from that aspect. So, that is on 1-20.

MR. BROOKMAN: Thank you.

Other comments on 1-20? Joanna?

MS. MAUER: Joanna Mauer.

So, I guess, first, on Option 2, it seems like there may be an energy-savings opportunity with Option 2 if there is a significant variation in VFD efficiency, and I don't know what that variation is. But it doesn't seem to us that that would by itself increase the use of VFDs in the field. I think it would just have the effect of, if you are already going to buy a pump with a VFD, now you are going to get one that has a VFD with a high efficiency.

I think to us the more interesting option is Option 3 because we see that the big opportunity here is increasing the market penetration of pumps with VFDs, getting more VFDs out into the field in applications where they can save a significant amount of energy.

And so, I think with Option 3 it seems like in many cases a customer who otherwise would buy a pump with a motor without a VFD is now going to get a package that includes a VFD. So, it seems like it is an option to increase the use of VFDs in the field.

And I think the other point about Option 3 is that, as you mentioned, there would still be two categories of pumps. There would still be a separate category of pumps sold without a motor. And so, certain customers who have an application where they are really not going to see a benefit from a VFD, where using a VSD may not be a beneficial option for them, that customer still has the option of buying a pump and separately buying a motor, so that they still have that option. They are not required to buy this package that includes the VSD.

MR. BROOKMAN: Albert? And then, to Gary.

MR. HUBER: Albert Huber, Hydraulic Institute.

Our proposal today is basically No. 3 or Regime No. 3. And basically, the pump only would be regulated by an MEI, or a Minimum Efficiency Index, and our extended product would have two categories, one being pump and motor and the other one being pump, motor, VFD, and feedback. So, this is exactly what we are proposing.

MR. BROOKMAN: Thank you.

Joanna, follow on, yes.

MS. MAUER: Joanna Mauer.

Maybe we just need to have some further discussions, but I think the difference, the way I see it, between what DOE has laid out in terms of Option 3 and what you have just mentioned, Al, is that by having three categories, customers still have the option of buying pump and motor without a VFD, where I think the real opportunity is getting more packages that include the VFD out into the field. And so, I don't have a good understanding of how having the three categories would actually increase the market penetration of products with VFDs.

MR. BROOKMAN: Ken, follow on.

MR. NAPOLITANO: No, I would just say that those are all good questions, and we are aligned with the notion of figuring out how to increase the adoption of VFDs.

MR. BROOKMAN: Okay. Gary?

MR. FERNSTROM: We strongly agree with Joanna.

MR. BROOKMAN: Okay. Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock, Edison Electric Institute.

I guess -- and it is good to hear -- but I guess in terms of DOE, under Option 3, that would mean that there would be three separate test procedures for this product. With other products there I am familiar with, I don't know if there are multiple efficiency test procedures. There is usually just one test procedure with, I will say, a static loading and static ambient conditions.

So, again, I don't mind. I would just say it would be kind of almost, it might be, again, unless there are other products that are doing it, it might be setting a precedent where, again, different manufacturers might have to do three different test procedures for all their products versus other manufacturers would only have to do one test procedure.

MR. BROOKMAN: Louis?

MR. STARR: In terms of Option 3, the only thing you might consider is perhaps putting some bookends in terms of the range of VFDs, where they are required. So, maybe 1 to 25 horsepower.

The concern I might see is that a

distributor could go out and start buying a VFD and a bare motor separately and putting these things together. Or, in other words, if you had an application where you had a constant flow, but you had to be buy a VFD, it is going to make the product more expensive. But if I can just buy the motor and sell it to you directly without having to put the VFD, my price is now lower than your price as a manufacturer. So, the prices of VFDs get to be pretty substantial when they get into certain ranges, and it can be as much as the product, the pump itself. So, you might think about some of the fallout of that.

MR. BROOKMAN: Okay.

I am eager for us to move on. So, Alison?

MS. WILLIAMS: Okay. So, until now, basically, we have been talking about pumps with electric motors. DOE acknowledges that about 10 percent of pumps are driven by something other than a motor, such as an engine or a steam turbine. DOE is potentially considering regulating those as pumps sold alone, even if they are driven with an engine, mostly for simplicity. And we are interested in comment on the market-share in applications of the pumps driven by other than electric motors.

MR. BROOKMAN: Steven Rosenstock?

MR. ROSENSTOCK: Steven Rosenstock, Edison Electric Institute.

I want to thank you for this slide. EEI feels very strongly that DOE should take a fuel- and market-neutral approach to any new standard. So, I applaud that DOE is going to regulate these products because that is the best way to achieve maximum energy savings, regardless of the driver.

In terms of the efficiency regulation, all I would say is please try to be consistent as possible. If you are going to have three test procedures, like the previous slides, for products that are using electric drivers or controls, then there should be a similar number of test procedures for the non-electric drivers, again, to maximize energy efficiency for these products. I think that is the best; it is the most market-neutral and fuel-neutral way to approach regulating these products.

Thank you.

MR. BROOKMAN: Rodney?

MR. MRKVICKA: Rodney Mrkvicka, Smith & Loveless, and the Hydraulic Institute.

On that comment on 1-22, the Hydraulic Institute does not have that data available, nor is it something that is in the near future that data available.

One comment on the first statement there. Approximately 10 percent of the pumps consider being driven by natural gas or diesel engines or steam turbines, it is our opinion that that figure is very high, comparatively speaking, to our membership and what we believe is non-electric motors. We think that number is extremely high.

MR. BROOKMAN: Would you care to venture what you think it is?

MR. MRKVICKA: Estimate maybe 2 to 3 percent.

MR. BROOKMAN: Thank you.

Louis?

MR. STARR: I have a little bit of a question. I wonder if the individual pump manufacturers know individually what the numbers of pumps they sold and ones without motors, and all these variations and comments. I am wondering, as a collective, they don't know because that is proprietary information, and I am not sure -- individual pumps, maybe that would be a clarification. I am wondering if the pump manufacturers individually know how much pumps you sold with motors, how many you sell without VFDs, but as a group you don't know. But maybe revealing that information is problematic. And if that is the case, it seems like perhaps there could be entering in with non-disclosure agreement would help that.

But am I wrong on that point or not?

MR. BROOKMAN: I saw both of you. Who of you would like to go first? Mark?

MR. HANDZEL: Mark Handzel on behalf of the Hydraulic Institute.

Your statement is correct. In general, as individual companies, we know that data. HI has never collected that data. So, that is why HI doesn't collectively have it. So, it does exist.

MR. BROOKMAN: Okay.

MR. NAPOLITANO: And I would just add to that. There probably are some proprietary confidential aspects of that within the membership of HI, which we could potentially get around. And there is also, you know, the way the channel works. So, although the manufacturer may sell a pump without a motor or without a motor and a VFD, what we would consider, we would often refer to as a bare pump, that doesn't mean that one or more of those devices aren't put together along the supply chain, such that the customer gets it complete.

And quite frankly, when the customer gets it from one of our authorized distributors, we give the distributor a pump. He puts a motor or something more on it and sells it to the customer. The customer pretty much views that as they got it from the manufacturer that way because the distributor is an extension of our supply chain. Where that value-added occurs in the supply chain, there is all kinds of market factors as to what drives that.

MR. BROOKMAN: Louis?

MR. STARR: Yes, I guess part of the reason I brought that up is I did design for seven years. I never bought a pump without a motor. I always thought they came together.

(Laughter.)

So, that is probably because I was buying it from the distributor.

MR. BROOKMAN: Okay. Alison?

MS. WILLIAMS: Okay. So, regardless of the Regulatory Regime chosen, DOE has reviewed some existing efficiency metrics for pumps.

The first one is pump efficiency, the ratio of hydraulic power to shaft input power. This is used in the EU clean water pump regulation and HI 20.3 and other country regulations, such as Mexico, South Korea, and China. The pump efficiency does not take into account the motor.

On the other hand, the overall wire-to-water efficiency takes into account electric input power at either a motor or control, depending on how it is defined. And this is used in Mexico for submersible pumps, where they basically have a minimum pump efficiency multiplied by a minimum motor efficiency.

The EEI is the Energy Efficiency Index used for circulators in the EU, based on some reference power from the market when it was developed.

And bowl efficiency is similar to pump efficiency, but for a single bowl in vertically-suspended pumps, which is used in HI 14.6.

So, as the stakeholders have recommended the EU approach, DOE has reviewed it a little more. Again, pump efficiency is the metric, and they set minimum pump efficiency by taking into account flow, specific speed, pump type, and speed. And just to note, the specific speed also incorporates head.

And the result is this 3D surface that you can see here where efficiency is a function of flow and specific speed, and they raise the surface up and down, depending on equipment class and design speed, in order to set the standard for a specific equipment class.

They also have a house-of-efficiency approach where they set pump efficiency at both the Best Efficiency Point, 75 percent BEP flow and 110 BEP flow. And the requirement is that each of the part-load and overload points are based on the requirement BEP, and a pump has to pass all three points to meet the standard.

The standard is also based on full impeller only, and they test on a certain number of stages for their multi-stage pumps in the regulation.

MR. BROOKMAN: Let's pause there.

Steve Rosenstock?

MR. ROSENSTOCK: Thank you.

Steve Rosenstock, EEI.

At 110 percent, again, I am just going to use the 110 percent flow is an overload situation. I guess is that just for temporary like a startup condition or --

MR. BROOKMAN: Albert wishes to comment.

MR. HUBER: A hundred and ten percent is 110 percent of BEP, 10 percent more than the Best Efficiency Point. It is just running at the higher flow. You are not overloading the pump nor the motor nor anything else.

MR. ROSENSTOCK: Thank you for that. I appreciate that.

MR. HUBER: To further clarify that, 75 to 110 is pretty much our preferred operating range.

MR. BROOKMAN: Okay. Alison?

MS. WILLIAMS: Overload is just a nomenclature used by the EU, for example.

So, in considering these metrics, DOE is considering following the EU approach using pump efficiency at 3 points for all pumps sold alone or all pumps sold alone not considering motor and controls.

DOE may consider some other

metrics, such as overall efficiency for submersible pumps or bowl efficiency for vertically-suspended pumps.

In the other options where DOE defines pumps inclusive of motor and controls, pump efficiency is not a sufficient metric. So, in Regime 2 for pumps sold with both motors and VSDs, DOE is considering overall efficiency as the metric in order to account for the use of more efficient VSDs. So, this would be, again, possibly overall efficiency at 3 points.

And in Regime 3 for pumps sold with motors, DOE would need a different metric that would enable it to compare the energy efficiency of pumps with VSDs to those with motors but without VSDs. So, we believe it would be some sort of electric input power-based metric and have a few options laid out in the framework document, but it would need to be more extensive than the overall efficiency metric.

Again, if DOE pursues Regime 2 or 3, there would be multiple equipment class sets in these cases. So, DOE must consider how to deal with the metrics.

The first option is to just set the most appropriate metric for each equipment class set and not worry about them being consistent.

The second is where you have the same metric for all equipment classes, and you might include some standardized numbers for motor or VSD efficiency for some of them.

And the third one, you would have the same metric, probably pump efficiency, for all classes and potentially have another metric for the pumps including the motor and/or VSD.

This table is basically summarizing those options. In the first metric option of separate, those are basically what DOE is considering as most appropriate for each of those, pump efficiency, overall efficiency, and electric input power-based, and others show the different combinations of how the metrics could potentially work with the different regimes.

DOE notes that these options may impact manufacturer burden. As we mentioned, a pump both sold alone and with other equipment could be placed into two equipment classes, which may each have their own standard. DOE believes that potentially the same testing could be used, and you may just have to take additional measurements, such as both shaft input power and electric input power to the motor or VSD, or simply taking pump efficiency and multiplying it by other standardized numbers.

So, these are the comments. This first comment page is about pumps alone. So, following the EU approach, whether 75 and 110 percent are the best points, and whether it should consider other metrics for submersible or vertically-suspended pumps.

MR. BROOKMAN: Let's just do that one first.

Ken?

MR. NAPOLITANO: Ken Napolitano, the Hydraulic Institute.

So, with respect to the operating range of 75 percent to 110 percent, we support that. That is our position, not only because it is harmonized with the EU, but because it is the appropriate range to optimize efficiency.

MR. BROOKMAN: Okay. Thank you.

Yes, Greg?

MR. CASE: To follow up on that, it also is in accordance with our HI preferred operating region, ANSI HI 9.6.3. So, there is a standard that backs up that flow range.

MR. BROOKMAN: Thank you.

Okay. Do you want to set up the next item?

Oh, Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock,

EEI.

And again, I appreciate the tables that you put out. I guess, again, I kind of think of this from the end-user. If there are -- how do I say it? -- if there are different metrics, but they sound alike, if they are all saying they're pump efficiency, but they really tested differently, I am a little worried about possible customer confusion, just because if one thing is 81 percent and the other one is 83 percent and another one is 85 percent, but if there are different tests, and they might need different things in terms of energy consumption, again, as we go down, I think there should try to be a way to make sure that there is minimum confusion for the end-user customer, that if one is 83 and another one is 81, the customer would say, okay, the 83 is going to be more efficient. And I just want to make sure it is going to be more efficient for the customer.

MR. BROOKMAN: Alison?

MS. WILLIAMS: Sure. I mean, I have kind of reviewed all these. So, that is moving on kind of to the other regimes.

MR. BROOKMAN: Hang on a second. Let's make sure.

MS. WILLIAMS: Yes.

MR. BROOKMAN: Look at the page, please. Item 1-29, 1-30, and 1-31. Let's make certain we have gotten the comments that we wish to get here.

Greg?

MR. CASE: On 1-29, again, echoing the comments from 1-28, we would like to remain harmonized as much as possible with EU. So, if we can stay in that range, we would like to stay there.

And it is, again, supported by the ANSI/HI allowable operating region document. So, instead of expanding that to a larger range, we would like to stay within that range. That is the preferred operating region. That is where pumps operate, where we tell our customers that is where they should operate their pumps.

MR. BROOKMAN: Okay. Thank you.

Albert?

MR. HUBER: Albert Huber, Hydraulic Institute.

I would like to point out that, if you are asking here if you can broaden the efficiency curves, if you broaden the curve, then your peak efficience or the BEP will drop by design. So, you will be defeating the purpose. The whole purpose of energy efficiency in pumps is to operate the pump at its BEP. And to broaden it out, so you lower it, you are defeating the purpose.

MS. WILLIAMS: Just to clarify, we are not necessarily suggesting broadening the curves. You could suggest other points between 75 and 110.

MR. BROOKMAN: Go ahead, Greg.

Do you wish to follow on, Albert? No?

Greg?

MR. CASE: Also, the possibility of using a weighted average, we could create a pump curve that had a weighted average that had a higher peak value, but was not as broad. So, it wouldn't be as applicable over a larger flow range.

So, the reason the house of efficiency was created was to create wider high-efficiency zones on pumps, so they could be applied over a wider range of flows and still maintain a high efficiency.

We can design pumps that have a very high peak efficiency and a very narrow band of efficiency. And I don't think that is where you want us to go.

MR. BROOKMAN: Okay. Got it.

MS. WILLIAMS: Okay. So, the next comment, 1-32 is about Regime 2, whether overall efficiency at 3 points would be an appropriate metric for that regime.

MR. BROOKMAN: Greg?

MR. CASE: Greg Case with Hydraulic Institute.

The Hydraulic Institute believes that this would increase the testing burden on manufacturers. These costs would also be passed on in the market. So, these costs would go up to the consumer, as we had to do all these different tests, possibly different vendors for multiple motor manufacturers, et cetera.

MR. BROOKMAN: Okay. Joanna?

MS. MAUER: Joanna Mauer.

I guess I am a little confused about Item 1-32. For pumps sold with a motor and VSD, I would imagine that you would want to have test points where the pump is operating at a lower speed.

MS. WILLIAMS: Right. So, we are requesting comment on whether we should add additional test points below 75 percent for that reason, to capture lower speeds that the pump or the VSD might be running at.

So, to clarify, the EU approach is testing at the same speed for all three points, but DOES could consider testing at different speeds to meet either of those same points or different points.

MR. BROOKMAN: Neal?

MR. ELLIOTT: This is Neal Elliott, ACEEE.

Clarification here: once you change the speed at which the pump is operating, you change the BEP, correct? You are going to move it down? So, we need to be careful here in our terminology. When we are saying this, you know, when you change the speed of the pump, you change the pump curve. It is not the same flow or pressure or these factors. So, it is a little more complex. I think we need to be clear about that in how we communicate it.

MS. WILLIAMS: So, to be precise, it should be intended to be 75 percent of the BEP flow at full speed. So, you would, then, potentially -- again, these are just considerations -- you would reduce speed to the equivalent.

MR. BROOKMAN: Did that make it more clear? Go ahead.

MR. ELLIOTT: I guess the point we need to be cognizant of is, when we are talking about the multiple testing points, that may be multiple testing points at multiple speeds, if we are talking about a VFD because we will have multiple BEPs at different speeds. And I don't know that that matters hydraulically.

MS. WILLIAMS: Right. So, I mean, that can be worked out, right? I mean, I think what was considered in the framework document -- and again, we are open to other suggestions -- is you might test the 100 percent point at full speed, 75 percent at 75 percent, or, you know, at a reduced speed equivalent to 75 percent flow at full speed. Sorry. It is a little confusing. But you wouldn't necessarily have to have multiple points on the same reduced-speed curve.

MR. BROOKMAN: I want to make sure we drag this to the ground before we are finished.

(Laughter.)

Go ahead.

MR. FERMAN: Yes, Randal Ferman, Ekwestrel Corp Consulting.

MR. BROOKMAN: Go ahead. Get to the microphone. We need this on the record.

And then, I am going to Rodney.

MR. FERMAN: Okay. I just wanted to, hopefully, clarify this point about operating at multiple speeds.

MR. BROOKMAN: Yes.

MR. FERMAN: In a pure friction system curve, which is fairly common in the smaller pumping systems, you drop it to a lower speed and the pump is still at its best efficiency point, if it was sized at its best efficiency point at full speed. So, there may be no issue as far as dropping speed relative to the pump performance curve itself.

MR. BROOKMAN: Mike, there is a microphone right there. The Mike Rivest follow-on.

I haven't forgotten you, Rodney.

MR. RIVEST: Yes, Mike Rivest, Navigant Consulting.

So, this boils down to how we define efficiency. What we are trying to achieve is energy savings. So, if we operate the pump at a lower speed and lower efficiency but we consume less energy, then that is our goal. So, I don't think -- I am seeing heads saying yes.

So, the question we are trying to answer is, what are the points, the test points, we should be looking at that would best reflect how systems operate, so that we capture the energy use?

MR. BROOKMAN: I am going to go to Rodney, unless you want to let him follow on.

Gary? Go ahead.

MR. FERNSTROM: This is Gary.

I am definitely with Mike on this. This is complicated, and we are talking about two different things.

So, with the pump running at a fixed speed, perhaps its maximum speed, to get this house of efficiency, we would like to see how it performs when it is a little bit underloaded and a little bit overloaded, the presumption being that in a lot of cases in real application it is going to be a little bit underloaded.

MR. BROOKMAN: Uh-hum.

MR. FERNSTROM: However, when you connect the VFD, the overall efficiency is how much clean water you move per unit of energy that is consumed. And pumps that operate at a lower flow and a lower total dynamic head are fundamentally presenting a greater system efficiency than ones that are operating at high flow and high head. So, somehow in our metric we would like to capture this.

So, it is complicated. I think it merits a lot more discussion and thought. But we want to make sure we get the right metric. In my mind, it aligns with what Mike is thinking.

MR. BROOKMAN: Rodney?

MR. MRKVICKA: Rodney Mrkvicka, Smith & Loveless and the Hydraulic Institute.

With respect to the points that you have there, BEP 75 percent and 110 percent, that associates to the pump or the bare pump efficiency as itself. So, the bare pump will be evaluated against those points through what was mentioned earlier, the MEI, or Minimum Efficiency Index. So, that is the bare pump.

When you put it into an extended product, you now have taken that extended product and you are evaluating against its system or load curve. From that standpoint, that unit has to operate to a system or load curve for whatever use it has been put into.

The points, then, that the EEI evaluated, is evaluated against, is a load curve set of points, not these BEP points. So, what is up there as 75 percent and 110 percent are just on the pump head or the MEI side. EEI will be evaluated versus a load curve, and that will be different points over the load, whether that is flow or pump head. That varies through for whatever system you are going to apply this into.

When you do that, and to mention the same comments that were mentioned earlier, the extended product is to save energy. And the amount of energy saved of a controlled product system versus an uncontrolled product system is what we are trying to achieve with the extended product. And that is where we get that 10-to-1 ratio of greater energy savings going ahead.

So, the points that here relate just to the bare pump evaluation or the MEI index. Our intention is to have various load profiles that the extended product will be evaluated against to tell you what the energy usage is, and the EEI will end up being a ratio between controlled and uncontrolled energy usage on that system.

MR. BROOKMAN: Okay.

MS. WILLIAMS: So, just to clarify, in the framework document we are discussing some options. You know, we are starting with the 75 and 110, and there is a table and a figure about how the different metrics for Regime 2, or particularly Regime 3, could create a metric based on different load points. So, DOE is certainly interested in any feedback on what those load points would be.

MR. BROOKMAN: Are you on this point? Okay, Steve Rosenstock.

MR. ROSENSTOCK: Steve Rosenstock, EEI.

I think at some point -- you know, this is obviously a very big test procedure question. I think you have the wonderful charts. If you show a table or chart that shows the test procedure and how it might operate for each of the different types of systems, pump alone, pump with motors, pump with VSD, and just show, I will say, the test conditions, I think that will help everybody in terms of, you know, will you be able to show the savings with the VFD, yes or no; will you be able to show the savings with a more efficient motor, yes or no? Once that is out, I think that will help answer a lot of questions.

MR. LLENZA: This is Charles Llenza from the Department of Energy.

The test procedure process is parallel, but it will have its own formats for meetings, for comments, et cetera. We welcome as much advance comments as to the nature of what we should be including, how complicated it should be or not be, and, also, streamlining any tests that are out there, integrating them into the DOE test procedure in such a way that we don't create any additional burdens, where possible.

MR. BROOKMAN: Well, I think we have kind of clarified the intent of these questions here. Do we have any other specific comment before we move on?

(No response.)

We are moving on.

MS. WILLIAMS: Okay. So, just the final comment request on this item is any issues that result from having different metrics for pumps sold alone and pumps sold with motors and VSDs. I think that was discussed a little bit already.

MR. BROOKMAN: Yes. Any amplification? Go ahead, Rodney.

MR. MRKVICKA: Just a statement. Oh, I'm sorry. Rod Mrkvicka from Smith & Loveless and the Hydraulic Institute.

The Institute doesn't anticipate any issues between pumps sold alone and pumps sold with motors and VFDs or the extended product, as we defined it, because we are stating that the pump, it has to meet an MEI, Minimum Efficiency Index, either way, whether it is sold alone or in an extended product.

MR. BROOKMAN: Aha. Okay. Okay.

MS. WILLIAMS: Okay. So, just to move forward with the potential implementation methods, DOE is considering whether to follow the EU approach where any standard would be a function of flow and specific speed. DOE could also explore other parameters, such as head.

DOE has done some initial analysis in comparing the U.S. market to the EU market to look at the EU surfaces. As I mentioned before, this is based on data that we pulled from the PUMP-FLO software to find all these different pump models we could look at.

So, our first comparison is if we create our own surface using the same form as the EU and compare it to the EU. So, we have both the 3D version on the left, which may or may not rotate. Okay, never mind.

(Laughter.)

And on the right, it is a 2D version of that where we are looking at a few different specific speeds. So, the left is specific speed versus flow. And just because that is a little bit hard to see, the right is a comparison at a few different specific speeds between surfaces that we developed with U.S. data and the EU surface.

And again, these surfaces are just kind of show a methodology. Any information we got about pump models would change these surfaces.

(Computer problem.)

We may need a break.

(Laughter.)

MR. BROOKMAN: Do you think it is stalled at this point?

MS. WILLIAMS: I am going to close it out and reopen it.

MR. BROOKMAN: Just if you are

curious, shortly we are going to be pausing for lunch because we are due for lunch.

(Laughter.)

MS. WILLIAMS: Okay. So, because the U.S. market and the EU market do not appear to be completely identical, we have been exploring other methods. So, we could either use the same surfaces as EU and just change the C-values to move the surface up and down or we can actually create our own surfaces for the U.S. market that are specific to individual product classes and actually specific to the efficiency level.

So, again, you can see the 3D surface. I am not going to try to play this movie, I guess. They are really cool, though.

(Laughter.)

Basically, the 2D slice is showing you that the surface can flatten from bottom to top of market because high flow pumps generally max out their efficiency sooner because they can reach higher efficiencies.

So, DOE has the ability to kind of follow the EU approach, but make it a little more specific to both the U.S. market and more accurate, specific efficiency levels.

MR. BROOKMAN: Steve, please.

MR. ROSENSTOCK: Steve Rosenstock, EEI.

So, at some point, there would be, I will say, three graphs, one at BEP, one at 75 BEP, and then, one at 110 BEP possibly?

MS. WILLIAMS: Well, so the EU didn't actually do that. They only have the graph at BEP. Someone can correct me if I am wrong. And then, they just have a multiplying factor. So, .947 and .985.

MR. BROOKMAN: Okay.

MS. WILLIAMS: So, DOE requests comment on this implementation methodology, including whether flow and specific speed are the appropriate parameters, whether they should maintain the same surfaces, or adjust them, or make them most appropriate to the different efficiency levels.

MR. BROOKMAN: Mark, is this you? No?

Greg? Thank you.

MR. CASE: Greg Case, Hydraulic Institute.

We would support staying with the EU equation except for that C-factor at the end. Again, from the result of harmonization, we would like to do that.

We also have done our own survey of our members, and we have 2,000 data points over all classes of pumps. With that, we found that we got a reasonably-good dropout rate.

Now one of the things that is much different from what you did than what the EU did was you don't have any dropout rates here. You have got a centerline that kind of goes through the middle of the data. You have got a top of market, and you have got a bottom of market. There are no MEI values in here.

So, I found it very difficult to try to equate what you got with what the EU has proposed. And so, that makes it kind of hard to know if your surfaces are better or worse than their surfaces.

I would have to agree that we could get equations that fit this data better, but in an attempt to harmonize with Europe and also reduce the burden to manufacturers of having to meet multiple different equations that they are going to have for each equipment class, the Hydraulic Institute would prefer that we just use that C-value to change things.

And we also found that our C-value was different than the European C-value, but it is still a very simple change to move that vertically on those C-values. I don't know if you have data on how far off theirs was. I mean, you have to assume in your analysis that your median and your mean were equal for your analysis to work, and I don't know that we can assume that.

MS. WILLIAMS: I mean, so just conceptually our average surface I showed would be equivalent to the EU MEI 50.

MR. CASE: But, again, you have to assume that your median and your mean are the equal, and I can't take that leap of faith.

MS. WILLIAMS: Also, just a point of clarification, I mean, if you are changing the C-values, you are still not exactly harmonized with the EU, right?

MR. CASE: That is correct. There would have to be two --

MS. WILLIAMS: So, regardless of how you change it, you are not harmonized.

MR. CASE: Yes, but you don't have to change the seven variables instead of just the one. They have different C-values for different motor --

MS. WILLIAMS: Right.

MR. CASE: -- or different equipment class and different speeds. And we would just propose that, for our speeds and our equipment classes, we would have a C-adjusted value. The C-factor would be adjusted. That would be our preference as manufacturers.

MR. BROOKMAN: Greg, did I hear you correctly? Did you say your survey has 2,000 data points?

MR. CASE: We have 2,024 data points.

MR. BROOKMAN: Can you provide those to the Department of Energy?

MR. CASE: We will provide those to the Department of Energy and, also, those are within the scope that we proposed. That doesn't go beyond that scope.

MR. BROOKMAN: I got you. Well, that is still a hell of a start.

(Laughter.)

Ken, go ahead.

MR. NAPOLITANO: Yes, I would like to just follow up on that. And we took this up at the recent Hydraulic Institute Board meeting.

So, as Greg said, on the scope that we had originally proposed -- so, it didn't include ANSI pumps, et cetera -- we went out and got a large group of the HI membership who participate in that class and confidentially gathered all that technical data. It was a huge effort. And we had an independent third party aggregate the data.

We believe it is, for that scope, very statistically-significant, an accurate representation of the baseline, the current state.

And we recently, through vote of the Board, have agreed to provide the DOE with that data, and at least for that scope of pumps, wherever the scope shakes out, we would recommend using that as the baseline because we have all validated that data.

MR. BROOKMAN: Okay. Thank you.

Do you have any questions before I

move on, Alison?

MS. WILLIAMS: No, and the subsequent questions are basically asking for what we are talking about, additional pump data that would help improve our database at full speed BEP flow, 75, and 110.

MR. BROOKMAN: I thought that was pretty clear. You don't have any clarifications on what they said, no?

MS. WILLIAMS: No. Just move on. Sorry.

MR. BROOKMAN: Okay. Yes, Greg?

MR. CASE: Greg Case, Hydraulic Institute.

One more comment. We noticed in your data that you have 27,000 pumps listed. When Europe did their survey, they had 2,300-plus.

MS. WILLIAMS: Yes.

MR. CASE: We have 2,024 in ours. So, we believe that your dataset may be a lot larger than what the dataset actually is out in the universe.

MS. WILLIAMS: Yes. So, just to clarify, it does include multiple-speed and multiple-stage versions of basic pump models. So, it is something we will work to refine in the future.

MR. CASE: But you have over 2,000 pumps in one style of pump.

MS. WILLIAMS: Uh-hum.

MR. CASE: And we didn't come anywhere near that. Again, you had a larger scope than we did, but I just want to make --

MS. WILLIAMS: Yes. I don't think the scope is all that much larger, but, yes, it is coming from 115 manufacturer catalogs and all their 60-hertz models at full impeller. So, I can't answer to discrepancy.

Okay. So --

MR. BROOKMAN: Wait. Are we there? Have you got one more? Yes, one more.

MS. WILLIAMS: Sure. Okay. So, just to follow up, DOE is considering following the EU, also, on the other things of basing the standard on full impeller and testing based on certain number of stages for radial split and submersible pumps.

And just to mention that we don't think the axial split multi-stage could be tested in one stage version because they are not cellular in nature.

So, we are basically requesting comments on these suggestions.

MR. BROOKMAN: Greg?

MR. CASE: We would concur that it should be tested at full diameter. That is, again, harmonized with the EU standard. We all do testing at that diameter. The pump is most efficient at that diameter. So, we believe that we should stay with that full diameter. So, that was 1-40.

MR. BROOKMAN: Okay.

MR. CASE: In 1-41, again, we would like to stay harmonized with the EU standard. We think the number of single-stage pumps that are actually sold is very limited. In the EU standard, they use three stages for the radial multi-stage and nine stages for the submersibles. And we found that that is where we took our data points from when we did our survey. We find those values to be reasonable or those stages to be reasonable.

If you test these as a one-stage pump, you are introducing all the efficiency losses for your intake and your discharge into that one stage; that will bring those efficiencies down.

MS. WILLIAMS: Yes. Just to clarify, the suggestion was, the alternative would not necessarily be to test a single stage, but to test in whatever configuration you are selling your pump.

MR. BROOKMAN: No? Okay.

And then, finally, 1-42. Comments on that? Steve?

MR. SCHMITZ: Thank you.

Steve Schmitz, Hydraulic Institute.

The Hydraulic Institute does not have information regarding the percent of pumps sold at full impeller diameters, for a number of the reasons that have already been stated. But we would be happy to cooperate with DOE in a joint analysis of obtaining this data.

MR. BROOKMAN: Additional comments here? Anything?

(No response.)

So, we have reached a point where we can pause for lunch.

And let me say that this has been an unusually effective comment at the framework stage. I think it is a very, very useful gleaning of information. And so, I thank all of you.

Don't go anywhere after lunch.

(Laughter.)

It is now 12:30. It takes just about an hour to eat if you stay in the building. If you leave the building, you need to clear back through security and all that. Don't do that. We can all go en masse down the elevator and across about 100 yards that away to the big cafeteria. There is also a Subway shop directly below us on the ground floor. You need to go to the ground floor in any case to get to eat.

We are going to resume at 1:30. Once again, let me remind you, you must wear this badge. This room will be locked. So, you can leave your stuff. Someone will be here. It will be locked. You might need an ID to get back in. In the cafeteria, you will have to clear back through a secure portal. So, you might need an ID to get back in.

So, anyway, a very good, very constructive morning. Thank you for that.

We will resume at 1:30 right here.

(Whereupon, the foregoing matter went off the record for lunch at 12:29 p.m. and went back on the record at 1:33 p.m.)

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

1:33 p.m.

MR. BROOKMAN: As a tool, and to provide information, the Department typically makes a Xerox copy of the business cards of all the individuals who are present. And so, Brenda Edwards just distributed that. And if you didn't get one, I am sure you can get your hands on a copy. So, that should be there for you as a reference document.

So, we are going to proceed, and we are going to pick up where we left off and hear about test procedures. We are going to hear from Sarah Widder.

MS. WIDDER: Good afternoon.

As Doug said, I am Sarah Widder from Pacific Northwest National Lab.

It looks like we haven't quite gotten everybody back. So, we will try to breeze through this before we get everybody.

(Laughter.)

No, I am just kidding. I hope we

don't have any comments.

(Laughter.)

But, hopefully, we have been through a lot of the main scope-related issues in this morning's discussion that are going to be pertinent to the test procedure. So, I would like you to keep those in mind.

And the first point of the test procedure is that, as Charlie mentioned, this is going to be a separate, but concurrent rulemaking process. The test procedure rulemaking and the standards rulemaking really work together. We need those well-described test procedures to understand the basis for how we build up that metric for pumps and how we understand, then, the ability to save energy based on those metrics.

So, the test procedure is very important for the standard, but it is going to occur as a separate process. That will start with a NOPR document that will be published, probably the next document you will see out of this effort.

And then, we will have a NOPR public meeting just like this. And that will be the opportunity to really get into the weeds on some of the technical details.

Right now, we are just going to stay a little bit higher, talking about scope and what we want to start to think about for the test procedure.

I sort of described the relationship between the standards and the test procedure, but once the pumps test procedure is established, every manufacturer must use that test procedure to establish the efficiency metrics and to show compliance with DOE standards, once those are set. And so, it is really important that we think about both the scope and the burden associated with these test procedures.

And as a basis, DOE really looks out to the industry, what is available in the industry. We want to minimize burden with the test procedures and have them have the flexibility to establish perhaps efficiency at multiple speeds or multiple rating points, if that is what we need to sufficiently describe the energy use or energy efficiency of a pump, but do that with the least amount of additional burden.

So, the first standard, industry standard test procedure, and probably the most prominent one that DOE reviewed, was HI 14.6, and you have heard that brought up. That is the test for rotodynamic pumps, and it is an acceptance test, that is really the framework it is written from currently. It applies to any size centrifugal, mixed-flow, or axial-flow rotodynamic pump without fittings and is particular to pumps that use clear water.

It does have provisions for using alternative homogenous liquids, but since we are preliminarily considering pumps just for clear water applications, we will just be using -- the standard would be sufficient to test those pumps. It is based on measuring the flow of the pump's liquid and, then, the power input to the pump to measure efficiency.

That is harmonized with an ISO Standard 9906 that was recently updated and has several grades of precision. Those two standards, as you have heard, are harmonized and have very similar test requirements and test metrics, as well as definitions.

The one thing that 14.6 doesn't address very well is submersible pumps. HI has a separate standard for that, 11.6. It has similar metrics and test conditions. It is also harmonized with the 14.6 test for rotodynamic pumps, but it is particular to submersible pumps where it is very difficult to measure the power input to the shaft because that is all one package. And also, it is particular only to clean water.

DOE also reviewed the ISO Standard for precision class testing, using a thermodynamic method. There could be reasons to consider a method like that if it is a very, very large pump where it is difficult to measure flow precisely. So, instead of measuring flow based on a flow measurement device, it is measured based on thermodynamic principles of temperature and pressure of the water.

So, in reviewing those standards, DOE is considering using HI 14.6 as the basis for the test procedure rulemaking since it seems to be a widely-accepted test standard for pumps and covers most of the scope of pumps we have been discussing here today.

DOE requests comment on using HI 14.6 2011 and HI 11.6 for submersible pumps. We also request comment on the other standards that we reviewed or any other standards that we may not have listed here that would be important for DOE to be aware of as we move forward with the test procedure rulemaking, to make sure that we are considering all the available procedures.

We also request comment on the scope of these test procedures, if there are any particular elements that they are not appropriate, or the comment earlier about making sure we are able to quantify the performance of pumps that are driven by gas or engines as opposed to electric motors might be something that we will have to consider as we move forward.

And then, DOE is also interested in the pros and cons of the thermodynamic approach and when that might be more appropriate than explicitly measuring flow.

MR. BROOKMAN: Let's start with 1-43.

Arnold Sdano?

MR. SDANO: Arnold Sdano, Pentair, representing HI.

MR. BROOKMAN: Is that turned on (referring to the microphone)?

MR. SDANO: Thank you.

MR. BROOKMAN: Thank you.

MR. SDANO: Arnold Sdano, Pentair, representing HI.

At HI, we have developed a formal, written response to this that is a little wordy. So, just to summarize, as mentioned previously, we have started the efforts or drafting a 14.6 DOE because we think that that is appropriate. And what it is is a condensed version of the 14.6 standard, focusing on what is required for this Committee's work, where we eliminate things like the mechanical tests and NPSH and the effect of reducing impeller diameter.

And towards that end, on the extended product approach, we are expanding the Appendix G, which is for string testing, where we would include the scope of submersible pumps or testing with motors and VFDs in that appendix as well.

So, all the appendices that were not normative in the existing standard are going to be made normative in this standard.

That draft has been presented to the Subcommittee at HI that had prepared it. I am starting to get comments back to that, and we expect to have that ready to present to the Department along with the deadline for these comments by, I think it was, May 2nd.

MS. WIDDER: That is very helpful. Thank you.

MR. BROOKMAN: So, you have adapted and, as you said, condensed. Is it much different than the existing HI 14.6?

MR. SDANO: What it has done is it has focused-in on what we believe are the pertinent criteria, Grade 2 testing, Grade 2(b) acceptance criteria. It doesn't reference anything of MEI because we understand that that has to be sorted out later, you know MEI 10, or whatever the level is going to be, nor does it get into what the EEI might be as acceptance levels. But it sets the protocol, the calibration periods, the instrumentation and accuracy, the instrumentation fluctuations that are required.

MR. BROOKMAN: Excellent. And you did not comment on 11.6 and the two ISOs that are listed in Comment 1-43.

MR. SDANO: The elements required out of 11.6 are going to be included into the Appendix G, which is for string testing. Considering that the pump and the motor are a combined-unit in submersibles, we think that is an appropriate area to include that. Ninety percent of those two documents are the same already. So, it is the perfect place to include that.

But the thermal method is something that we disagree with wholeheartedly; that is not, in our experience, used in the United States. And the fact that it has a publication date of 1999, and since ANSI standards come under a five-year review, a ten-year cycle, I would suspect it is probably in withdrawn status.

MR. BROOKMAN: I see. Okay.

John Cymbalsky?

MR. CYMBALSKY: Thanks. John Cymbalsky, DOE.

I just wanted to reiterate a little bit what Sarah said about representations of your products with respect to efficiency. When you are developing this test method, and as we develop ours, I just want to make it clear that any representation that you want to make with respect to the efficiency metrics in the DOE standard must use the DOE test procedure. So, keep this in mind as you are developing your test methods.

MR. BROOKMAN: Okay. Yes, okay.

So, other comments related to 1-43? And then, we will proceed on down this comment box.

(No response.)

Okay. We are moving on, -44 and -45.

(No response.)

Nothing additional?

Did you want any additional queries?

MS. WIDDER: I am looking forward to the HI submission of their revised test procedure. I don't think I have any additional specific comments at this point.

MR. BROOKMAN: Okay. Then, we are moving on.

MS. WIDDER: Okay. And this is consistent with what you heard this morning. DOE is considering an extended product approach that might consider the pump inclusive of the motor and VSD, a pumping system, in addition to or instead of the pump all by itself, if the pump is sold that way from the manufacturer.

If that is the case, then I understand that HI is expanding Appendix G, which is the string test, to be more specific about how to determine the overall wire-to-water efficiency metric that would be applied to those pumps. That would account for the pump efficiency as well as the motor efficiency and the VSD efficiency.

Some things to think about for that particular metric, and if we include VSDs, are, as we discussed this morning, the particular test points that would effectively and sufficiently capture the energy use of a pumping system with a VSD, such that it wasn't overly burdensome for the manufacturer producing that pump.

That is really all I have to say about that. I think we have talked a lot about some of the issues associated with testing pumping systems, as well as pumps by themselves, and that it could be very burdensome for manufacturers if multiple tests are required. And so, making sure that those tests are streamlined and, as Alison mentioned earlier, perhaps developing a test that we could test a pumping system and capture the pump efficiency as well as the wire-to-water efficiency on one stand in one test, and having those requirements all in the same test procedure, would be something that DOE is very interested in, if this extended product approach is considered.

So, really, specific comments about that and particularly the burden associated with multiple test points and how much it costs to produce a test. The DOE, as you will hear about later on, really considers manufacturer burden in the test procedure as well as standards rulemaking. And so, data related to that will help us craft the proposal that will form the NOPR test procedure. So, I would put a request for that as well.

MR. BROOKMAN: Gary Fernstrom?

MR. FERNSTROM: So, Gary Fernstrom, the California Investor Owned Utilities.

I would encourage DOE to consider for this particular category, pump plus motor plus VSD, an energy-efficiency approach similar to what Mike was talking about earlier which would compare the amount of water pumped, the volume of water, to the electric energy required to pump that.

And in order to do that, you have to take some system curve into consideration, and I would encourage DOE to investigate what might be typical system curves for some common pump applications. That approach is used in swimming pool pumps by the California Energy Commission and Energy Star.

MR. BROOKMAN: Good. Thank you.

MS. WIDDER: Okay?

MR. BROOKMAN: Yes.

MS. WIDDER: The next slide is just related to test procedure accuracy. This is also a very important aspect of the test procedure. One of the most important parts of the test procedure, actually, is that the manufacturers, as well as DOE, can have confidence that this is an accurate and repeatable representation of the energy efficiency of a particular product. And so, if DOE were to test that particular pump and a third-party lab were to test that particular pump and the manufacturer were to test that particular pump, everyone would get the same result. And so, that is something that we will definitely need to consider as we move forward with the test procedure rulemaking.

I forgot the gentleman's name, but from HI who mentioned considering Grade 2 in the HI 14.6 DOE draft. That tolerance and uncertainty criteria, if that is something the industry is comfortable with, we can definitely base the uncertainty measurement and the tolerances that DOE adopts on something that already exists in the industry. And that would work well for everyone. But we need to make sure that gives DOE as well as the manufacturers the right level of certainty that we have a repeatable test.

The Department, in their

investigation, understands that some smaller pumps, less than 10-kilowatt hours, can have higher uncertainty or higher variability in their measurement of efficiency. And that is something the DOE will have to consider when forming this test procedure. We could consider wider tolerances, which is currently what is in 14.6, on the particular rating or on some of the measurement criteria, or - DOE requires a certain number of products to be tested to form a certification for each product - And so, you could increase the number of products or pieces of equipment that were tested for a particular rating.

And so, those are some of the things that we will be thinking about as we move forward in the test procedure rulemaking, and DOE encourages comments on those as well.

MR. BROOKMAN: Neal?

MR. ELLIOTT: Neal Elliott, ACEEE.

Just looking back and remembering some of the challenges that we encountered with the motor rules a decade-and-a-half ago in terms of reproducibility, I think it is going to be important for the testing community, the industry, and DOE to work together to do the reasonable round-robin testing, so that we actually have a sense of what is normal product variation, what is normal test variation facility-to-facility.

Unfortunately, as you start combining pump testing with the motor and other associated components, as my colleague, Kitt Butler from Advanced Energy, can speak to, we have got a lot of variables, both from the test as well as in the product itself. So, I think to the extent the industry, DOE, and the testing community can come together to produce some kind of an understanding of what is natural variation, I think that would contribute substantially to making this work.

I think for the Department to create unrealistic tolerances on the testing could potentially be a major problem.

MR. BROOKMAN: Okay. Thank you.

Okay. And perhaps 1-47 has been addressed already.

Do you want to set up 1-48?

MS. WIDDER: Sure. So, we did talk about DOE's Request for Comment on applicable test procedures for the complete motor package. DOE also requests comment on the accuracy of different measurement equipment. And I think the comment we just heard was answering that to some extent, about the different contributors to uncertainty in the test, both product variability as well as test variability. And we will certainly want to consider those and would love to work with industry to develop appropriate tolerances and uncertainty for pumps.

MR. BROOKMAN: Additional questions or comments before we move on?

Yes, Arnold?

MR. SDANO: Arnold Sdano, Pentair, representing HI.

Most pump manufacturers that are members of HI are already performing the extended product tests for customers. Typically, it would be a wire-to-water, and it would include losses of the variable-speed drive and the motor and the pump itself.

What we have learned is that we do have to upgrade some of our instrumentation, so that, particularly on power analyzers, the newer generation of power analyzers in front of the VFD are what is required in order to accurately measure that and to avoid the destruction that the VFD can cause to the power readings, if you attempt to measure them some other place.

But it is really something manageable and within the scope of what most of the HI members are doing today.

MR. BROOKMAN: Thank you.

Yes, other thoughts on 1-48, the equipment needed, changes that might be made, et cetera?

Gary Fernstrom?

MR. FERNSTROM: Following up on Pentair's comments, many of these VFDs are introduced on linear wave forms into the utility system. So, it would be important to measure their power and energy use with true RMS power-measuring equipment.

MR. BROOKMAN: Okay. Thank you.

MS. WIDDER: Thank you.

MR. BROOKMAN: Additional thoughts?

(No response.)

We are a little bit behind. So, let me keep pressing us forward here.

MS. WIDDER: All right. The next Request for Comment relates to the applicability of calculation methods. For some types of equipment, DOE has considered alternative methods of rating equipment or coming up with a certification for DOE that has to do with rating one representative piece of equipment, and then using that rating, that tested piece of equipment, to extrapolate ratings for other similar types of equipment if there is appropriate calculation methods that can be applied. There is an appendix in 14.6 that does address this somewhat for pumps that have similar geometric and kinematic characteristics.

And so, DOE is requesting on comment on the applicability of that appendix or any other calculation methods to establishing reliable ratings for pumps or if testing every piece of equipment, every basic model is the right approach.

MR. BROOKMAN: Arnold?

MR. SDANO: One of the things we have done in this draft of 14.6 DOE is we have extracted the model test section that I believe you might have been referring to. However, we do believe that the calculation methods are mostly appropriate. Generally, what we do as pump manufacturers, and we have somewhat of a luxury over perhaps the motor manufacturers, of what they have experienced, in that we are producing product basically off of patterns that pretty much define the geometry of a particular pump. And so, we will test a particular pump in the development stage, go back and modify the patterns, if required, and retest it until we get through -- and my company refers to it as a PPAP process or the first article inspection.

Once we get it passed, that is kind of locked down, and we really only need that one sample pump to base our curves on that we go to the market with. And that is typical throughout the pump industry. But I might only test a three-stage turbine, knowing how I would extrapolate it for a one-stage up through a nine-stage. And so, you know, I am using that basis of that test and extrapolating it using our calculation method.

MR. BROOKMAN: Okay.

MS. WIDDER: Thank you.

If any other pump manufacturers - maybe not now, but in their written comments -

have similar experiences, and DOE would also be interested in any sacrifices of accuracy that a calculation method would be incurring.

MR. BROOKMAN: From Arnold's comment, I wasn't sure -- your company does it one way, or is it fairly uniform?

MR. SDANO: I don't know of any variations from company-to-company. I believe we use very similar processes.

MR. BROOKMAN: I just thought I would inquire. Okay.

MS. WIDDER: Okay.

MR. BROOKMAN: Yes. Good.

MS. WIDDER: The last Request for Comment is on the number of unique pump models manufacturers would have to test. And this could be with or without the calculation method that we have just described, since we are interested in the ability of that calculation method to reduce test burden, and what the burden would be without that calculation method.

We are also interested in, when we talk about overall wire-to-water tests, the additional burden that might be required at additional test points, and any comment related to that burden is welcome.

MR. BROOKMAN: Arnold?

MR. SDANO: So, just to repeat, some of the pump manufacturers are going to upgrade their instrumentation to do the extended product approach, and that you need a higher-quality power analyzer upfront.

Yes, there probably are additional points. We find that frequently on extended product approach right now, where customers insist on multiple points at different speeds, but it is not an undue burden. It is something that we face every day. It is an everyday occurrence already for us.

MS. WIDDER: So, just to clarify, that is not really an incremental burden? It is something that is common in the industry, although it is I don't believe normative in the standard right now?

MR. SDANO: That is correct.

MS. WIDDER: Okay. Thank you.

One other quick question, add-on on the burden question. We talked previously about tolerances, and the DOE understands that additional, tighter tolerances would increase burden. You would need more precise measurement equipment and could require more tests. And so, how different levels of certainty or uncertainty in the test relate to burden is also very helpful.

So, for example, in HI 14.6, if we were to move to, say, a Grade 1 tolerance versus a Grade 2 tolerance, or down to a Grade 3 tolerance, what does that do for the cost of testing, the burden of testing, from a manufacturer's perspective, so we can make an informed decision about what the right tolerance level is?

MR. BROOKMAN: Arnold?

MR. SDANO: Right now, since HI, as

members, we test to 14.6, our customers come in and audit us against 14.6, and 14.6 defines the requirements. When you get in excess of 200 horsepower, you are going to be to a Grade 1 already. Those pump manufacturers that make that equipment of the higher energy levels, we already have the instrumentation that complies with that.

And on the other hand, if it is an ANSI-pump manufacturer and generally lower horsepowers, you know, they might have much of their product shipping as a Grade 3. And so, it would have to be an upgrade to meet what we are proposing for the 14.6 DOE.

But the bulk of the manufacturers fitting within the scope as suggested, that the Grade 2 and 2(b) acceptance levels would fit right in with what we do daily.

MR. BROOKMAN: Okay. Thank you.

MS. WIDDER: Thank you.

MR. BROOKMAN: Additional comments on this stream of content?

(No response.)

Okay.

MS. WIDDER: Yes, I am done. So, now I think I am inviting Alison back to the podium to talk about, to introduce the subsequent rulemaking analyses that DOE will perform to set standard levels.

MS. WILLIAMS: Okay. Thanks, Sarah.

So, whenever DOE does this rulemaking procedure, we go through several analyses that Charlie introduced briefly earlier.

The first one, we undertake, as part of the preliminary analysis, is the market and technology assessment. The purpose of this is basically to characterize the pumps market and the measures to improve efficiencies. So, we look at manufacturers, shipments and trends, technologies that improve efficiency, and different regulatory and non-regulatory initiatives related to pump efficiency.

So, as just an overview of the manufacturers as far as what DOE understands right now, we believe there are 10 companies representing 60 to 70 percent of the total U.S. pump market, and that these companies represent approximately 70 brands or divisions. And we do have in the framework document a list of those major suppliers and their parent companies.

We have also looked at the Census data for pumps that is available through 2010. We don't expect any further data to be available from the Census because they have discontinued that report.

Pages 46 to 51 of the framework document, go through our attempted mapping of Census codes to product categories that we are looking at, allocations of exports and imports to the different product codes because the Census presents only very aggregated import and export data, and estimated percentage of pumps in the Census shipments that are serving clean water. So, we will welcome comment on any of those estimates that we have in the framework document.

And just as a bit of a market overview, the estimate is that 89 percent of shipments of the covered pumps that DOE is considering covering are end suction close coupled, but that is only 35 percent by value, which as a proxy for energy use might be significantly lower.

And so, again, we are just requesting comments on the market assessment. We would like any information on pump features, efficiencies, trends in efficiency, historical shipments, and prices. Bookings data would also be important if shipments are not available.

MR. BROOKMAN: Steve Rosenstock.

MR. ROSENSTOCK: Steve Rosenstock, Edison Electric Institute.

For pumps that are driven by

electric motors that are covered under DOE regulations already specifically talking about especially ones from 1 to 200 horsepower that already have had energy-efficient standards into EPACT '92, DOE is doing another rulemaking for those motors. I believe there was a joint recommendation from -- well, NEMA is not here and the advocates -- in terms of new standards that would go into effect in 2015.

Are you going to use that information to help with your assessment? Or have you included that in a preliminary assessment?

MS. WILLIAMS: We can certainly look at that data that is available.

MR. ROSENSTOCK: Okay. Thank you.

MR. BROOKMAN: Yes, Mark?

MR. HANDZEL: Mark Handzel for the Hydraulic Institute.

Regarding 3.1, the specific information that you are asking for here, Alison, you know, the Hydraulic Institute does not have that data. It really resides with each of our individual members.

It would be a considerable undertaking to try to gather it. I think that is why you are asking for it, is because you have figured that out.

MS. WILLIAMS: My understanding is that HI does have M10 booking data, though.

MR. HANDZEL: So, understand that M10 bookings data is collected in sales dollars.

MS. WILLIAMS: Uh-hum.

MR. HANDZEL: So there is no unit volume information. So, it is not going to give you complete information for what you want.

MS. WILLIAMS: We accept proxy information also.

(Laughter.)

MR. HANDZEL: Okay. So, I think we will take that under advisement. In our written response, we will evaluate including that information. Okay? So, that is 3.1.

I have a response for 3.2. Are we ready to move on to that?

MR. BROOKMAN: Yes.

MR. HANDZEL: And, Alison, you have kind of already hit on some of this, but I will just say -- I have a written thing -- the Hydraulic Institute wishes to clarify that, historically, the U.S. Census data has not aligned with the ANSI/HI nomenclature descriptions. So, we cannot provide accurate input on this question.

Furthermore, we want to point out that the U.S. Census data MA333 report was an estimate in the sense that they collected some data and, then, used load factors to increase the data to give an overall number. So, we have concerns about its accuracy.

And then, lastly, you have already said the data hasn't been collected since 2010, and it doesn't sound like it is going to be collected again. So, we just really struggle with the data that is there.

MR. BROOKMAN: But would you be willing to characterize the accuracy of the Census data?

MR. HANDZEL: I am not comfortable doing that.

(Laughter.)

We haven't talked about that as a group. So, I can't really give you an answer on that, though.

MR. BROOKMAN: Okay. Yes, Neal?

MR. ELLIOTT: Neal Elliott, ACEEE.

I would also note that 2010 shipments data was still with the depths of the Great Recession. And so, that data may not be reflective of overall market characteristics. So, it should be dealt with with a great deal of caution.

MR. BROOKMAN: Okay. Thank you.

MS. WILLIAMS: I just also wanted to comment on that. Some of the things we did in the framework with the 2010 data in terms of disaggregation or allocation, if we get input on whether or not those were good, we can apply them to historical Census data as well. So, we don't plan to use only 2010.

MR. BROOKMAN: Did they address 3.3 fully, Alison?

MS. WILLIAMS: It sounds like there is not really any information on it.

MR. BROOKMAN: Nothing additional on that? Okay. Let's go.

MS. WILLIAMS: Okay. So, in terms of the market assessment, one of the things that DOE does is develop equipment classes. Each equipment class is subject to its own standard.

So, here, what we are looking at is equipment classes that DOE is considering. Right now, they are basically aligning directly with the equipment categories that you have seen before, although we do have a design speed addition on the right side. I am going to get into design speed in a couple of more slides.

So, just in terms of the equipment classes, the things that DOE can base them on is type of energy, capacity, and performance. We are not proposing to do type of energy at this point because pumps driven by engines are currently considered just to regulate the pumps themselves regardless of the fuel. Capacity we are not considering because we are considering the standard as a function of flow and specific speed, which would address that. So, we are only looking at performance-related features right now.

In addition, there are comments about this. DOE understands that some of these equipment classes maybe could be aggregated together and some may need further disaggregation. So, we are interested in whether, for example, end suction close coupled and frame-mounted can be a single equipment class because the wet ends are often identical.

So, I will just move to the comment slide. We are interested in 3-4 about other performance-related features that maybe we haven't considered for equipment classes that should be in. And then, as well, in 3-5 or 3-6, different disaggregations or aggregations that should potentially be made to these equipment classes.

MR. BROOKMAN: Maybe you could return to the preceding slide.

MS. WILLIAMS: Yes.

MR. BROOKMAN: Steve?

MR. SCHMITZ: Thank you.

Along the lines of what you have heard previously, HI does not believe that DOE should pursue evaluating different equipment classes, and that we would support maintaining the originally-mentioned descriptions for pump types as it applies to the EU Directive.

MS. WILLIAMS: So, just to clarify, you just mean that you only want those pump types to be considered as equipment classes?

MR. SCHMITZ: Correct.

MR. BROOKMAN: Any other thoughts on aggregations, disaggregations, variations from what is presented in slide 78?

John Cymbalsky?

MR. CYMBALSKY: Maybe I am jumping ahead a little bit. But if DOE today were to just take the EU standard and the EU product classes and apply them as the standard, what percent do you think of the pumps out there now would fall off the market? Do we know that number? I may have asked this at one of our ex parte meetings.

MR. NAPOLITANO: Let me take a shot.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: So, there are two separate questions there. One is, what scope of product by market volume -- I mean, it gets back to the market -- does the EU scope? The question of how many fall out is where you set the MEI index.

MR. CYMBALSKY: Right.

MR. NAPOLITANO: So, the EU standard set initially of .1, which translates to the worst 10 percent of the current state snapshot dropout, and then, eventually, escalates over time to a .4, which means you are taking out the worst 40 percent performers.

So, there are two things. One, scope, how many pumps are you capturing? And then, two, where do you set that MEI index?

MR. CYMBALSKY: Okay. And do you think that the U.S. market is similar in stature to the EU market?

MR. NAPOLITANO: Yes. The discussion that we had earlier -- and Greg will jump in -- around the MEI and the C-factor and the difference between the dataset that they used when they captured the current state of the market of products versus what we captured versus the 27,000 points basically says you can get very close ultimately to that same current set of data, tweak the C-factor a little bit, and then, choose to set your MEI index, which, then, by definition, says whatever that dataset is, I am taking the worst 10 percent out, the next level, however you want to set that. And then, you could ultimately figured out tied to an energy saving.

MR. BROOKMAN: Please, Greg.

MR. CASE: Greg Case, PD-cubed, on behalf of HI.

One of the things that we found when we first analyzed the EU methodology, and we took a small sample, kind of a straw poll of HI manufacturers, we found that we did get the 10 percent and the 40 percent dropout rate when we applied their C-factors to our data, that limited, very limited set of data.

And the reason that that happened was we did it as an aggregate. We looked at all the different pump types. And when we bring them together, yes, we got a 10 percent and a 40 percent dropout rate, just like they did.

When we went and got the larger set of data that we are going to supply to the DOE, and we looked at by equipment class, we got much different fallout rates than they did. And so, adjusting, as Ken was saying, adjusting that C-factor allowed us to get the 40 percent and the 10 percent dropout rates, just like they did, with the adjusted C-factor.

MR. BROOKMAN: Got it.

MR. CASE: Now, as an aggregate, you would probably get close to the 10 and the 40 percent.

MR. BROOKMAN: Okay. Did we get 3-7?

MS. WILLIAMS: No. So, 3-7, we are interested in specific equipment classes that would always be used in variable load applications.

MR. BROOKMAN: Mark, please?

MR. HANDZEL: Mark Handzel, on behalf of the Hydraulic Institute.

Again, we just wanted to clarify that the equipment class does not determine whether or not a pump can be used in variable load applications. Really, the application is what defines this, and there is no other way to explain it. That is just the way it is.

MR. BROOKMAN: The industry representatives seem aligned on this point. It is okay to have a counterpoint here in this room, if anybody has one.

(Laughter.)

(No response.)

Okay. We are moving on.

MS. WILLIAMS: Okay. So, to move on to whether or not design speed should be included as a differentiator of equipment classes, just to note that the EU regulation does contain separate efficiency standards for pumps operating with two-pole and four-pole motors.

Our understanding is that this captures a size effect in which a larger pump running at lower speeds is more efficient than a smaller pump at higher speeds. However, the implication of setting these two different standards results in different predicted efficiency for the same pump running at multiple speeds.

So, DOE is interested in a possible result of this on market shift or other issues and wants to make sure that the way the efficiency equations and standards are set is appropriate for pumps running at different speeds.

And regardless of whether DOE sets equipment classes based on a design speed, there has to be some determination of what speed is used for testing and compliance. It might be difficult to select a single speed for testing because of variation in each equipment class. Another possibility would be to require calculating minimum efficiency at multiple speeds and, then, requiring compliance at one of those speeds, such as the one with the greatest efficiency requirement or the lowest efficiency requirement or the most stringent one.

So, again, we just want to request comment on various issues related to this design speed problem. There's a whole bunch of pages in the framework document that gets into a lot more detail about this that we don't have time to get into right now.

But one of them relates to whether or not it is better to use Reynolds number instead of flow for setting these standards. And again, in 3-9, I already mentioned we are interested in what method of surface-fitting provides the most appropriate predicted or the minimum efficiency for different pumps.

MR. BROOKMAN: Arnold?

MR. SDANO: ANSI/HI 20.3 2009, efficiency prediction method, that is a standard we have. I have chaired that Committee. What we did is we brought all the information we could find in the industry together of how do you predict pump efficiency when we drafted that standard. We went out and polled our members and came up with their efficiency based on equipment class and divided it up that way.

And one of the problems that we saw with using the Reynolds number, or particularly that was extracted from HH Anderson, was that it doesn't reflect the significant change in design when you go from a pure radial volute-type pump to a vertical turbine-type pump, where it becomes a mixed flow. And so, instead of a single hump on efficiency at about 2500 U.S. Units specific speed, in fact, our data showed that we had a two-humped camel, and it was based on a change in design when you got into mixed flow and reflected the difference between volute and a diffuser-type pump.

And so, we recommend going out, and that is what we are collecting data, and based on different pump types, is it a more appropriate method if we would look towards the 20.3? You can see the way we ended up there, and we think that is much more appropriate.

MS. WILLIAMS: So, in terms of 20.3, as I recall, that is just flow and specific speed correction, and doesn't correct separately for design speed, as the EU does?

MR. SDANO: No, in 14.6, in the model section we have already talked about, though, there is a Reynolds number scale-up, but that variation is just minute in comparison to the change in the pump type.

MS. WILLIAMS: Okay. So, is HI proposing to use those design speed equipment classes the way that EU did or no?

MR. SDANO: Yes.

MS. WILLIAMS: Yes? Okay. So, you are proposing -- I mean, I know you don't like to use equipment categories.

MR. SDANO: With different C-factors for different types of pumps.

MS. WILLIAMS: But you --

MR. SDANO: Yes.

MS. WILLIAMS: -- agree with having the different --

MR. SDANO: That is correct.

MS. WILLIAMS: Okay. And so, in the next comment related to that, we are interested in how testing occurs in the EU. You know, if you have a single-pump model that is offered at multiple speeds, what speed do the manufacturers determine to test it at, and any other of these comments related to the speed issue?

MR. BROOKMAN: Greg?

MR. CASE: To go back to 3-9, because we do advocate at HI -- Greg Case, Hydraulic Institute -- we do advocate that we would support the different speeds in the testing. Okay? Because we have found that there are significant data differences between the two, just as you did in your comments.

There are also things that we do design-wise to the impeller to be able to -- or to the pump itself, things like that, with the larger or higher-speed equipment. So, on the efficiency, balance holes, things like that that we might do.

Moving on to the 3-10, we do believe that you should be using separate equations for the multiple speed.

MS. WILLIAMS: And so, then, if you have a pump model offered at multiple speeds, in the EU are people testing at both speeds?

MR. CASE: Yes. And it would have different C-factors based on those two tests. Again, you may sell a pump at four-pole speed and, actually, modify that pump slightly to run at two-pole speed, based on thrust balancing and things like that.

MR. BROOKMAN: Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock,

EEI.

Just again, this is a quick follow-up. Then, would that mean that you would have to test the same pump at multiple speeds and, then, at three BEP conditions? Or are there some calculations in there?

MR. BROOKMAN: Greg?

MR. CASE: You would have two BEPs that you test at but three points on the curve. Most of our testing actually happens on multiple points on the curve, possibly seven or more, when we are running these tests. But we would test at the 75, 110, and the BEP for both speeds, correct.

MR. BROOKMAN: Do you want to set up -- do you have follow-on? I like your questioning. It is good.

MS. WILLIAMS: No, I think that --

MR. BROOKMAN: Did we get 3-11, -12, and -13 yet?

MS. WILLIAMS: They are kind of all related. So, it sounds like the answer to -12 and -13 --

MR. BROOKMAN: And I think they talked about testing and compliance burden, at least globally.

MS. WILLIAMS: Yes.

MR. BROOKMAN: And then, is there any other specific query you want to put out there, based on this comment box?

MS. WILLIAMS: I don't have any.

MR. BROOKMAN: Okay. No additional comments? We are moving on.

Greg?

MR. CASE: We would, again, the testing would be done at nominal speeds, not some intermediate speed. So, we would say two-pole and four-pole nominal speeds at 60 hertz.

MR. BROOKMAN: Sixty? Okay.

MS. WILLIAMS: All right. And just to clarify something I didn't say earlier, the DOE has not yet determined how many speeds or poles it is covering. So, if it decides to cover more speeds, then this would actually break down into additional speeds for six-pole and eight-pole motors, for example.

MR. BROOKMAN: Joanna?

MS. MAUER: Joanna Mauer.

I just want to make sure I understand kind of the questions. Is this about that in some cases the same physical pump can be operated at different speeds? And so, that pump could fall into different, the same pump could fall into more than one equipment class?

MR. LLENZA: The usage of the pump could be more than just one application. That is what I think.

MR. BROOKMAN: That was Charles.

Albert, do you want to take that one?

MR. HUBER: Yes. I mean, you can, but the efficiency is going to be different. And therefore, we would test at all speeds that we were going to be held to. That is what we do today.

MS. MAUER: So, the same pump might be tested at different speeds and certified at different speeds as meeting standards that apply to --

MR. HUBER: Yes, for that speed, yes.

MS. MAUER: -- different product classes?

MR. HUBER: Yes. For that speed, yes.

I don't really know how you would have your product classes, whether you would break it down by speed or you would just have the class and, then, show the different speeds. I really don't know.

MR. LLENZA: This is Charles Llenza, Department of Energy.

So, for a pump that is tested at different speeds, would you give it a nominal rating or an average rating for efficiency or --

MR. NAPOLITANO: Well, you would just have a rating specific to each of the primary speeds that that pump would typically run. So, if you looked in any manufacturer's performance data, catalog of pump curves, you would see a given size pump and you would see a performance curve at two-pole speed and at four-pole speed and maybe at six-pole speed, because not only is the head and flow different, but the efficiency characteristics are slightly different at those different speeds, enough to warrant taking the data and publishing it at its different speeds.

So, whether that means that it is a different equipment class I guess ultimately depends on how the equipment classes are defined and whether the exact same pump runs at two different speeds. It is two classes. If it is, then the answer is yes, and if it isn't, the answer is no.

MR. BROOKMAN: Okay. Good. Yes.

Gary Fernstrom?

MR. FERNSTROM: Well, where this plays out is with the variable-speed pump motor and controller. So, you know, you would want to have information reported at different speeds that this equipment would likely be run at. And again, my frame of reference goes back to the swimming pool pumps where we specify different speeds -- high speed, half speed, low speed, and best efficiency speed -- that we would like to see the efficiency rated at. But it may different for this application.

MR. BROOKMAN: Ken, please, yes.

MR. NAPOLITANO: Okay. Gary, so in the case of a variable-speed drive, and what we have talked about is an extended product, the approach that we are proposing, essentially, goes after wire-to-water, right? It says I am going to apply a load profile to this integrated pump motor drive, and I am going to measure for how much output I get, how much energy input am I consuming. And that takes all of the variables into account.

So, if, for example, the pump hydraulic efficiency at a lower speeds is slightly different than it is at the same point at a higher speed, that all comes out in the wash with the wire-to-water, because you are, then, basically, what are you putting in and what are you getting out, and everything in between is the aggregated efficiency.

MR. BROOKMAN: Mike Rivest?

MR. RIVEST: Mike Rivest, Navigant.

I understand what you are saying. But the benefit of having different efficiencies published at different ratings, you know, different loads, is that we can, then, use that to evaluate the economics on a client that may have a different load profile than the test load profile.

So, integrating everything into a single metric and reporting just that metric wouldn't give us the information we need to see if it is cost-effective on a single-speed customer or, you know, someone very different low profile. I don't know if that is what you are going at, Gary.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Well, first of all, we would agree with that. We are already saying that we do today publish the efficiency at multiple speeds --

MR. RIVEST: Okay.

MR. NAPOLITANO: -- and in some cases, even a variable-speed version of that curve that gives gradations in between the nominal motor speeds.

MR. RIVEST: Okay.

MR. NAPOLITANO: So, I think we have --

MR. RIVEST: Okay. I was just concerned that you were collapsing everything and reporting just that one --

MR. NAPOLITANO: No, just the point that, when you ultimately did the wire-and-water test --

MR. RIVEST: Yes.

MR. NAPOLITANO: -- it was taking all of those components into account.

MR. BROOKMAN: Gary?

MR. FERNSTROM: I will pass.

MR. BROOKMAN: Okay. Have we covered this?

MS. WILLIAMS: I think we have.

MR. BROOKMAN: Okay. Let's go on.

MS. WILLIAMS: Okay. So, when DOE performs its engineering analysis that we will talk about next, sometimes DOE does not analyze all of the equipment classes separately. So, one thing that DOE can do is select some representative classes that results can be used to extrapolate to the other classes.

So, just in terms of analysis, the things that DOE has identified that could possibly be combined are end suction close coupled and frame-mounted pumps and possibly vertical turbine and submersible pumps, depending on the metric chosen for those.

Within the representative classes, DOE traditionally selects representative units to analyze as a basis to determine the incremental costs associated with increases in efficiency. So, in general, these are units that are functionally equivalent in all aspects except efficiency. So, a lot of times, for example, for motors, you will look at the same motor at standard and premium efficiency.

For pumps, what we think would happen is we would have to find pumps with approximately the same BEP flow and specific speed, but with different efficiency levels. And we understand that these may be a little more difficult to find than traditional products because the same manufacturer will not necessarily offer multiple pumps at the same BEP because they are covering a wide area of duty points.

So, then, once DOE selects these

representative units, and again, scale the results from the analysis to the full range of flow and specific speeds within the equipment class, efficiency results could possibly be scaled with some of the 3D figures that we have looked at now, but DOE also has to determine ways to scale the cost.

So, I have some Requests for Comments here. And actually, thinking about it, some of these might be best answered after we have gone a little farther. But, in case someone has a comment right now, we are basically seeking information on whether there is any representative classes that could be grouped together and what representative units would be most appropriate.

MR. BROOKMAN: Steve?

MR. ROSENSTOCK: Steve Rosenstock, EEI.

And I will use my experience with the transformers. You know, I don't mind the concept of this. I just know that sometimes when you have too wide of a swathe, you get some very interesting results because of the representative class is too large. And I will just say for like the transformers, for certain types of transformers, you were going anywhere from 10 KVA to 333 KVA in terms of capacity. And, yes, they were the same design line, but they are different products when you get right down to it. They are doing the same function, but because of their size and because of some of their application, they could be significantly different products.

And the fact that, again, the current scope is anywhere from 1 to 200 horsepower, again, you are talking about, I will say, physically small to very large. And then, when you put in the variable-speed drives on top of that, again, I am just thinking that, then, there is probably, from 1 to 200 horsepower, that is at least 20 different motor sizes at least right there within each class of product here.

So, I like the idea, but I think there has to be real care, especially in terms of either motor horsepower that is serving or engine -- excuse me -- steam or diesel engine or electric motor, the size of the motor or engine that is serving the product as well as just physical size and possibly the application, just because of the fact, you know, just in terms of cost and, then, actually, in terms of some of the loading, there is going to be such a variation. You might be making, when you get right down to it, there could be, you know, 50 products being analyzed here. And that is before you get to the motor horsepower from the 1 to 200 horsepower.

So, I like the idea, but I think there is going to be some pretty small ranges of representative classes to get better accuracy in terms of results.

MS. WILLIAMS: Okay.

MR. BROOKMAN: Arnold?

MR. SDANO: Frankly, I am kind of at a loss to understand why you would select one specific speed and one flow for that analysis. A pump type is going to have a significant impact on what efficiency you get.

Basically, you are only confirming one point on that entire 3D curve that Europump came up with for their MEI. And I don't know how you would extrapolate that from that point.

MR. RIVEST: Mike Rivest, Navigant Consulting.

Can you put up the figure with the dots and the lines?

MR. BROOKMAN: Which one?

MR. RIVEST: I think I saw one.

MS. WILLIAMS: There?

MR. RIVEST: Right.

So, this would represent all the pumps in a particular product class. And what makes a product class is that every pump within that class would have to meet the same efficiency equation.

And earlier, there was a description of how the EU set the standard, so that that first standard line would eliminate from the market 10 percent of the pumps, so 10 percent of the dots, and then, with an intent of eliminating 40 percent of the dots eventually.

If you were aggregating too many product classes, too many types of pumps that really should not be in the same product class, as you lift that standard from 10 to 40, you would notice that certain types of pumps are disappearing completely. What that would mean is that you really haven't established the product classes correctly. If they were established correctly, all of the pump types, part of that class would be eliminated at the same rate. So, that is one way of thinking of what we are trying to do with the class, just not separate things up too much, but, then, not aggregate them so much that, by raising the bar, we are eliminating certain types of pumps.

Then, the idea of a representative unit is, what we are trying to do is determine the cost-effectiveness to the consumer of raising that curve from baseline, say zero, to 10 or to 40. And what we do is we try to purchase a pump at 40 that is on that line of 40 percent and one that is at the bottom at zero and say, okay, what design features are incorporated in the better pump, and how much does it cost to get there?

And to do that tradeoff analysis between the incremental cost of that pump and the economics, and the payback to the consumer. Of course, we can't do that for every pump here. So, we try to pick on that locus of points -- can you put that back there? -- where is the highest density of bumps, if you will, and the flow there being -- say you were to take your representative units at 600 gallons per minute and base your analysis on the economics of that type of pump. So, we would look at the cost of zero, the red line, the cost of the blue line, do the economics on that, and then, from that representative unit, make a conclusion about the cost-effectiveness of going to 40 percent.

If we are using a representative unit, the representative pump as being that one, we would, then, extend our conclusion to all the pumps on this graph and say, well, if it is cost-effective for the 600 to go to 40 percent, we are going to go to 40 percent on everything else.

If you know something about how these costs scale, you may say, "That's just not right because it is cost-effective to go to 40 percent at one size, but not at another." We may decide to break that down into three segments, look at a 200, a 600, and a 1200, and then, set the cost-effective level using the economics of each of those separately. So, that is what a representative unit would be. That is how we would use it.

MR. BROOKMAN: Yes, Albert?

MR. HUBER: Albert Huber from HI.

Just so there is no misunderstanding about the MEI that Europe is using, what they are endeavoring to do is they look at the market as a whole. And because none of our BEPs are always the same flow for any product class, that is another difficulty you have with pumps. Not everybody's BEP for a certain size pump is at 500 gallons, for instance. It could be 450; it could be 550.

MR. BROOKMAN: I'm sorry, the BEP was what again?

MR. HUBER: The Best Efficiency Point.

MR. BROOKMAN: Okay.

MR. HUBER: So, what it does is you take a full diameter impeller for a particular class of pump -- and Greg can correct me if I am wrong -- but you take it, and you take the

BEP, you take 75 percent, and you take the 110 percent. And then, you measure the total population. Everybody in the marketplace submits; in this case, the HI did and we are going to turn this data over to you. We all did that. We turned in our best efficiency at full diameter for each class, for the classes and scope that we have provided. That is already done.

MR. RIVEST: So, you know how the word "class" keeps coming back.

MR. HUBER: Okay.

MR. RIVEST: And I just don't know whether we are all using "class" the same way.

When you all submitted your data, this was cost and efficiency data or --

MR. HUBER: No, no, no. We do have cost data.

MR. RIVEST: Okay. So, you sort of wrote down the spec of the pump you were all costing?

MR. HUBER: Right. We took it

all --

MR. RIVEST: That is a representative unit?

MR. HUBER: Yes. We took it off the HI nomenclature. We said you submit this pump.

MR. RIVEST: Right.

MR. HUBER: You submit it at full diameter. You submit it --

MR. RIVEST: By flow rate?

MR. HUBER: No.

MR. RIVEST: No?

MR. HUBER: No. It is not a flow rate, is it? There is a flow rate in there, but your BEP may not be at the same point.

MR. RIVEST: Right.

MR. BROOKMAN: Alison, come on.

MS. WILLIAMS: Can I jump in here?

MR. BROOKMAN: Yes.

MS. WILLIAMS: So, I think we are talking about a couple of different things. So, when we are looking -- I am actually going to go a couple more slides, I think.

What Mike was saying was that we are looking to determine the cost differential of increasing efficiency for pumps that are very similar. And for that, that is what we traditionally do; we use those rep units for.

It would not take away from I think what you are talking about, where you are collecting pumps of the same type, whatever size they are, and comparing them to the minimum efficiency equation to get the MEI. That would still happen. We are just looking for ways to isolate determining the cost of that increased efficiency. Traditionally, DOE does this by choosing representative units that can, then, scale those costs to a different unit.

MR. RIVEST: So, we can scale the cost, but we don't have to scale the cost. We can just agree that the standard level -- so, once you have represented the population with the dots and, then, you have run your lines and your equations that fit those dots, we need to determine which line we are going to take as a standard.

So, we just have to agree what pump, you know, what segments, what cross-section of those lines of the analysis for the cost-effectiveness is going to be based. Once it is determined it is 40 percent, the 40 percent line is what sets the standard to everything. So, we don't have to scale. You know, we don't have to look at any other pumps.

MR. BROOKMAN: Thanks, Mike.

Now to Ken.

MR. NAPOLITANO: Ken Napolitano.

So, going back to your original point in this string, which was that we have to get the breakdown of classifications balanced correctly, so that you don't penalize one style of pump versus -- we completely agree with that. That is absolutely dead-on right.

What that actually shakes out as, you know, and there is an equation for different styles of pumps and how fine do you break it down or not and the tradeoffs with that, you are absolutely right.

I don't know if we know, sitting here today, for the purposes of this other discussion, which is understanding the incremental cost to go from 10 to 20 or 20 to 40, or whatever, whether or not inside of a particular class, however you end up defining that, picking one representative point and comparing the 10 to the 40 of that same representative unit can be extrapolated to all extremes and be accurate. I don't think we know that.

That is something we would probably have to go back and take a look at and, to your point say, is one close enough or do you want to do one at the low end, one at the high end, because of how costs change with size, or do you need to look at a couple? I don't think we know the answer to that that I am aware of.

Greg, do you have --

MR. BROOKMAN: Greg, use the microphone, if you are going to respond.

MR. CASE: I am just wondering if I should respond.

(Laughter.)

MR. BROOKMAN: Albert? And then, to Greg, and back to Mike.

MR. HUBER: What we did to try to come up with some idea of what it would cost to redesign, we did a study and it was independently surveyed, which we intend to turn over to the DOE. We said this is the cost of taking a pump -- I think we said, we told our people we wanted to go to 40. So, this is what it is going to take. The MEI, we all knew what we were talking about for each class.

MR. NAPOLITANO: Just remember there are two costs, the cost of redesign and the cost to the consumer.

MR. HUBER: That is true.

MR. NAPOLITANO: And I believe you were programming --

MR. BROOKMAN: Repeat that into the record, Albert. Or, Ken, go ahead, Ken.

MR. NAPOLITANO: I just want to make sure we are clarifying, and both are probably relevant, but they are different. All right. There are two costs to consider in how much does it cost to go from 10 to 40. One is the cost to the industry, and the other is the cost to the consumer. We have captured one, and not necessarily the other.

MR. HUBER: That is correct.

MR. RIVEST: They are both separate considerations.

MR. HUBER: Right. And we did it by horsepower. So, that gave us size.

MR. RIVEST: You did it by horsepower. So, we will see how that maps to -- they are probably pretty close, right?

MR. HUBER: It is probably pretty close.

MR. RIVEST: Okay.

MR. HUBER: And, you know, we intend to turn that over. The larger you got in the pump, the more it costs.

MR. RIVEST: And Steve started this conversation by saying, "Well, be careful you don't aggregate too much," because transformer standards were set in a very similar fashion. So, our scale there goes from like 25 to 1500, and we split it into three segments. There were some thought that maybe we should have split into more segments. Because as you do the economics on the 25, the 500, and the 1500, to determine if the whole equation is cost-justified, we weigh the results of the economic analysis.

MR. BROOKMAN: Greg, do you want to add on?

MR. CASE: No.

MR. BROOKMAN: No, not at this

point?

Did we cover it?

MS. WILLIAMS: Yes. I just want to say, yes, in the interest of moving on, as I said, what I have been talking about is DOE's traditional approach, and we are certainly open to methods of getting cost increase data from the industry. And I think we will work with you moving forward on that.

So, to move on, baseline models, I really want to talk about efficiency levels, as Mike started. So, what we want to start with is the baseline level, what is basically the lowest efficiency, the most typical pump on the market right now?

In other rulemakings, it is often the current federal standard, but there isn't one for pumps. So, DOE is considering the appropriate method to develop those levels.

This is a 2D slice that you have seen before. The red line on the bottom is the bottom of market. So, if you take the whole 3D space and put a surface to the very lowest pumps across the 3D space, you get that line. What you see happens is that in certain areas there are no pumps that are actually at that baseline level.

So, to solve that problem, there are a couple of things we have thought of that we can do, one of which is to make a discontinuous surface, if that works. But the other one is to raise the level of the bottom of the market to create a baseline that represents least-efficient, most-typical pumps across the flow and specific speed. So, you can see the example in this slice where that line goes through many more pumps.

So, DOE is still exploring options for how it would set baseline levels in this case. And again, it is designed to represent the same level across all the flows and specific speeds.

So, similarly, DOE looks at efficiency levels from the baseline through the max-tech level. Max-tech does not necessarily have to be available on the market right now. It could be involved in a working prototype. Sometimes it is the market maximum. So, you may have pumps on the market right now that are basically the highest it can go.

And then, DOE looks at the design options and costs associated with getting to each of the levels it selects from baseline to max-tech, which is similar to the EU's different MEI levels.

So, DOE is also looking at how to define max-tech, in this case, based on market maximums. And the same problem with the baseline level; if you set it based on the whole 3D space, you end up with a lot of spaces that don't have pumps there. And this could be problematic. If you choose where there is a pump, it may not represent the same level of cost across these spaces where there aren't any pumps.

So, again, the options are discontinuous functions or lowering the market max level to something that crosses a lot more pumps across the space, which is essentially treating some of these other ones as outliers.

The DOE seeks comment on how the baseline level and the efficiency level, including the max-tech level, are set. That is all three of these issues right here.

MR. BROOKMAN: Steve Rosenstock?

MR. ROSENSTOCK: Would you go back to the previous slide I think you showed? I guess I am misreading this. It is looking like the max-tech is lower than the top of the market?

MS. WILLIAMS: Sorry. That is mislabeled.

MR. ROSENSTOCK: Okay. I just wanted to double --

MS. WILLIAMS: So, the blue line is top of market. Oh, the red line should be a revised market maximum level, basically.

There is not really a good name for it, right? So, the blue is if you set top of market based on all the pumps in the 3D surface and you end up with these holes, and the red line is basically just one example of an attempt to get a market maximum that represents all the flow and specific speed spaces. So, the terminology is not really correct and is confusing.

MR. ROSENSTOCK: And again, Steve Rosenstock.

Yes, again, it is a matter of earlier on there was like four different versions of efficiency that were shown, you know, that was being used throughout the world.

MS. WILLIAMS: Yes. So, these particular figures are based on pump efficiency.

MR. ROSENSTOCK: Right.

MS. WILLIAMS: Yes. Sorry. So, we could do something similar with overall efficiency or other metrics. We just basically have these as examples for a methodology that could be followed.

MR. ROSENSTOCK: Steve Rosenstock.

Yes, so this is just one example of one possible approach --

MS. WILLIAMS: That's right.

MR. ROSENSTOCK: -- at this specific test condition at Best Efficient point?

MS. WILLIAMS: Correct.

MR. ROSENSTOCK: Thank you.

MR. BROOKMAN: Greg?

MR. CASE: Greg Case, HI.

One difference I want to try to make clear here is the MEI looks to drop the bottom 10 percent. It is not shooting for a certain efficiency level, which we seem to be going for here. It is I want to eliminate a certain portion of the market that is the lowest-performing part of that market.

And so, you would be able to always

find a spot with that 10 percent. You wouldn't have to worry about discontinuities or any of that.

MS. WILLIAMS: Yes.

MR. CASE: So, it differs from your process, I understand, but it does simplify trying to find 10 percent, 15 percent, 20 percent, whatever we set that level at.

MS. WILLIAMS: Right. So, DOE's process, basically, deals with efficiency levels. So, you could create an efficiency level that was the equivalent of cutting off a certain percentage of market, and that is something that could be done. But, yes, the terminology and the process here is different in that respect.

MS. WILLIAMS: So, moving on, the next part of the market assessment is the technology assessment in which DOE identifies technology options that can be used to improve efficiency. And this list is a preliminary list of things that could happen. We understand that the primary thing that happens is just hydraulic redesign of the pumps to meet the new standard. And we have identified a few other things that have more detail in the framework, including smoothing surface finish, reducing clearances, reducing friction.

And then, if we do go to the expanded approach of pumps inclusive of motor and VSD, we will also potentially look at technology options, which are adding a VSD, improving the VSD efficiency, and, also, reducing standby power for those VSDs. And we are also interested in other suggestions that manufacturers are using to improve the efficiency of their pumps.

MR. BROOKMAN: Yes, Greg?

MR. CASE: Greg Case, HI.

In 3-14, we agree with the factors for the pump that you have come up with as ways to improve the pump. In the framework document, we believe some of the percentages of increase would be going from the lowest pump on the market to max-tech level, to be able to hit those types of increases. A surface finish of 18 percent increase in efficiency, only a very, very small segment market could possibly benefit like that.

MS. WILLIAMS: To be fair, the framework document does state that it is typically 1 to 3 percent.

MR. CASE: Yes, yes. So, we just wanted to go on record as HI saying some of the efficiencies that we saw, the 10 to 12 percent increase in efficiency, that would be taking us from the bottom of the market to the top of the market in most cases.

MS. WILLIAMS: So, we would be interested in specific information related to that and the efficiency increases that the manufacturers believe actually result from these technology options.

MR. BROOKMAN: Neal?

MR. ELLIOTT: Neal Elliott, ACEEE.

The other concern, just in terms of some of these technologies -- and I am going to mention, in particular, the surface finish and running clearances -- those are designed as new. And one of the concerns I have is actually persistence in the marketplace for those.

You know, having an ultra-smooth finish is something that may be great for performance right out of the box. It is unlikely that performance would persist in the marketplace.

So, I just think we need to be careful in terms of looking at, if you will, from my racing days when I raced cars, blueprinting an engine and taking an engine that we are actually going to try to run for 100,000. So, let's not push the envelope on stuff that is not going to have long-term market persistence.

The other thing -- and this came up at lunch, and I just wanted to reiterate this

-- when we use the term "VFD" here or "VSD," I think we want to be clear that, when we are talking about it from the advocates' perspective and from HI's perspective, we are not taking about just putting an adjustable-speed motor device there. We are talking about putting an adjustable-speed motor device control and feedback circuitry together. It is not just the VSD; there is more to that.

And I think I am concerned that we kind of go into the shorthand, but I think we need to be cognizant that the adjustable-speed drive or variable-speed drive without controls doesn't really produce the results we are looking for.

MR. BROOKMAN: Charles Llenza?

MR. LLENZA: Yes, that has to do with the definition of what we decide that VSD is for these applications. So, you could sort of define it.

MR. BROOKMAN: And I think that is useful because I think that is the first time we have all been really clear. We have kind of danced around the edges about those elements being one thing. So, thank you for that.

MR. ELLIOTT: Yes, and I think it is an issue, you know, as long as we define this clearly -- that was not clearly-defined in the framework document. I think in the HI it was clear. When we clearly defined it, we defined it as the four components, which was the pump, the drive, the motor, and the feedback control system. So, I think in our sense there are the four elements.

MR. BROOKMAN: Mike, follow on. Go ahead.

MR. RIVEST: Mike Rivest.

You know, in any case, when we look at the consumer end-costs, we are looking at installed cost. So, we would have those components plus their installation. So, it would be a total. You know, we would capture all the costs.

MR. ELLIOTT: I understand. This is a question for transparency and clarity in terminology because I don't want this to come and be misconstrued in the market by others who we are dealing with or, basically, have it come around and bite us in the back side.

MR. BROOKMAN: Right.

MR. ELLIOTT: So, I am just looking for transparency.

MR. BROOKMAN: Gary first. And then, back to Steve.

MR. FERNSTROM: Gary Fernstrom, California IOUs.

This isn't just an issue with respect to capturing the cost. It is an issue with respect to fully understanding the savings. So, we are going to regulate an appliance, we will better understand the savings if we are looking at an appliance, a pump, that is sold in a fully-integrated package, which would include the pump, motor, control, and control algorithm.

And I would like to make one quick comments on 3-14, the opportunities for improvement. Neal mentioned persistence in the market of these opportunities. I think there may be an opportunity associated with improving maintainability or persistence of savings in the market itself.

For example, that might be easily-accessible taps for measuring suction and discharge pressure. It might be perhaps selling some pumps with gauges, so operators could determine whether or not they are operating at their Best Efficiency Point or even within their operating range.

So, as you look at options, I think you should look at a group of options that may improve maintenance and persistence of savings over the lifetime rather than just as the pump package is sold.

MR. BROOKMAN: Okay. Thank you.

MS. WILLIAMS: I just want to follow up on that. Any technology options that you want to propose to be considered, just keep in mind that they do have to be captured in a metric. And as was mentioned before, if it is strictly a design requirement -- it is just something to keep in mind where you are thinking of the options; we do have to be able to capture them in a metric.

MR. FERNSTROM: Okay. So, that is an excellent point. Looking to the lighting industry, it utilizes mean lamp lumens, which is metric of performance over life. I don't know what may or may not be appropriate for pumps, but, surely, there are some savings associated with measures that would improve performance over life that could and should be looked at.

MR. BROOKMAN: Okay. Steve, thanks for being patient.

MR. ROSENSTOCK: Well, sure. Again, Steve Rosenstock, EEI.

And again, please forgive me I didn't read that section of the framework document. But, again, I just have to come back to the fact I know variable-speed drives are very common and they have come down in price quite significantly. But I would hope that, if there are other technologies that go in that parentheses that says "pumps plus motors plus," if there is a stage control that would work better or two-stage or three-stage control, that may or may not be in the classical definition a variable-speed drive or some other technology out there that could also provide savings for these products, I would not want them to be excluded from the technology options or the analysis.

Because manufacturers and other companies are innovating all the time, and I just kind of get a sense that it is like, "Oh, well, it is a variable-speed drive and the feedback control are the option with this equipment, period," and I don't feel that that is the case. There might be others out there.

Thank you.

MR. BROOKMAN: Yes.

Louis?

MR. STARR: I think maybe some of the points that Steve is bringing up, some examples of that would be like an Aquastat, which measures return water temperature. So, it turns the pump on full speed whenever you need hot water. And then, another example would be like a submersible pump. Like you have an air conditioner system and you have water that comes off the coil and you pump it up and dump it into the thing. Neither of those applications would have VFD used in, but an Aquastat, which is very cheap, or relatively cheap, and a float switch, which is also relatively cheap, would be some things that would be kind of technologies that would kind of meet what he is talking about.

MR. BROOKMAN: Okay. Thank you.

Ken?

MR. NAPOLITANO: Ken Napolitano with HI.

I just wanted to reiterate that what the HI is proposing in the extended product approach is two categories. One is a pump motor variable-speed device, variable-speed drive, with feedback, which isn't necessarily a VFD, variable-frequency drive, which is a very specific electronic device to vary the speed of a motor, but not the only way to vary speed. So, we are not limiting it to that.

And then, the second category of extended product which is a pump and a motor with some control mechanism that doesn't include variable speed, which does exactly what was just mentioned, like turning a pump on and off based on load demand. So, that is how we have proposed to address that.

MR. BROOKMAN: Thank you.

Joanna?

MS. MAUER: Joanna Mauer.

Ken, is HI considering a test procedure for extended products that would capture the effectiveness of the feedback control?

MR. NAPOLITANO: Yes, the simple answer is yes. The effectiveness of the feedback control itself or of the extended product including the feedback control?

MS. MAUER: The extended product including the feedback control.

MR. NAPOLITANO: Yes. So, in simple terms, it is here is a load profile of a variable load which you define, and then, you test products against that. It is essentially that wire-to-water that says how much energy do I have to put in to get out what amount of output.

MS. MAUER: So, it could capture, if you an identical, two identical pumps, motors, VFDs, say, but with different control systems, that one might be better than the other, would the test procedure capture that difference?

MR. BROOKMAN: Greg?

MR. CASE: The semi-analytical model might be better than test procedure there. We would develop a set of load profiles, kind of like miles per gallon for a car. You know you are not really going to get the miles per gallon that the sticker says, but we would test against a certain criteria, load profile, maybe for possibly more than those. Those pumps could be rated, those pumps, motors, possibly drives, possibly on/off controls could be rated against those, and we would get an output number. It would allow you to compare one unit to the other.

So, not a test, but more of a semi-analytical model that we could provide the data into that would give you that output and help you with that decision matrix.

MR. BROOKMAN: Okay. Louis?

MR. STARR: I think, essentially, what he is saying is just a load profile. Even for those two examples I provided, you could create a load profile for that. Then, with that load profile, you could capture the savings based on it. So, basically, it's just identifying the load profiles for certain conditions.

MR. BROOKMAN: Okay.

MR. HANDZEL: But you have to have the load data for the motor, the drive, and the pump.

MR. BROOKMAN: And that was Mark last.

MR. HANDZEL: Sorry.

MR. BROOKMAN: So, Tom Eckman?

That's okay.

MR. ECKMAN: Tom Eckman.

I am really glad DOE has a top-notch analytical team to deal with this problem. I will just state that for the record.

(Laughter.)

Because, in addition to the load profile, to do the economics right, we need to know the share or the fraction of the units out there today that already have this system engaged. So, how many variable-speed drives are in place on pumps today for various horsepowers, flow rates, and what have you?

Because the base-case condition would be in some cases a variable-speed drive and in some cases no variable-speed drive. So, good luck with that.

MR. BROOKMAN: Yes.

Sarah, do you want in here?

MS. WIDDER: Sure. Just really quick, I think Tom is exactly right. We are going to get into that and try to talk about our analysis approach in the next few slides. So, that is a good prelude to it.

And it will be a difficult problem. So, hopefully, everyone can help us with that.

The one thing I had to follow up on the semi-analytical model you were describing, which seems to be this 14.6 DOE test procedure, or is that separate? The semi-analytical model is different than the 14.6

DOE? Okay. Excellent. That is very helpful. I was concerned that we were talking about load profiles for different applications in the test procedure, which would be very difficult to achieve.

Okay. Thanks.

MR. BROOKMAN: Okay. We are moving on.

And shortly, for those of you who are interested, we are going to be taking a break.

Go ahead.

MS. WILLIAMS: So, just skipping to the next analysis, which is directly, it is the screening analysis in which DOE basically looks at all the technology options that have been identified and evaluates them against the following four criteria, which have to do with technological feasibility; practicability to manufacture, sell, and service; impacts on utility or availability to customers; and impacts on health and safety.

So, DOE seeks any comment in the framework document related to the technologies listed or unlisted and which screening criteria might apply to them.

MR. BROOKMAN: Neal

MR. ELLIOTT: Just in response to 4-1, I wanted to reiterate the concern about the persistence issue and the feasibility of these in actual performance in the marketplace over an extended period.

MR. BROOKMAN: And let's take a break, and we are not going to go far. Let's see if we can do this in 10 minutes. We are behind schedule, and we will continue doing this until we are finished. Okay?

(Laughter.)

So, let's run to the restroom and get back here in 10 minutes, which by the wall clock there means 3:15. So, we will see back here shortly.

(Whereupon, the foregoing matter went off the record at 3:04 p.m. and went back on the record at 3:14 p.m.)

MR. BROOKMAN: So, we are handing out a document. Many of you in the back don't have this yet.

This is a document concerning commercial and industrial pumps, a rulemaking action issued by the Department of Energy. Although it is not intended or expected, should any discrepancy occur between the document posted here and the document posted in The Federal Register, The Federal Register publication controls. This document is being made available through the internet solely as a means to facilitate public access to this document.

So, you want to hand it out back there.

And now, we are going to resume and we are going to hear from Dan Weintraub, engineering analysis and manufacturing impact analysis.

MR. WEINTRAUB: Hello, everyone.

As he said, my name is Dan Weintraub. I am with Navigant Consulting, and I will be taking us through an overview of our engineering analysis and then a quick overview of the preliminary manufacturer impact analysis also.

So, what we are going to go through here, Mike Rivest actually hit on a little bit as we were discussing the relationships between cost and efficiency.

So, the purpose here of the analysis overall is to develop a cost-efficiency curve. That represents the relationship between manufacturer price and efficiency. This would be for each product class or equipment class. We would like to develop as many curves as we can. Of course, we have the limitations that we were discussing earlier.

Now the reasons we develop these curves, these are inputs into the downstream analyses, which ultimately help us with our decision-making. So, some of these rulemaking analyses that these feed into would be the life-cycle cost and payback period analysis, manufacturer impact analysis, and the employment impact analysis. Again, these are all downstream.

So, next we will look at the approaches we take to get us to this cost-efficiency relationship. We have multiple options that we generally go through. We are looking at this generically right now, and we will drill down as we get into these analyses, as the process goes on.

But, in general, we can use a combination of three approaches. Those would be the design option approach, the efficiency-level approach, and the reverse-engineering approach.

Looking at them specifically, the design option approach is more of a bottoms-up approach. In this case, we look at energy-efficient design options that are currently on the market or potentially on the market, maybe in prototype phases, and we look at the cost to adopt these individual options or combinations of these options, and look at the resulting efficiency to build incremental cost curves.

On the other hand, if we look at the efficiency-level approach, that is a more of a top-down approach. So, this would be looking at setting a target efficiency level that we would like to hit and then looks at the technologies and costs that are needed to reach those target levels.

So, if, for example, we were looking to cut out the bottom 10 percent of the market, we would look at the efficiency level needed to do that and the cost associated with doing so. And that can be done for any level.

Finally, the last option that we generally use is the reverse-engineering approach. This is more of an empirical approach. Here we evaluate the cost of efficiency in products that are already out on the market, out there already, and to do so, we purchase these products. These would be part of the representative units that we were discussing earlier. We tear them down. We run them through a cost model of our own, which we will discuss a little bit more later, and understand the cost-efficiency curve for what is out there right now.

MR. BROOKMAN: As the comment box on this page reflects, the Department might consider using any one or a combination of these approaches. We have had some comment on this already. Additional comments before we move on?

Yes? Your name, please?

MR. McKINSTRY: Dave McKinstry, Colfax Fluid Handling.

MR. BROOKMAN: Is that on (referring to the microphone)? You are not on, Dave.

MR. McKINSTRY: I am on now.

MR. BROOKMAN: Okay. Good.

MR. McKINSTRY: Okay. I guess my question is probably a little heresy in this group. But I don't see this fitting very well into the MEI process, if the MEI process is adopted.

The MEI process really fundamentally says we have a tool to eliminate a percentage of the lowest efficiency pumps in the marketplace. And as long as you keep doing that in some form, .1, .2, .3, the marketplace takes care of all of this work in order to bring more efficient products to the marketplace, so that the market adjusts for the MEI.

MR. BROOKMAN: Mike Rivest?

MR. RIVEST: Heresy, you say, huh?

(Laughter.)

There are so many jokes we could make here.

So, the Department's job, the

analysts on this project are looking for the level that is cost-justified. And so, the process of going from 10 to 30 to 40 to 50, you know, intuitively, you guys probably know what the right number is because you have the experience. You know how much it is to make these products. You know what you are capable of achieving at a reasonable cost.

But there comes a moment where the costs are no longer reasonable. And so, what we are trying to do is find out how much it costs to eliminate 10 percent or 20 or 30 and stop where the benefit to the consumer is weighed, is less than the incremental cost to the consumer of that pump.

So, we need to understand your costs of manufacturing these pumps. What is it you have to do to replace this 10 percent of the market with more efficient products? Is it redesign costs? Are you having to go to different materials? New tooling? Different tolerances? We need to understand that and monetize it.

MR. BROOKMAN: Dave?

MR. McKINSTRY: Dave McKinstry, Colfax Fluid Handling.

Well, you know, we do that every day. That is what we do to stay in business. But the beauty of the proposition that we have made is that we have one process to bring up the efficiency overall of the marketplace by using the MEI method, and we have a second process that saves some real energy, which is the extended product. So, the combination of those two will bring massive improvements to reduction of energy consumption without any of this work in the technical analysis of costs of a manufacturer.

MR. RIVEST: The method that the Department uses is similar to what you are describing, which would be to set a level that eliminates the least-efficient product from the market and creates a product class that is more efficient and label it, and have people adopt it.

But we still need a way of knowing that the correct number is 10 percent, not 20 percent. So, we need to document it.

MR. McKINSTRY: Then, here is my challenge to you: find that way and make the MEI work rather than go through your historic process, which we think is wasteful -- I shouldn't speak "we" because that is not an institute position -- which I think is wasteful.

MR. BROOKMAN: Okay. Thank you.

Ken?

MR. NAPOLITANO: So, maybe I could add a little clarity here because I think we are conflating several things here. So, first of all, HI wants to reiterate the fact that we strongly recommend that we harmonize as much as possible with the EU. And the EU used an MEI approach, and they did so after studying for many, many years. There are a lot of technical reasons why that approach is better than trying to set an efficiency number for a particular size pump and a particular class, because it adjusts for a lot of variables.

And so, I think one of the things that is coming out here is that, when Alison was last up, we were looking at the maps, and it maybe kind of missed us at the time that that was talking about an efficiency number as opposed to this concept of the MEI index.

We just want to reiterate that we believe that the MEI index is the proper methodology, the most effective methodology for calculating how you are going to exclude the low-performing, separate from what level you end up choosing. So, that is one point, is using the MEI index.

And then, there is this separate point about the cost/benefit relationship between the various levels. Although I don't know that we know the answer on how to calculate that, although we are going to be providing data, from the standpoint of what the redesign costs are to hit different levels, we have that. So, that is one component of it. It may not be all the components of it because it is just the redesign aspect.

But, clearly, we understand the need to try to figure out what is the logical place to draw that line.

MR. BROOKMAN: Gary?

MR. FERNSTROM: I don't think these two things are mutually-exclusive. I think MEI is a good way to look at efficiency. What efficiency improvement we hope to get relative to the standards that are set is an economic question. You know, obviously, the higher and higher we want to go, at some point there is going to be some cost.

So, the advocates are going to be asking for the very best efficiency we can get that is cost-effective for consumers, and that is an economic question that needs to be answered. I would highly recommend that DOE use mature market cost for these improvements rather than the cost that one might find through analyzing a design approach, for example, using today's costs, because we have consistently found that the mature market cost of improving efficiency is less than it may have been estimated during proceedings like this that preceded those rules going into effect.

MR. BROOKMAN: Mike, do you have a final comment?

MR. RIVEST: No final comment, except to say that, you know, we look forward to working with HI to capture what those costs are, to understand that if you are going to submit the data, that would be fantastic. It is better, though, if we understand how they were constructed, so that we can document and -- I don't like to use the word -- but validate, if you will, that we agree with those incremental costs.

MR. BROOKMAN: So, back to Dan for

a brief description of these methodologies.

MR. WEINTRAUB: Sure. So, moving forward, yes, if we continue to look at our historical methodologies that we would use to develop these cost-efficiency curves, basically, at a high level we define our baseline models, which we have discussed in-depth earlier what these baseline models are.

We go through tear-down and testing, data collection and interviews, and that takes us to developing our cost-efficiency relationship.

Now, looking at the steps in detail, we have gone through baseline. Alison spoke to that earlier. The next two steps, tear-down and testing, and data collection and interviews, are generally steps that can be done in parallel, depending on the situation. And then, tear-down and testing, here is where we would conduct tests to verify performance and efficiency ratings. This has been touched on earlier also. And again, this is important since the test procedure is not yet in place. You are currently using HI standards, and hopefully, we can see how those line up with whatever we arrive at.

And then, following that, we perform reverse-engineering on these products that we have tested. And we mentioned on the previous slide -- and we will mention it again in more detail -- what we mean by reverse-engineering to help us understand the costs a little bit better.

Now, when it comes to data collection and interviews, here we look to collect all available public and private data on efficient pump designs. And that means looking at publicly-available data, but also having conversations with you, manufacturers, usually under NDA, to try to understand as best we can, so everything you know we can know at the same time. We are looking to gain as much information as possible.

Along those lines, once we have

gathered as much information as we can, that allows us to, then, go forward and develop these cost-efficiency relationships. So, we have our inputs, and that brings us down to our cost-efficiency relationships.

So, at this time, we will have some comments we are looking for. So, the DOE seeks input on the methods and approaches used by manufacturers to improve the efficiency of pumps and, in particular, how frequently hydraulic redesign would be the only method employed. I know there was a little discussion of that earlier.

MR. BROOKMAN: Comment on that? Ken?

MR. NAPOLITANO: Yes. So, this is an important point. I think our position is that hydraulic redesign is going to be the predominant method because things like surface finish, tightening clearances, you know, tightening clearances, in particular, those are easy to do. And if we could get a little more efficiency out of a pump by tightening the clearances, we have already done it.

Forget about Neal's point, which is also valid, that if you tighten them, they are going to open. The more you tighten them, the faster they are going to open and you will lose that efficiency anyway. Because there is a process of natural selection in the marketplace which says, especially in today's marketplace, if you have an inefficient pump, you are going to have a hard time selling it.

So, if you can tweak the clearances or do any of those types of things to eke it up, you have already gone down that route. Surface finish, material changes in most cases are so costly for the benefit you get from them that the economically-viable variance of that has also already been exercised. So, you are back to hydraulic redesign.

And hydraulic redesign involves a lot of upfront cost: engineering time, tooling, new patterns, testing, qualification process, and so forth. And so, it is going to be difficult for a third party, for example, to do a reverse-engineering to determine the cost of inefficient-versus-efficient because the number of pieces, the pounds per piece, the number of machining, it is going to be exactly the same.

The difference is that you have spent millions of dollars to redesign, and a manufacturer is going to need to amortize those costs over some reasonable life, which is what gets passed on to the consumer. But the physical product won't necessarily evaluate, from a pure cost to manufacture standpoint, all that -- now there are some exceptions, but, overwhelmingly, it is the massive cost of the redesign amortized over some period of time to recoup that.

MR. BROOKMAN: Okay. Thank you.

Steve Rosenstock? No? Okay.

Do you want to hit 5-8?

MR. WEINTRAUB: Yes. So, the other item we are looking for comment on here, Item 5-8, for each equipment class, DOE welcomes comments on methods and approaches that DOE intends to employ to determine potential efficiency improvements for pumps, detailed information on the pump's performance and the incremental manufacturing costs, e.g., material cost, labor, overhead, building conversion, capital expenditures for tooling or equipment, conversion costs associated with efficient design, R&D expenses, marketing expenses. That would all be useful. So, again, just talk about this in general. I mean, we are aware there is a lot on the front-end.

MR. BROOKMAN: Gary Fernstrom?

MR. FERNSTROM: I would like to go back to the point that we are already making the most efficient pumps that can be made.

(Laughter.)

I think what the industry means by that is we are already making the most efficient pumps that competitive pressures bring upon us by virtue of what consumers are willing to buy. And there are probably, certainly, some segments of the market where, rather than good performance, least-cost is the buying priority of consumers.

And I submit that in that case, competitive pressure probably does not bring us to the most-efficient pumps that can be made. They bring us to the best pumps that can be made while meeting the price expectations of customers.

MR. BROOKMAN: Ken wishes to respond.

MR. NAPOLITANO: Ken Napolitano, HI.

No, I didn't mean to suggest in any case that we are making the most-efficient pumps that can be made. I would say, though, that over the years, especially in the recent couple of decades, manufacturers have invested substantially in improving their efficiencies. If you were to take the baseline 20 or 30 years ago and compare it to today, we have already dropped out -- who knows? -- the bottom 25, for lots of reasons, whether it is ASHRAE or AHRI, you know, building codes, but just the general LEED green building certifications, the general efficiency awareness of consumers in the marketplace, right?

How many of us bought fluorescent lightbulbs 20 years ago, and they were 10 times the cost of a regular lightbulb, even though you could do the math in your head? So, the marketplace has changed, and so the line has moved.

But we wouldn't be here at the table in a cooperation fashion to say, yes, we can raise the efficiencies more and here is the methodology to do that, and start to take out whatever today's baseline is against the bottom 10, the bottom 20, and, by the way, couple it with an extended-product approach, which really gets at a big chunk of energy.

So, we agree.

MR. BROOKMAN: Go ahead, Gary.

MR. FERNSTROM: So, I don't think regulations are really directed at manufacturers. I mean, obviously, manufacturers are the ones that are required to comply. But I think the regulations are to assist those customers that maybe don't want to buy what is best.

MR. BROOKMAN: Louis?

MR. STARR: I have a general question in terms of, it seems like the way the European market, they adopted the MEI of 10 and 40 percent. What it sounds like they didn't do is really -- I mean, because it seems like the natural thing is to split it out per class and decide an MEI based upon that class.

I am kind of wondering, in the European market, if they didn't do that kind of cost analysis, it seems like it would have some pretty bad impacts on some of your pumplines. I mean, they may have been trying to achieve it across the market, but it seems like it could have some negatives, just as a pump manufacturer. You might have to improve, spend a lot of money improving certain pumplines; other ones, it was 10 percent was no problem.

MR. BROOKMAN: Ken?

MR. NAPOLITANO: Yes. So, back to the point about breaking it down into its categories, the EU did do that. So, the equation for a particular class of pump is not the same for another, for that reason.

So, they segregated it that way. It gets to the C-factor and the equation that is used. And then, inside of that class, they said 10 or 20, but against a different equation. So, one was not disproportionately disadvantaged to another.

MR. BROOKMAN: Okay. We are going to press on with the content on slide 102.

MR. WEINTRAUB: All right.

MR. BROOKMAN: Oh, Mike Rivest wishes to wedge-in here.

MR. RIVEST: Just out of curiosity, did that analysis take into account costs? How was that performed?

MR. BROOKMAN: Dave?

MR. McKINSTRY: Well, EU did this. EU did this over a 10-year period, and there are some really substantial studies that have been made, published, and I think Alison may have them and have looked at them; I am not sure.

MR. BROOKMAN: Did you hear him? Do you have the studies that the EU produced over a 10-year period?

MS. WILLIAMS: So, we have looked at the studies, and they are fairly extensive in terms of the efficiency analysis, but there is not really cost analysis in there. As far as I understand, the only cost analysis was that brief calculation of the manufacturer cost at each level that was highly top-down.

It wasn’t like built up and looked at every level separately and comprehensively. So, I think we are talking about a different level of cost-effectiveness analysis in this rulemaking.

MR. BROOKMAN: Charles Llenza?

MR. LLENZA: I just wanted to ask, also, what about impacts to the consumer? There wasn't anything on that particular level, either?

MS. WILLIAMS: They do do some analyses, but, in general, the EU analyses are much more simple than what DOE is required to do by EPCA.

MR. BROOKMAN: Back to Dave.

MR. McKINSTRY: No, I would concur because that is my recollection of those reports. They were done -- there were cost studies from the manufacturing standpoint done and provided by Europump to the EU in the process. I guess those are probably available, but we don't have them.

MR. BROOKMAN: Charles Llenza?

MR. LLENZA: Yes, I just want to bring back to the point again, when we go back to what EPCA requires the Department to do, and the seven factors, and our analysis is a little bit more complicated. I think the EU's system of adoption for standards is a lot more simplistic in many ways.

We have to go through a dragged-out process of going to the stakeholders and the manufacturers and the advocates and the U.S. public in general. We have to provide an extensive cost analysis of the impacts in all the different areas in order to move on with a standard.

So, I think that is part of what we are seeing, that maybe while the EU methodology might be more simplistic, they didn't have to go through as many hurdles as we do to get to our final levels.

MR. BROOKMAN: Steve?

MR. ROSENSTOCK: Steve Rosenstock,

EEI.

So, again, what I am hearing, the EU process, they didn't have to have public meetings or let the end-users know that they were doing this?

MR. McKINSTRY: Oh, yes, the EU process, believe me, had public meetings.

MR. ROSENSTOCK: Okay.

MR. McKINSTRY: They had discussions, multiple discussions with advocates and with adversaries and the government.

(Laughter.)

And they weren't so lucky as to have the environmental NGOs as a portion of their pre-teamwork. So, they were very heated activities, and there was a lot of discussion, and that is what surfaced, is what you see.

MR. BROOKMAN: Charles?

MR. LLENZA: What kind of timeframe for adoption did they use?

MR. McKINSTRY: Well, I think they

call that process that they have been in 12 years. They this year adopted the first one, 13. They are going to adopt .4 in 2015, and then, they are going to start back in on the process with additional activities in 2015 with additional products.

So, they view it, I think, as a continuum, as you do. In some cases, though, I hear you mention six years. But the process is well-vetted. It has been a lot of discussion.

I don't suggest you don't have to do these things. If the law says you have to do these things, you do them. I am suggesting that, as you have encouraged us to try new, innovative ideas, we would encourage you to comply with the law with new, innovative concepts, too.

(Laughter.)

MR. BROOKMAN: Okay. Back to Dan. Go, Dan.

MR. WEINTRAUB: All right. So,

resetting ourselves back where we were before, talking a bit about our tear-down and test methodology, this is our generic methodology. We would definitely have to tailor this toward this industry, as we have discussed. You are not going to expect to see a lot of difference in costs, manufacturing costs, of each pump, but it would all come in the front-end. But we would still, nonetheless, if we were to take this approach, I will take you through what it would look like.

And that would be selection of units. So, we have discussed that earlier. That would bring us to physical tear-down. And physical tear-down means taking these products down to their core components, as small as you can go, and creating a bill of materials and using our experience to break these out into either fabricated parts, parts that we would believe that were fabricated in-house by the manufacturers or purchased parts from outside sources.

For fabricated parts, we use our models and our experience to come up with raw material plus labor plus manufacturing overhead. A whole variety of costs run into that to understand the cost of that part.

And on the other side, we use the best-available data for the cost of these purchased parts, what is out there in the marketplace.

Once you have these parts, you have your fabricated and your purchased, we then model the assembly process that you guys would go through in your own factories and how much that would cost to put it together.

And when you bring that all together, you have a manufacturer production cost, which would be our estimate, which is one of the reasons we come up with this; we discuss these things with you, and we want to come up with the best estimates possible to understand these things.

And that is key as we are looking

at changing, if we are looking at coming up with theoretical changes to designs, we want to understand what the baseline was and how costs will vary when we come up with these changes.

So, next we will take a closer look at manufacturer's selling price and what is and is not included in this, in our analyses. So, manufacturer selling price, MSP, would include manufacturer production costs, which we just discussed, and that is materials, direct labor, operating cost, maintenance, appreciation, taxes; all costs such as these. We then, estimate a markup, and that markup pretty much represents contribution margin. It is all the costs not associated with production. And when you multiply those two, it comes to a manufacturer selling price that we use within our models. And again, we intend to have these discussions with the manufacturers to try to validate our initial assumptions.

What is not included in manufacturer selling price is conversion costs. These are some of the things that were just discussed earlier, and that would be your front-end costs.

So, conversion costs typically come in two, well, you break them out into two sides. That would be product conversion cost and capital conversion cost. So, product conversion cost would be those engineering redesigns, the testing costs and labor; and like we said, hydraulic redesigns would fall under those types of costs.

On the other hand, capital conversion costs; these are the costs of capital investments needed to meet these standards. And that would be new machines, new tooling, basically, anything that would fall under plant property and equipment that the industry would need to invest in in order to meet new standards.

Now, although they are not included

in the MSP and in the engineering analysis, typically, they are included in the manufacturing impact analysis. And that is where these costs come into play, and we look at the impact on the manufacturers as a whole.

Now there are some precedents where we can look at bringing these costs in and amortizing them, if we truly believe there are going to be price increases due to them. And those are things that can be worked out down the line.

So, at this time, we have another comment box and Item 5-9. DOE welcomes comment on the markup approach proposed for developing estimates of manufacturer's selling prices. Do you want to start there?

MR. BROOKMAN: Sure. Yes, Gary?

MR. FERNSTROM: Gary Fernstrom, California Investor Owned Utilities.

I would like to reiterate my point about the importance of mature market cost. And I would like to relate an example.

About five-six years ago, Pentair introduced an extended-product category pool pump. This product was the combination of a pump head, motor, variable-speed drive, and integral control. It wholesaled for about $1800. Five years later, it is about $1,000 on the wholesale market. So, in a five-year period, that is a drop of $800, which is really significant. It is almost half the cost.

And I would encourage DOE, as they do these analyses, to look not just at the current cost of the transition to a higher efficiency, but to consider what might happen to those costs in the years following.

MR. BROOKMAN: Thank you.

Dave?

MR. McKINSTRY: Dave McKinstry, Colfax Fluid Handling.

This is the required response from the Hydraulic Institute, that we can't talk about 5-9, 5-10, 5-11 because of our requirements under antitrust. I am sure that the DOE can talk individually to companies, but we can't talk in a room with members of other companies. So, we decline any comment on those.

MR. BROOKMAN: Okay. Thank you.

Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock.

Yes, just a quick thought. In terms of the tear-down and test methodology, depending on the regulatory regime that is chosen, at this point, then, you would have to really look at tearing down, I will say, standalone pumps, pumps sold alone, as well as the pumps sold with motors. So, you are tearing down the pump and the motor, and then, you might have to tear down a pump, motor, and VSD combination to really get the full range of costs.

MR. WEINTRAUB: Yes. So, that is correct. But the way that we would be looking at it, as I mentioned, purchased part versus fabricated parts, and generally, these motors are going to be purchased, brought in. So, we understand the cost of the purchased motor. We understand the cost of a VSD system, if it is not made in-house, which doesn't add as much complexity. If, on the other hand, they are manufacturing things in-house, that does lead to a whole lot more complexity.

But we would consider whatever the regime leads us to. We would consider these products and tearing them down.

MR. ROSENSTOCK: Okay. Thank you.

MR. BROOKMAN: Do we have additional comments on 5-10 or 5-11? Because we are about to move on.

(No response.)

MR. WEINTRAUB: All right. I will move forward.

Finally, to wrap up the engineering analysis, we will look at outside regulatory changes, and this also will tie in a little bit to cumulative regulatory burden, which we will discuss a little later.

But, just to touch upon this, the DOE will consider the effects of both DOE and non-DOE regulations that may impact manufacturers of the covered products. This is done with the understanding that other regulatory changes or other DOE changes may impact the efficiency of the product, how far you can go with efficiency based on regulation of other products, along with financial impacts that go with it.

MR. BROOKMAN: Steve?

MR. ROSENSTOCK: Steve Rosenstock, Edison Electric Institute.

As someone alluded to earlier, there have been a lot of significant improvements in ASHRAE 90.1, which covers commercial buildings in the United States. Some of them -- again, I didn't bring it with me -- but there are some requirements that do affect pumps in commercial buildings, whether they are new buildings or total renovations.

And for 2013, there is always a whole slew of new sections or revised sections to ASHRAE. The 2013 version of ASHRAE will be published probably in October/November.

And again, in terms of the analytics, the Pacific Northwest National Lab does the analysis and the progress reports for ASHRAE 90.1. So, in terms of any new language that has been approved into ASHRAE, you might, if you get a chance to talk to them about anything that affects pumping energy, I would strongly suggest that you -- or take a look at some of the historical analysis that has quite an impact on building energy use in the U.S.

MR. BROOKMAN: Mark?

MR. HANDZEL: Steve, they have been publishing some preliminary copies of that 90.1 2013, and there is no additional changes planned at this time to variable-speed requirements in that document that we are aware of.

MR. ROSENSTOCK: Steve Rosenstock.

Yes, they are not done yet.

(Laughter.)

MR. HANDZEL: Oh, I know that. I know that they have been progressively moving down horsepower. But, from what we understand, there is not a plan to drop the horsepower requirements on variable loads in this next document.

MR. ROSENSTOCK: It's not over yet.

(Laughter.)

MR. HANDZEL: Okay.

MR. BROOKMAN: Louis?

MR. STARR: Oh, no.

MR. BROOKMAN: No? Okay.

MR. WEINTRAUB: So, if there is no more discussion on the engineering analysis, that will conclude that section.

And now, we are going to go through a very brief overview of the manufacturer impact analysis, and we will take you through that.

So, here, the purpose of the

manufacturer impact analysis is threefold. It is to assess the impact of standards on the manufacturers. So, this is where we are looking at the financial effect on you, the manufacturers; identify and estimate impacts on manufacturer subgroups that may experience greater impact than the industry as a whole, and examine the impact of cumulative regulatory burden on the industry.

And the way that we get, the methods that we use, are toanalyze industry cashflow and net present value through the use of our Government Regulatory Impact Model, which the acronym is GRIM, aptly named.

(Laughter.)

And then, we would go ahead and interview the manufacturers to refine our initial inputs that we have gathered. And we would also develop subgroup analyses and address qualitative issues as we go through it.

So, next I will take you through an

overview of the process. So, here we have broken it out into three phases. Phase 1 occurs in the interim or preliminary analysis, which we will be entering soon. Phases 2 and 3 occur during the NOPR phase. And I will walk you through it a bit. We are going to try to go through this quickly.

So, it starts with developing an industry profile. This is where we identify the industry structures; we evaluate market characteristics; we develop average financial parameters based on publicly-available information. This is where we start to get ourselves grounded in your industry, so that when we come to talk to you, we have a baseline to start discussing, a place to start.

From there, we go through initial MIA interviews. And these will be in conjunction with engineering interviews. So, they will both be together. They usually work out well that way.

And here, we will identify issues that are important to manufacturers, and we will also look to gain as much information as we can on a preliminary basis. And this will also feed into the preliminary engineering analysis that goes on. So, we will look to get as much information as we can in those early phases.

At the start of Phase 2, we will tailor a generic GRIM model, and that is what we mean by developing a strawman GRIM. We will tailor that to the industry structure, now that we have spoken with manufacturers and we have a better understanding of the standing of the industry.

At that point, we will develop an interview guide. This will be a written document. It will have all of the questions that we are looking to ask manufacturers, at that time, and those will be sent out ahead of time in front of our interviews. So that you have as much time as possible to prepare any answers to questions you do and do not want to answer and, also, give you time to prepare any questions you have for us or additional concerns that have come up along the way.

So, then, when we enter Phase 3, that is when we go into interviews and perform the analyses. So, at this point, we will meet with you, and it is generally conducted in our confidentiality agreements. We go through the interview guide. We discuss all these key issues. We look to see what information can be shared, what can't, to see how you feel about our assumptions we have made so far, and try to bring it all together and get all the additional input that we need to finally run our financial model, the GRIM.

And that is the final stage. That is where we run our models and we estimate the impact to the industry, net present value, and domestic employment. And that is using that model.

Then, along with these estimates,

we will also assess the cumulative regulatory burden -- that is kind of done in parallel -- and the effects on industry competition that this may have, and any disproportionate effects to subgroups, especially small businesses. We will always be looking at effects on small businesses. And, again, input from the industry on that front is always very, very useful.

So, that is a quick overview of a much larger process. At this time, I will go into the comment section. So, Item 12-1, the DOE seeks comment on the subgroups of pump equipment manufacturers that should be considered in a manufacturing subgroup analysis.

And I guess we will start with that, see if there is any input.

MR. BROOKMAN: Subgroups that you would identify?

MR. WEINTRAUB: Would there be any subgroups that may not be represented by the industry as a whole if we were to start aggregating data?

(No response.)

All right.

MR. BROOKMAN: No comment, yes.

MR. WEINTRAUB: Move on to Item 12-2. DOE seeks comments on what other existing regulations or pending regulations it should consider in its examination of cumulative regulatory burden.

(No response.)

All right. And finally, we have an additional item that has been added on. It is not in the framework. And that is 12-A. That would be DOE seeks comments on small businesses that could be impacted by potential energy conservation standards for commercial and industrial pumps as well as what these impacts might be.

And at this point in the game, we are really just looking for names of small businesses in your industry that you know of that would fall under the Small Business Administration, a headstart for us because you guys are more familiar with your industry than we are.

(No response.)

MR. BROOKMAN: No? Okay.

MR. WEINTRAUB: All right. Well, at that point, I think we are done with this section.

MR. BROOKMAN: On to Sarah. Mark-ups analysis, energy use analysis.

MS. WIDDER: Okay. Good afternoon again, everyone.

As the afternoon wears on, we seem to be getting less comments, which is good.

(Laughter.)

So, maybe we will all go home by 5:00 or close to that.

So, Dan just talked to you a little bit about the economic analysis we do to understand the impacts on manufacturers. We also spend a lot of time thinking about how those costs and changes in manufacturer's selling price trickle down to the consumer. And this is all part of our big economic model, trying to cost-justify the standard level that we will end up setting for different product classes.

So, I am going to talk to you right now a little bit about the mark-ups analysis we do to get to that final consumer price. And as has been noted previously, the market for pumps is very diverse and there could be a lot of ways a consumer gets a pump or a pumping system. And we are going to have to account for that in our mark-up analysis.

The purpose of this analysis is to convert that manufacturer's selling price, sort of like a wholesale price, to what a consumer would pay. It could be through an OEM dealer, through a distributor; there's a number of different paths that that pump could reach the customer, and we will want to account for each of those mark-ups. And that is where we get into the method here. We are going to identify some representative distribution channels and apply representative mark-ups to each of those channels.

So, here are some representative distribution channels that we have used. It is similar to the distribution channels we see in other commercial equipment, commercial and industrial equipment. The manufacturer selling directly to the customer, and that is a wholesale-type distribution channel. The manufacturer selling through an OEM or an OEM distributor, and we talked about that being perhaps common for a lot of pumps where the distributor is associated with the manufacturer; that is an OEM channel. The manufacturer selling through a wholesaler, who then sells to the customer. Or a manufacturer selling to the wholesaler who sells to a contractor who, then, sells to the customer. And each of those is going to have different economic implications for that end-customer who we are concerned with in this analysis.

We try to look out at, I guess, the litany of publicly-available information to try to determine what each of these incremental mark-ups should be and that might vary by application or by market segment that the pump is being sold into.

There is a lot of data available from the U.S. Census Bureau; also, RS Means data, and industry reports about where pumps are going and through which distribution channels, based on the application, and then, the incremental mark-ups that that distribution channel might incur.

In our mark-ups analysis, we also want to account for efficiency improvements that might occur because of standards. So, we are going to look at, similar to our engineering analysis, we are going to look at a baseline mark-up that is currently applied right now and is applicable to all the equipment that is available in the market, and would have those incremental pieces that we saw on the previous slide.

And then, we also want to look at the incremental mark-up and how the mark-up might change based on an efficiency improvement. So, some things might not change the mark-up.

Transportation is a good example. So, we do want to account for shipping costs or transportation costs sometimes in our mark-up. But if an efficiency improvement doesn't change the weight or the size of a piece of equipment, that doesn't always need to be part of the mark-up or part of the incremental mark-up.

MR. BROOKMAN: Louis?

MS. WIDDER: Go ahead.

MR. STARR: Actually, on your previous slide, slide 111, you have manufacturer like a sales rep for a manufacturer. Which one of the channels is that, and is that different than like buying a pump from Granger, although I don't think you could probably buy it? It looks like your third one. Where is that captured? Which one of those market distribution channels would be manufacturer's sales rep be on that?

MS. WIDDER: From a sales rep? It would probably depend on how that piece of equipment is marked up. I would think it would either be manufacturer -- I think it would be the OEM channel, is probably what would be most representative.

Dave, if you want to answer, go ahead.

MR. McKINSTRY: Yes, I would suggest No. 1. Most companies put the sales agent channels as a cost of sales, which is in their cost rollup. If you sell to a distributor, then you sell to a distributor at a price, and he marks it up. If you sell with agents, which was your example, then, generally, you set the price because it is your produce, and, then, you pay the agent a commission.

MR. STARR: Okay. Well, I know from experience in buying stuff, when we did contracting work, it seems like, depending on which ones you were, you paid a different price for the piece of equipment. It wasn't pumps, but on valves and things. So, it seems like it can be that your price can be a lot different if you are really big than if you are small.

MS. WIDDER: And that is part of what this analysis is trying to account for, the difference from a wholesale or large company price that you might get versus a small company price. Way back when the pump was manufactured, that same pump cost the same amount to manufacture, regardless of where it went and got sold.

And maybe these distribution channels are totally the wrong ones and we should have different distribution channels. And if that is the case, please comment to that effect.

But what we are trying to get at in this analysis is exactly what you mentioned. That pump ends up being a lot of different prices out there in the marketplace. And how can we analyze that and account for that in some representative way?

MR. BROOKMAN: Let's go to the comment boxes. You can see the comment boxes listed there on 113. Information about distribution channels, comments and additional information on appropriate way to establish distribution channel percentages across equipment classes and applications, and then, finally, 6-3, sources of relevant data that could be used to characterize mark-ups.

Mark, do you want to start?

MR. HANDZEL: Well, much like the answer that veDave gave earlier, while we are all here in the room as members of the Hydraulic Institute, you know, we are all competitors.

MR. BROOKMAN: Yes. Right.

MR. HANDZEL: So, we all have different ways that we deal with this. So, we don't have an industry answer for you on this subject.

MR. BROOKMAN: Okay.

MR. HANDZEL: So, you will have to get it from us individually.

MR. BROOKMAN: Yes. And that is what the interview process will accommodate.

Other comments on this series of comment boxes?

(No response.)

Is there a different distribution channel than those that are arrayed here on the previous --

MR. McKINSTRY: I thought that she captured them pretty well.

MR. BROOKMAN: Okay. Thank you, Dave.

MR. McKINSTRY: Dave McKinstry, Colfax Fluid Handling.

MR. BROOKMAN: And Mark?

MR. HANDZEL: Mark Handzel.

I would agree that she captured them. There are many variations that could adapt those further, but you have the gist of it.

MR. BROOKMAN: Okay.

MR. HANDZEL: Okay?

MS. WIDDER: Thank you.

MR. BROOKMAN: And then, the next comment box, 6-4 and 6-5?

MS. WIDDER: So, these Requests for Comments are related to the baseline and incremental mark-ups, to the extent that that is applicable for pumps where some efficiency improvements might require an incremental mark-up, and that wouldn't be captured in the baseline mark-up. And comments on that approach?

And then, DOE seeks comments specifically on the appropriate transportation and shipping costs to include, and then, how to best allocate those costs as part of the baseline mark-up or incremental mark-up or a manufacturer's selling price.

MR. BROOKMAN: David?

MR. McKINSTRY: David McKinstry, Colfax Pump.

You are going to get tired of hearing this, but those, again, would be things we couldn't discuss among our competitors.

MS. WIDDER: Right, which is certainly reasonable, and that is why we do the manufacturer interview process. That data, then, we can use in our analysis and have that information without having it in this public forum.

MR. BROOKMAN: So, we are moving on to the energy use.

MS. WIDDER: Yes. Oh, go ahead.

MR. ROSENSTOCK: Hi. Steve Rosenstock, EEI.

And again, this gets back to the

regulatory regime. It is kind of the same question. So, under the regime, where you are looking at the pumps and the motors and the VSDs, you are going to have to contact the manufacturers of each of the separate products in this case, right?

MS. WIDDER: That is a very --

MR. ROSENSTOCK: Separate components. Excuse me.

MS. WIDDER: That is a very good point. I think that is something that we will have to consider as we -- to be honest, we haven't gotten that far yet because we are still talking about scope and what the extended-product approach would look like just from a regulation-of-pumps standpoint.

But when we look at market impacts and the manufacturer price, we would certainly need data about that. Whether or not that would be going to those individual manufacturers as well and doing a similar analysis, it probably would be more looking at what available data there was in the public domain as well as the knowledge of the pump manufacturers who worked probably closely with those manufacturers to get something representative we can use in our analysis without having to redo the whole process. But that is certainly something we will have to consider, based on the scope we decide to move forward with.

MR. BROOKMAN: Gary Fernstrom?

MR. FERNSTROM: I was going to say, aren't we something of a common opinion here that these integrated products or extended products would be sold as a unit? So, you would probably want to start with the manufacturer because they would be buying and putting the drive on the product. And then, to double-check to see whether or not the information you are getting is reasonable, you might want to check drives in the market.

MS. WIDDER: Certainly. That is a good suggestion.

MR. BROOKMAN: Dave?

MR. McKINSTRY: Yes, Dave McKinstry, Colfax Fluid Handling.

Well, we really fundamentally agree with Gary. We think under the extended-product, the manufacturer assumes the price responsibility for those.

MS. WIDDER: Uh-hum.

MR. BROOKMAN: Okay.

MS. WIDDER: Great.

Okay. So, now we are going to talk a little bit about -- the one thing I will say about mark-ups before we move on is just to emphasize the cost analysis that DOE does. It is really based on cost to the consumer and cost-effectiveness to the consumer, while accounting for manufacturer impacts.

And so, these mark-ups fall into the life-cycle cost analysis and, then, the payback period analysis. The reason I bring that up is the other component of the payback period analysis is this energy use characterization that I am going to talk about now.

So, we look at the price to the consumer through these different channels. And then, we do this energy use characterization to try to describe, based on all the different applications you could put pumps in, what is the energy use, what is the total current energy use and how will our standards impact that energy use or conserve energy.

And then, those two pieces are really what get us to the life-cycle cost and payback period analysis, and let us flow down to set standard levels.

So, I am going to talk at a high level about what that analysis looks like. As we all sort of are aware and Tom brought up, this is going to be a very complex question.

I think what we are talking about in these few slides is similar to the semi-analytical approach that HI has developed to look at part-load performance of pumps. So, hopefully, we are consistent on that, but it is certainly going to be very important that we develop representative curves for large market segments that pumps are sold into, to make sure that we get at least the baseline energy use characterized well.

So, the purpose, again, is to identify how pumps are actually operated by users in representative market segments and, then, vary the efficiency of those pumps, based on those load profiles or those specific applications, to determine energy savings in the field.

And we estimate that annual energy consumption, again, for baseline and higher-efficiency designs. There are a lot of issues that we sort of talked about.

One is that there is a lot of duty profiles that are expected to vary across the equipment classes. Also, as we know and as has been stated, pumps are often designed to exceed the flow rate capacity and head requirements as an engineering precaution. And to what extent is that done? And what is an average operating point for that pump? It may not be exactly the best operating point, or the design point even, all the time.

And then, pumps are often sized based on peak load and knowing how often that pump actually even operates at peak load. We are going to have to have some data that helps us make estimates about that.

So, here is the just fundamental framework for an approach that we have talked about. I think it sounds similar to what HI was proposing where we would define for each application - and some common applications that we might consider are wastewater and the construction industry, HVAC, cooling towers, food processing. We can talk about what the most representative market segments or applications are for particular pump classes. And then, for those applications, for those pumps, define load profiles based on the flow rate and the head throughout the year.

So, you can see there is a flow rate, a head, and operating hours at that point. And then, we would calculate that AEC for each perhaps pump class in each applications. And it becomes this big exponential, as it were, analysis.

And then, we try to take account for the efficiency of the pumping system in this analysis. So, for pumps that are sold as pumps alone, we will have to assume, make some assumptions about what type and efficiency of motors and if they have controls that were added after market, et cetera, et cetera.

So, this is really getting to how we justify standards levels and decide how much energy we are going to try and save, but there is going to be a lot of work developing these profiles. And so, I certainly hope that the manufacturers can help us get that right.

MR. STARR: Yes, I was just

thinking your equation should probably -- I think maybe your transmission one is trying to capture this, the VFD efficiency. But if it is not that, I don't know, transmission could also be, depending on whether it is direct-drive or belt, or whatever, but I don't know if you were trying to capture that, but it probably needs to be in there.

And then, also, the efficiency changes based upon where the VFD load is. If it is more fully loaded, it is more efficient. If it is less loaded, it is less efficient.

MS. WIDDER: Right.

MR. STARR: So, that is another element in there.

MS. WIDDER: You know, just to tie this all together, but not to make it too complex, it is going to get back to what metric we have to start with pump efficiency, so how we rate pumps, how we define their efficiency, at what flow rates, full or part load, and then, how we use those rated efficiencies to extrapolate to a more annualized energy use.

MR. BROOKMAN: Gary Fernstrom?

MS. WIDDER: Yes, go ahead.

MR. FERNSTROM: I was going to say you might argue that the VFD efficiency is a function of the control system efficiency because it is controlling the mother.

MS. WIDDER: Yes, directly to your question, I believe the control system efficiency --

MR. BROOKMAN: Steve?

MR. ROSENSTOCK: Steve Rosenstock.

Yes, I think on this one, because you are looking at the non-electric systems as well, you are going to have to add an indicator for like a fossil fuel and turbine in terms of some of this equation as well for those applications.

And in terms of the VFD, the control system, again, just thinking of the VSD or VFD, is that the efficiency of the driver, the efficiency of the motor after -- it is really how it affects the motor, the pump motor efficiency, not the VFD efficiency, right?

MS. WIDDER: Sorry. Just to make sure I understand your question, so we are looking at the motor efficiency, which may be a function of the VFD efficiency?

MR. ROSENSTOCK: And then, could incorporate the N sub C.

MS. WIDDER: Right, right.

MR. ROSENSTOCK: Because the VFD is having an impact on the motor efficiency.

MS. WIDDER: Yes, yes. That is certainly true.

MR. ROSENSTOCK: And then, I guess the other thing would be -- again, this is all generic -- but there is going to be a control system energy usage that is going to be separate from the motor. There is going to be a control system, there is going to be extra kilowatt hours just of the control by itself regardless of what is happening with the pump. So, there is an extra, I will say, constant or something in there to account for that.

MS. WIDDER: Right, right.

MR. ROSENSTOCK: Okay.

MS. WIDDER: And that will have to certainly be part of --

MR. ROSENSTOCK: For the extended ones.

MS. WIDDER: If we are going to account for the efficiency, we also have to account for the VFD energy use, yes.

MR. ROSENSTOCK: Thanks. Thanks.

MS. WIDDER: Definitely.

MR. BROOKMAN: Gary?

MR. FERNSTROM: Well, another way of saying that is, with this particular extended product category, we are talking about potential standby power.

MS. WIDDER: Uh-hum.

MR. ROSENSTOCK: It is not just standby.

This is Steve Rosenstock.

Yes, it is not just standby; it is active as well.

MS. WIDDER: Yes.

MR. BROOKMAN: Let's go now to the comment boxes.

MS. WIDDER: Yes, and this will come up a lot. You will hear about this more. But now we have some preliminary requests for comments that will at least help us get started on developing the dataset we will need to understand energy use of pumps in the field.

DOE requests input on a lot of things, recommendations for identifying those high-volume applications, those representative applications that we can use to develop profiles. We are not going to get every application of every pump, but what suite of profiles would be representative enough to give us a good picture?

Recommendations on data sources,

and they could be application-specific or market-level. And we can make those estimates work together to try to verify our analysis.

DOE requests inputs on ways to characterize pump sizing and selection practices for different equipment classes. So, maybe pumps are more regularly oversized in particular applications. We want to account for that in this analysis.

And the last, 7.5, is requesting comment on the nominal duty profiles to consider in the rulemaking. So, perhaps there are some applications that can be rolled up and have more representative duty profiles. And this HI nominal assessment that they have done, nominal analysis of EEI, I think it is, might be appropriate for those nominal duty profiles.

MR. McKINSTRY: Just as a bit of information for you, when the EU looked at all these different load profiles, they found that the load profile didn't really make a whole lot of difference.

MS. WIDDER: And that would be wonderful if we found the same thing.

(Laughter.)

MR. BROOKMAN: Now Louis. That was Dave. Louis?

MR. STARR: So, the last thing is Item 7-4, the other thing you might think about, there is a certain amount of oversizing that happens as kind of good engineering practices.

MS. WIDDER: Uh-hum.

MR. STARR: Design, you know, is 10 percent more than break horsepower you want.

But the other element that happens is, once you have selected the motor, there is never a 2.3 horsepower motor. It is either 2 or 3. And so, even if you just did a random analysis of sticking in numbers, because the operating system points on systems are random. And therefore, if you start sticking in numbers, you can actually start to see there is inherently a certain amount of oversizing, and then you are doing your break horsepower oversizing. So, you are getting two elements that are playing there together.

That is why the discussion of using a VFD, even on a constant load application, can actually save power, just by being able to dial that system in when you actually know what the system losses really are.

MS. WIDDER: Right.

MR. STARR: And so, there is a lot of value there.

MS. WIDDER: Yes.

MR. BROOKMAN: Bruce?

MR. LUNG: Just to kind of piggyback on that, there is another little comment I would like to make on this 7-4. There are also times where you could have a manufacturing plant that, properly sized, it pumps for a given application, but over time the end-use requirements may have declined. But, because they focus on production and, then, they switch production equipment, they leave the existing cross-cutting stuff in place. This is true for pumps as well as for compressors and some other type of equipment.

So, you could have a situation where, because they don't take account of the true end-use needs, they keep oversized pumps in place; whereas, at the beginning the pumps were properly sized. And they end up diverting the flow, so they have to keep operating that BEP.

MS. WIDDER: And that certainly could be the case, to the extent that we have data about how prevalent that practice is and in what particular market segments. That is how we would be able to account for that in our analysis. Just anecdotally noting that that sometimes occurs, it is difficult for us to incorporate.

MR. BROOKMAN: Tom Eckman?

MR. ECKMAN: Yes. You and Dave should check with Graham Parker on the load shapes. We have all the ELCAP stuff that was put up on the web. So, all the hourly data is out there now.

MS. WIDDER: Yes.

MR. ECKMAN: So, I don't know; there is lots of commercial. I don't think there is any industrial, but there is lots of commercial. And we can also run down some industrial load shapes --

MS. WIDDER: Yes, yes.

MR. ECKMAN: -- particularly for food processing and irrigation.

MS. WIDDER: And that often is a ripe data source for us.

MR. ECKMAN: Yes. Well, Graham knows where it is at now.

MS. WIDDER: Yes.

MR. BROOKMAN: Gary Fernstrom.

MR. FERNSTROM: So, I would like to go back to swimming pools as an example, even though they are not a subject of this rulemaking. And that is, for commercial pools, the Health and Safety Codes require that pool pumps be designed to pump against 60 feet of head at their design flow, when in reality the actual head they see is rarely in excess of 15 feet. So, there is an example of built-in overdesign.

MS. WIDDER: Uh-hum.

MR. BROOKMAN: Okay. Louis?

MR. STARR: In terms of oversizing and information, I think it is Evan Mills with, I think it is California Energy Commission, but they do actually have numbers on kind of what approximately - from retrocommissioning - in terms of what the oversizing is. So, they can kind of give you, because they did a bit of a study, I think on 238 samples or something. So, there is information out there. I will probably try to look for it. But Evan Mills is --

MR. BROOKMAN: So, let's scan these Request for Comment boxes one time before we move on, make sure we have covered what we can.

MS. WIDDER: Yes. Okay.

MR. BROOKMAN: Okay. Now we are moving on.

MS. WIDDER: Moving on, we actually have another page of Requests for Comments.

MR. BROOKMAN: Right. I know that.

(Laughter.)

MS. WIDDER: Can't wait.

This is related to -- and this came up earlier -- about coming up with our baseline assessment of energy use, so that we can, then, add on the impact of any standards that were to be set.

So, for that, we will need information about the current penetration of VSDs. And again, that may vary by application or type of pump. And to the extent it does, we will need information on that.

We just really want, in order to understand how standards will impact the market and impact energy use, we need to understand first how pumps are currently impacting energy use. And so, any data about that -- I think we don't need to accept more comments on that.

Comment on the recommendation on the range and number of sizes over which the analysis should be carried out. So, this analysis could actually get very complex since there is a number of specific speed applications where the same pump could be sold into any number of different applications. And to think about looking at each one would be nearly impossible. And so, trying to characterize what are the representative, maybe a high, a low, and a middle, maybe 5 or 10 representative duty profiles and speeds that we could apply our analysis to and get a pretty good picture. So, information about that.

And we are requesting comment on establishing the mean value and the ranges of likely values for some of those efficiencies.

And also, to the extent that they are dependent on one another, we will want to take account for that, by receiving comment on that dependency. And we are looking for ranges of those values because we probably will do sensitivity around some of those ranges.

So, that is the extent of this comment. I don't know if there is other information. We will probably just need to go and consider and we will accept written comments, Doug.

MR. BROOKMAN: So, then, now we are moving on.

Thank you, Sarah

And back to Alison.

MS. WILLIAMS: Thank you.

So, we are going to move on to the life-cycle cost and payback period analysis, which is very related to the energy use analysis. It is from the customer's perspective.

The standards usually have the

effect of increasing purchase price and decreasing operating cost. So, the LCC is basically looking at those relationships, the customer price plus the sum of annual operating cost.

Again, it is customer perspective, and it is always the difference between a baseline and the standard level. And we also look at payback period in this analysis.

So, the center of this approach is to look at the pump selection process. So, basically, matching pump duty points with pump equipment. And it is based on the distribution of equipment efficiencies expected for the compliance year. So, some customers will not be affected by the standard, and the LCC accounts for that.

Again, it aggregates the annual energy consumption over the pump's lifetime, and it uses probability distributions to characterize operating costs and other parameters. And it is all run using a Monte

Carlo simulation to look at a lot of the distributions and determine the percent of customers benefitting from, being burdened by, or not being affected by the standard.

This is a little visual representation of the approach. So, you can see at the center is the pump selection box. We are basically going to match duty points of pumps with the pumps themselves and, also, motors.

And then, we will use the energy use analysis that Sarah just discussed to get the annual energy consumption and combine that with other parameters, including lifetime, discount rate, energy price, potentially efficiency degradation factor over time, and installation cost to arrive at the final life-cycle cost.

So, I will just discuss a little bit of these inputs. So, installation costs, labor, and overhead, and other miscellaneous materials and parts. We will look at energy prices by customer sector, including looking at energy tariffs, focusing on the EIA's Annual Energy Outlook to estimate future energy prices over time, and we may consider reactive power prices.

Ideally, we also will include the maintenance and repair costs in the LCC. We expect that they won't change with incremental increases in efficiency, but may potentially change with significant improvements, and we are interested in information on that.

We also will look at equipment lifetime. DOE believes the average lifetime is about 10 to 15 years with a max around 25. However, this depends on various things, such as higher values of pump head, horsepower and speed, or higher values of temperature. In addition, some pumps are basically thrown away when they break; whereas, others have repair cycles that may be repeated.

And finally, DOE will look at discount rates for commercial and industrial users.

So, this Request for Comments on a variety of these parameters, including installation cost, electricity prices, repair costs lifetime, any data on degradation of efficiency over time, and approaches for estimating discount rates.

MR. BROOKMAN: Steve Rosenstock?

MR. ROSENSTOCK: Steve Rosenstock, EEI.

Just a comment on 8-2. In your approach, you said that DOE will also survey reactive power prices. And I was kind of curious about why you might do that, because that only comes into play if the entire facility, the power factor for the entire facility, goes below the requirement of the utility where they have the reactive meters to check on power factors.

You know, most motors and drives are designed to make sure that they don't cause power factors to degrade. So, reactive power prices can add to the cost to the end-users, but especially large commercial and industrial, they always make sure that they meet the requirement. So, I personally don't necessarily see the need of why you would have to check on reactive power prices, unless you know that some of the technologies considered would definitely guarantee that the building power factor would go below a certain level.

MS. WILLIAMS: We will take that into account.

MR. BROOKMAN: Gary Fernstrom?

MR. FERNSTROM: That caught my attention, too, reactive power cost. And the way we do it, over, let's call it, an objective power factor of 85 percent, you get a credit on your bill; below that, you get a penalty on your bill. So, no matter where you are, power factor makes a difference in the customer's bill.

And no matter where the whole plant is, any individual contributor makes a difference in the whole plant's power factor. It may not be one-for-one. It may be diluted, but it makes a difference.

So, I think that you definitely ought to consider the effect or the cost of reactive power for consumers because it is a real cost.

MR. BROOKMAN: Steve?

MR. ROSENSTOCK: Steve Rosenstock.

Yes, again, I appreciate that. There are other utilities that I am aware of -- we did a survey; actually, we did it for our national key account customers, a survey of investor-owned utilities. That is going back several years.

And for the most part, again, there are a couple of utilities that have credit versus penalty based on the level of where the entire building is at the entrance to the building, basically, but there are a lot of utilities that also have -- if you are below it, you get penalized; if you are above it, you don't get penalized. So, you don't get credit for going above the power factor, but you do get penalized if you go below it. So, it can make an incremental difference, but is it enough to push you into the penalty side? If it is every single pump in the building, maybe; if it is an individual pump, then probably not, I would say.

MR. BROOKMAN: Gary?

MR. FERNSTROM: Okay. So, I think we have two competing arguments here. One is maybe you ought to treat it the way that it is prevalent in this country among the most utilities. On the other hand, even for those that don't give a credit above a certain level, it still has an impact on their cost, and they are simply distributing those costs differently among those customers. So, it does represent a cost to society, no matter which way it goes.

And I had a comment on degradation. That is, we ought to be looking at the degradation of the higher-efficiency pump relative to the degradation of the standard-efficiency pump.

So, that should only be a factor if we think, for some reason, the higher-efficiency pump is going to have a greater degradation than pumps in general. And it might work the other way, where the higher-efficiency pump has less degradation.

MR. BROOKMAN: Louis?

MR. STARR: If you are going to look at that reactive power, you should probably be looking at the demand charge side, too, I would think.

MR. BROOKMAN: Did we hear anything about installation costs or repair costs yet? I don't think so. No comments on those?

MR. HANDZEL: Mark Handzel for Hydraulic Institute.

We didn't prepare a response on these. So, we will probably be able to give you some information in our written response.

MR. BROOKMAN: Okay. That is helpful. Okay.

Then, we are moving on.

MS. WILLIAMS: Okay. So, the next analysis is the shipments analysis, which serves as the foundation for both the national impact analysis and the manufacturer impact analysis that Dan discussed earlier.

So, the purpose is pretty straightforward. We want to project future shipments by equipment class, so that we can have the proper baseline from which to calculate energy savings and other information.

We will look at a number of data sources, anything that we can find. Typically, DOE projects shipments for a 30-year period, beginning on the expected compliance date of a standard. DOE will attempt to tie growth indices from industrial and commercial sectors to the shipments projection. And in some cases, the shipments projection in the standards case may differ from that in the base case because of changes in purchase price or operating cost.

So, we request comments on the shipments methodology as well as historical shipments and bookings data for the equipment classes and any information available on how the standards might impact shipments for the standards case as compared to the base case.

MR. BROOKMAN: Comments at this time?

(No response.)

No comments at this time.

MS. WILLIAMS: Okay. Then, moving on to the national impact analysis, the purpose is twofold: to derive national energy savings and net present value. Where the LCC focuses on customers, this is at a national level.

So, we will look at the annual series of both energy and economic impacts. Again, as I mentioned, it is based on the shipments model. It also includes costs and energy use per unit from the LCC. It involves efficiency trends over time. And all this is aggregated over the years. And so, we will report both the national energy savings in both primary and full-fuel cycle savings as well as the national customer NPV, and it takes into account discount rates.

MR. BROOKMAN: I don't see the comment box.

MS. WILLIAMS: I have no comment box, but feel free to comment.

(Laughter.)

MR. BROOKMAN: Yes.

(No response.)

We are going to keep going.

MS. WILLIAMS: Okay. So, the remainder of the analyses are for the NOPR analyses, not the preliminary. So, in the interest of time, we could choose to not go over those today.

MR. BROOKMAN: Why don't you just

mention them and see if they are familiar?

MS. WILLIAMS: Okay.

MR. BROOKMAN: These are what they call further downstream, that is, later.

Charles?

MR. LLENZA: Let me just mention this section is just basically we lay out the foundation and the framework, and then the preliminary analysis. And then, at the NOPR stage, we actually construct a very comprehensive TSD with all this information.

So, what you see in the NOPR part here is, again, a part of a process here. You are putting the frosting on the cake, as I call it, and the candles. And so, it is a lot of detail, but it is also been built up through the prior two processes, and lots of work, by the way.

MR. BROOKMAN: So, just take a few moments to list them.

MR. LLENZA: Yes, just go through this.

MS. WILLIAMS: Sure. So, we have the customer subgroup, which is basically just the LCC for certain disproportionately-impacted subgroups.

We do an emissions analysis for several of these emissions, you can see here, and, also, monetize some of them, currently, CO2 and NOx.

We do a utility impact analysis to look at avoided capacity.

An employment impact analysis. While the MIA looks at direct employment impacts, this looks at indirect ones resulting from shifts in consumer expenditures.

And we, finally, do a regulatory impact analysis that looks at the potential for other non-regulatory alternatives to affect the energy efficiency of pumps.

MR. BROOKMAN: So, that concludes the PowerPoints that we have been trying to go through.

I know, we are not quite done yet.

(Laughter.)

But, in the interest of being efficient, I am going to hand out these evaluation forms now, so you can ponder how you will fill them out.

(Laughter.)

Tom, yes?

MR. ECKMAN: Yes, I am going to get on my saw again.

MR. BROOKMAN: Before you do, though -- (laughter) --

MR. ECKMAN: Very quickly.

MR. BROOKMAN: -- just reminder that now is an opportunity for anybody that wishes to, to make final comments, brief, summary comments, anything that didn't get covered sufficiently during the day.

Tom Eckman, you are up.

MR. ECKMAN: Yes. Before starting, I don't know, maybe a year or two years ago, DOE began monetizing the emissions. Those prices cover a wide range of costs. They use the intergovernmental estimate of that. That is wonderful. But they neglect to monetize the cost of avoided new electric capacity, which are real costs paid by real ratepayers.

And the social cost of carbon, we are going to pay sometime; I don't know what it is. But the reality is, when we avoid plants by doing these things, which is the purpose of doing these things, it saves people money. And I would encourage the DOE, once again, to take a look at that and try to monetize the cost of avoided capacity that is affected by these rules. Whether they are in individual rules or cumulatively, it is significant, but we have never figured out how much it saved us. And it is an important number to know.

MR. BROOKMAN: Okay. Steve?

MR. ROSENSTOCK: Steve Rosenstock.

Yes, I am going to go back, also, to the emissions analysis. There is a lot going on, and it will impact the analysis, especially because for this analysis, for this rulemaking, we are talking about a rule that is finalized in 2016 with standards that go into effect, at the earliest, in 2019.

At the current time, EPA is about to finalize CO_2 emission standards for new power plants. They are also working on a rule for CO_2 on existing power plants. I don't know how soon that will be out, but probably within the next few years.

The EPA is also about to finalize rules on mercury at power plants, which will go into effect by 2016. Basically, they will get three; 2016, 2017 is the timeframe before this rule goes into effect.

So, my point is and, also, I have had issues, and I have discussed this, so mercury will be capped. Of course, nitrogen oxides, there has been an issue because the monetized nitrogen oxide seems to be based on a study that was done in 2001. Okay.

And they keep it changing it to

reflect current dollar values. But, again, if you look at the emissions, look at EPA data, nitrous oxides emissions from the electric power sector since 2001 have gone down well over 50 percent. So, the monetized value has been inflated while the actual emissions have gone down. Therefore, there seems to be confluence, a disconnect there in terms of the value versus the actual what is happening out there.

Also, as part of the analysis, which I have agreed with, it is wherever emissions have been capped like SO2 or NOx, that basically there is zero impact from efficiency upgrades because of the way the caps work.

Well, DOE is not taking into account their CO2 caps in New England, and now one just started in California, starting this year. So, again, that has not been taken into account, into the analysis. In my view, eventually, when it is monetized, it is overstating the impact because it is not taking into account the significant amount of the caps that are going into effect here.

So, I will write some of this down, but I believe that changes are significant and that some of this monetization is overstating the eventual domestic benefit of the emissions reductions.

Thank you.

MR. BROOKMAN: Thank you.

So, now, yes, please. Your name?

MR. LEMMOND: Jon Lemmond, AHRI.

One quick thing. AHRI is supportive of the positions held by HI. That's all.

MR. BROOKMAN: Thank you. Thank you.

I have a final invitation for final remarks before I turn it back to Charles to go over all of the details surrounding submission of comments and all of that.

MR. FERNSTROM: Great job. Thank

you.

MR. LLENZA: And I will be brief on that.

MR. BROOKMAN: Gary, say it again?

MR. FERNSTROM: Good job. Thank you.

MR. BROOKMAN: Oh, thank you.

Thanks to all of you.

Final comments, additional final comments? I don't want anyone to be closed out here.

(No response.)

Then, my final comment is to thank you all. It was a very, very constructive meeting today, a lot of really good content. We really covered a lot of ground, especially the new participants in this rather complicated regulatory process generally and a very complicated subject, and traversed adequately, competently as the day went on. So, many thanks to all of you and for your endurance; I appreciate that as well.

Back to Charles.

MR. LLENZA: Yes, thanks, everybody for attending. I know this has been a little bit long and winded maybe.

But I also just want to put one thought in everybody's mind. We have a regulatory process. We have an obligation to fulfill our regulatory mandate via a process that we have that is pretty rigorous and that is inclusive of your comments.

I also want to make sure that you understand that the consensus process may provide you alternatives that you don't have through the regulatory process. And we sort of have to fill in all the boxes and cross all the "T's" and dot all the "I's". In the consensus process, you may have different flexibility.

I have provided a website for the ASRAC Committee. It is something that probably would be beneficial to bring this up to ASRAC and to see if you could explore alternative methods for being out of the box of our regulatory process in terms of achieving kind of the same objectives, which is saving energy through improvements in eliminating the bad actors in terms of pumps in the U.S. economy.

MR. BROOKMAN: If they wish to interact or pursue ASRAC as something to consider, how would they do that?

MR. LLENZA: Yes, there is a website. I already sent a website link, and I think it has been distributed. So, feel free to attend. I think there is a webinar on it, too. So, you probably attend remotely. You don't have to necessarily travel. And they have a comment period, just like any process here at DOE. So, you are more than welcome to send in your comments, written comments, within their time limits.

So, I just want to again thank you for attending. This has been long and winded. I am not going to go everything. The extension of the comment period closes May the 2nd. And then, here is the process, basically, on how to submit comments.

Again, thanks, and safe travels back.

(Whereupon, at 4:42 p.m., the meeting was adjourned.)

H

C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Energy Conservation Standards for Commercial and Industrial Pumps

Before: US DOE

Date: 02-20-13

Place: Washington, DC

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate record of the proceedings.

Neal R Gross

Court Reporter