

U.S. DEPARTMENT OF ENERGY

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PUBLIC MEETING ON THE NOTICE OF
PROPOSED RULEMAKING FOR TEST PROCEDURES
FOR RESIDENTIAL FURNACES AND BOILERS

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TUESDAY,
AUGUST 18, 2009

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

PRESENT:

DOUG BROOKMAN, Facilitator, Public Solutions, Inc.
KARIM AMRANE, Ph.D., Air-Conditioning, Heating & Refrigeration Institute (AHRI)
ERIC S. ANDERSEN, Pacific Northwest National Laboratory (PNNL)
ASHLEY ARMSTRONG, Navigant Consulting
BELINDA CARR, Energetics, Inc.
ADAM DARLINGTON, Navigant Consulting
LANCE DeLAURA, Southern California Gas Company (SoCALGAS), Sempra Energy Utilities
BRENDA EDWARDS, Department of Energy (DOE)
GARY FERNSTROM, Pacific Gas & Electric (PG&E)
CYRIL E. FOWBLE, IV, Lennox International
KYLE E. GILLEY, Lennox International
WILLIAM M. HEALY, Ph.D., United State Department of Commerce, National Institute of Standards and Technology (NIST)
MOHAMMED KHAN, Department of Energy (DOE)

ALEX LEKOV, Lawrence Berkeley National
Laboratory (LBNL)
ROGER D. MARRAN, Energy Kinetics, Inc.
KAREN B. MEYERS, Rheem Heating & Cooling
JIM RANFONE, American Gas Association
KRISTEN RAYMOND, Department of Justice
HARVEY SACHS, Ph.D., American Council for an
Energy-Efficient Economy (ACEEE)
FRANK STANONIK, Air-Conditioning, Heating, and
Refrigeration Institute (AHRI)
ERIC STAS, Department of Energy (DOE)
JOHN MICHAEL TALBOTT, P.E., Talbott Consulting
JAMES T. VERSHAW, Trane Residential Systems
JENNIFER WILLIAMSON, Pacific Northwest
National Laboratory (PNNL)

TABLE OF CONTENTS

AGENDA ITEM	PAGE
Welcome.....	4
Opening Remarks, Introduction and Agenda Review.....	6
Rulemaking Overview.....	9
Brief Opening Remarks from Interested Parties.....	11
Rulemaking Steps, Rulemaking History, and Discussion of Proposed Amendments...20	
Adjourn	

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

2 9:04 a.m.

3 FACILITATOR BROOKMAN: Good

4 morning, everybody. Welcome. This is the
5 U.S. Department of Energy's Public Meeting on
6 the Notice of Proposed Rulemaking for Test
7 Procedures for Residential Furnaces and
8 Boilers. My name is Doug Brookman from Public
9 Solutions in Baltimore. Nice to see you. I
10 don't see too many new faces, a few. This is
11 your opportunity to comment on the proposed
12 test procedure and we look forward to hearing
13 from you as the day proceeds.

14 It's our tradition to give
15 everyone a chance to introduce him or herself.

16 So we'll do this and we'll be testing the
17 microphones as we do. Please, name and
18 organizational affiliation.

19 MR. MARRAN: Roger Marran with
20 Energy Kinetics.

21 MS. MEYERS: Karen Meyers, Rheem
22 Manufacturing.

1 MS. RAYMOND: Kristen Raymond,
2 Department of Justice.

3 MR. FERNSTROM: Gary Fernstrom,
4 Pacific Gas and Electric Company.

5 MR. DeLAURA: Lance DeLaura, Sempka
6 Energy Utilities.

7 DR. AMRANE: Karim Amrane, Air-
8 Conditioning Heating and Refrigeration
9 Institute.

10 DR. SACHS: Harvey Sachs, American
11 Council for an Energy-Efficient Economy.

12 MR. VERSHAW: Jim VerShaw with
13 Trane.

14 MR. GILLEY: Kyle Gilley, Lennox.

15 MR. FOWBLE: Cyril Fowble with
16 Lennox.

17 MR. STAS: Eric Stas, DOE General
18 Counsel's Office.

19 MR. KHAN: Mohammed Khan, DOE.

20 FACILITATOR BROOKMAN: John?

21 MR. TALBOTT: John Talbott,
22 Consulting for NIST.

1 DR. HEALY: Bill Healy from NIST.

2 MR. DARLINGTON: Adam Darlington,
3 Navigant Consulting.

4 FACILITATOR BROOKMAN: Did that
5 work?

6 MR. DARLINGTON: Adam Darlington,
7 Navigant Consulting.

8 FACILITATOR BROOKMAN: That worked.

9 MS. ARMSTRONG: Ashley Armstrong,
10 Navigant Consulting.

11 MR. LEKOV: Alek Lekov, Lawrence
12 Berkeley National Laboratory.

13 FACILITATOR BROOKMAN: Thank you.

14 MS. WILLIAMSON: Jennifer
15 Williamson, Pacific Northwest National
16 Laboratory.

17 MR. ANDERSON: Eric Anderson,
18 Pacific Northwest National Laboratory.

19 FACILITATOR BROOKMAN: Thanks.
20 Thanks to all of you. Maybe there will be
21 some others joining us as we go on here. I'm
22 going to do a brief review of the agenda and

1 then we're going to launch right square into
2 the material. I think all of you received, as
3 you registered, a copy of the PowerPoint
4 slides that will be the focus of both
5 presentation and discussion for the day, also
6 a copy of the Federal Register Notice and a
7 statement, I see, from Energy Kinetics.

8 Following -- well, to the agenda
9 review, immediately following this agenda
10 review we're going to have a brief rulemaking
11 overview and following that overview, there's
12 an opportunity for any of you that wish to do
13 so to make brief summary remarks about your
14 concerns and issues that you wish to raise.

15 Following that, we will proceed
16 with a presentation on Rulemaking Steps,
17 Rulemaking History and Discussion of Proposed
18 Amendments. We'll take a break mid-morning,
19 probably 10:30 or 10:45ish and then a more
20 detailed presentation, discussion, Q&A, based
21 on the proposed amendments. We'll see how
22 this proceeds. If we need to keep going

1 passed lunch, we'll take lunch at noon and
2 then following lunch, there's additional
3 opportunity for other issues to be raised and
4 also for individuals to make final remarks.

5 So that's the plan for the day. I
6 will see -- our intention is to do this
7 officially and still provide everybody a
8 chance to say everything they wish to say.

9 Okay? So then I'd just ask for your
10 consideration. Please try and keep your
11 remarks focused. Say your name each time for
12 the record. I'm going to be cuing people by
13 name as best I can. Please say your name each
14 time you speak for the record. Get the
15 microphone close to you so we pick this up.

16 This meeting will be fully recorded. There
17 will be a transcript of the entire meeting
18 available and it will be posted on the
19 Building Technologies website. And so thanks
20 for your consideration. Please turn your cell
21 phones on silent mode and if you can keep your
22 remarks as targeted and focused as possible,

1 that will help. Okay.

2 So then Mohammed.

3 MR. KHAN: Good morning, everyone.

4 Welcome and thank you for participating in
5 today's public meeting on the U.S. Department
6 of Energy's Notice of Proposed Rulemaking on
7 Test Procedures for Residential Furnaces and
8 Boilers. My name is Mohammed Khan and I'm the
9 DOE's Project Manager for this Rulemaking
10 activity. I'll be providing a brief overview
11 of this Rulemaking effort which is in response
12 to the Energy Independence and Security Act of
13 2007 requiring DOE to establish test
14 procedures for measuring the energy
15 consumption of furnaces and boilers during the
16 standby mode and off-mode operations.

17 Following me will be Mr. John
18 Talbot of Talbot Consulting, Incorporated, and
19 he will be providing details on proposed test
20 procedure amendments.

21 MR. FERNSTROM: Gary Fernstrom,
22 PG&E. Could you speak a little closer to the

1 microphone, please?

2 MR. KHAN: Is that better?

3 MR. FERNSTROM: Yes.

4 MR. KHAN: There are several
5 purposes of today's meeting. First, we want
6 to present the Department's proposed test
7 procedure amendments and explain the
8 methodology, specifically how DOE applied the
9 requirements of the EISA Act in the context of
10 residential furnaces and boilers.

11 Second, we want to have a two-way
12 discussion. We want to convey the key points
13 and concepts associated with this rulemaking
14 as well as hear and listen to your thoughts
15 and potential concerns. And lastly, we want
16 to describe what are the next steps and what
17 you should anticipate from the Department.

18 I can't overemphasize the
19 importance of your participation today and
20 whatever written comments you might provide
21 us. You're all encouraged to ask questions and
22 add to today's exchange. Additionally,

1 everyone is invited to submit written comments
2 and please let me remind you that the comment
3 period closes on the 13th of October. Before
4 we proceed, at this juncture we want to
5 provide an opportunity for interested parties
6 to provide their opening remarks.

7 FACILITATOR BROOKMAN: As I
8 understand it, one person has requested to
9 speak and we want to provide an opportunity
10 for others that wish to chime in as well.
11 Roger, do you wish to make brief remarks?

12 MR. MARRAN: Yes, thank you Doug.
13 Roger Marran with Energy Kinetics. At the
14 back of your handout there's a copy of my
15 written remarks. All right, several points; I
16 think the first thing is I was taking
17 advantage of the statement that said in
18 today's NOPRs, it's tentatively concluded that
19 standby mode and off-mode fossil fuel energy
20 consumption is accounted for and I think that
21 speaks to further direction than I am looking
22 at here.

1 So the first item is that we
2 believe the current minimum efficiency
3 standard AFUE causes severe restraint for
4 trade and efficiency progress in the
5 residential boiler market. The rating
6 procedure for boilers doesn't properly reflect
7 the real performance efficiency in boilers
8 supplying each of American homes. It's based
9 on the incorrect concept of hydronic heating
10 systems installed operations.

11 Item two says, "We have been
12 advised in the past meetings that there's
13 almost universal agreement among those
14 required to use the rating standard that the
15 AFUE rating for boilers really needs to be
16 fixed". The current AFUE rating for boilers
17 inhibited the market from advancing
18 significant energy efficient improvements in
19 hydronic home heating systems by consistently
20 overrating the seasonal efficiency of boilers
21 and ignoring the domestic hot water function
22 also.

1 Item three, the Department of
2 Energy has not introduced an effective rating
3 for combination heat and hot water systems
4 which also offer significant potential for
5 energy conservation improvements. Item four,
6 is in the AFUE test procedure. While
7 indicating a very specific test procedure, the
8 test points reflects a rating essentially
9 equal to steady state combustion efficiency.
10 A well-run test can actually have a resultant
11 AFUE which is higher than the steady state
12 combustion efficiency. This is supported with
13 several points.

14 The first one, Item 4.1, the
15 procedure doesn't take into account that most
16 boilers are high thermal mass devices. That's
17 changing more so in recent years but still the
18 majority of the sales and as installed,
19 maintain a temperature for much of the heating
20 season. Item 4.2, by maintaining temperature,
21 the subject to standby loss is not accounted
22 for in the test.

1 Item three, the test temperatures
2 of 120 and 140 aren't representative of the
3 typical hydronic heating system. Item 4.4,
4 the boilers experience jacket losses both when
5 running and also in standby which occurs for
6 the mass majority of heating season hours.
7 So, steady state jacket losses can range from
8 two to six percent are not accounted for.
9 Item 4.5 the Department of Energy has
10 stipulated in the standard it seems that these
11 losses contribute to heating the home even
12 though in most instances, they are not located
13 within the heated space, so jacket losses do,
14 in fact, count as efficiency losses.

15 If we go to Item 4.6 on the
16 following page, the standard doesn't account
17 for energy saving controls and operation that
18 reduce standby losses and increase annual
19 efficiency. So in the current rating system,
20 a lower performing boiler can actually receive
21 a higher rating than a better performing
22 boiler as these factors aren't accounted for.

1

2 So if we move to Item five, for
3 furnaces due to concerns having to relieve
4 pressure from the California Energy
5 Commission, this is going back several years,
6 it was agreed that because of installation
7 location, jacket losses are now deducted from
8 the ratings for furnaces. The standard for
9 furnaces and boilers should be the same.

10 Item 5.1, the current standard, by
11 not including jacket losses, encourages
12 manufacturers to minimally insulate the
13 boilers. The lack of insulation can actually
14 contribute to higher AFUE rating because it
15 reduces the steady state flue gas temperature.

16 Item 5.2, in the ASHRAE 124 standard to
17 develop a combined heat and hot water
18 appliance, the application for AFUE for the
19 heating season creates a conflict. The hot
20 water portion of the test, the jacket losses
21 are considered a loss, whereas for the heating
22 portion of the test it considers losses a

1 gain.

2 To combine the two tests,
3 obviously, creates an engineering
4 incompatibility. So Item 6, the input/output
5 rating procedure, similar to that envisioned
6 in the forward thinking ASHRAE 155, commercial
7 boiler standard, could provide a definition of
8 jacket loss and improved seasonal energy
9 efficiency analysis. Supporting that are two
10 items. At time of the development of the
11 current AFUE procedure, adequate
12 instrumentation was not economically available
13 for an input/output test. It's my belief that
14 this conclusion was developed only for
15 furnaces.

16 Today, the input/output test can
17 be far more accurate and run on a current
18 procedure -- than the current procedure and
19 should improve accuracy of comparative ratings
20 data. So current water heater test procedures
21 actually do involve essentially input/output
22 test measurements.

1 So Item 6.2 support that is also,
2 we'd encourage improved insulation of boilers
3 which would represent a significant
4 contribution to energy conservation for all.
5 And finally, on Item 7, the AFUE's prescribed
6 for boilers and furnaces, although a separate
7 metric should be used to develop -- should be
8 developed to provide better information for
9 consumers due to the energy delivered to
10 conditioned space. There's some inherent
11 differences between the two.

12 So in Item 7.1 to support that,
13 energy efficiency and renewable energy in the
14 National Renewable Energy Lab report indicates
15 very high efficiency in boiler and hydronic
16 distribution systems and very high
17 distribution losses in conventional ducted
18 distribution systems typically used with
19 furnaces. As such the distribution efficiency
20 can have an overarching impact on the amount
21 of energy that's delivered to conditioned
22 space and the overall energy consumed to heat

1 residences when comparing boilers and furnaces
2 as separate appliances.

3 Item 7.2 says the combination of
4 the appliance efficiency and the respective
5 distribution efficiency would provide a better
6 comparative indicator of annual efficiency and
7 more transparency to consumers. So in
8 summary, between different studies that have
9 been done and reports that are out there, if
10 we take a look at the delivered efficiency
11 really should be incorporated into these --
12 into the test standards to get a better
13 direction for actual efficiency of the
14 appliances.

15 So in a nutshell, we've got some
16 real good opportunities, very good
17 opportunities here to improve overall
18 delivered efficiency to homes and reduce fuel
19 consumption and we really should have a
20 standard that supports the actual performances
21 of the equipment in real life applications in
22 real homes.

1 FACILITATOR BROOKMAN: Okay.

2 MR. MARRAN: Thank you.

3 FACILITATOR BROOKMAN: Thank you.

4 And as Roger noted, this -- his listing of
5 specific issues and concerns are there in the
6 record for everybody to see today. Okay, any
7 additional thoughts, ideas, summary remarks
8 here at the outset before we launch into the
9 content. Harvey Sachs.

10 DR. SACHS: Harvey Sachs, ACEEE.

11 I'd like to thank Roger for his thought
12 provoking observations on the AFUE test, even
13 if it's on the periphery of our work today,
14 and note that it underscores a much larger
15 issue of the need for updating of our rating
16 methods and standards across the board. I
17 realize the pressures that DOE is under with
18 the Consent Decree but we at ACEEE would hope
19 that we can find mechanisms to work together
20 on rating methods and standards that are a
21 little bit more innovation friendly and
22 reflect a little bit better what we understand

1 today about performance of technologies in the
2 field, information that just was not available
3 to the developers of these tests a quarter
4 century ago.

5 FACILITATOR BROOKMAN: Okay, thank
6 you. Thanks, Harvey.

7 Additional comments here at the
8 outset before we launch into a rather detailed
9 explanation of this test procedure? Okay,
10 proceed, Mohammed.

11 MR. KHAN: This one outlines the
12 steps for the Furnace and Boiler Rulemaking.
13 It's the Department's goal to be as
14 transparent as possible in its rulemaking
15 efforts and for this particular rulemaking
16 there are three major stages of public
17 interaction. On July 27th DOE published a
18 NOPR in the Federal Register. Today we're
19 conducting the public meeting and following
20 the 75-day comment period, and after DOE has
21 analyzed all received written comments, we
22 will publish the final rule.

1 Regulatory history, I'd like to
2 summarize some of the key regulatory points
3 relevant to furnace and boilers. First, on
4 May 12th, 1997 DOE published its current
5 applicable test procedure which includes the
6 AFUE energy factor and heating seasonal
7 efficiency metrics. It's codified at 10 CFR
8 Part 430, Subpart B, Appendix N. Second, as a
9 result of the most recent amendments were
10 applicable energy conservation standards. The
11 current standards were published on November
12 19th, 2007. Please note that this standard is
13 AFUE based and does not specify standby and
14 off-mode electrical energy conservation
15 standards.

16 These final points regard EISA.
17 The current rulemaking response to the EISA
18 2007 which directs DOE to incorporate a method
19 for measuring standby mode and off-mode energy
20 consumption into its test procedures. EISA
21 also directs DOE to integrate if technically
22 feasible, the standby and off-mode energy

1 consumption into the regulated metric or other
2 energy descriptor.

3 Finally, DOE must consider the
4 most current versions of the International
5 Electrotechnical Commission Standards, 62301
6 and 62087 which provide accepted methods of
7 measurement of standby power and energy
8 consumption of electrically powered
9 appliances. I just want to point out that
10 62087 was not applicable because of the
11 products it covers.

12 Now, this slide presents some key
13 points and summarizes the first four major
14 discussion items in our NOPR. First, the
15 Department's approach involved concerning the
16 EISA definitions for standby and off-mode
17 operation and clarifying them in the context
18 of how residential furnaces and boilers
19 actually function. We've equated the EISA
20 definitions for active mode, standby mode and
21 off-mode to the terminology in the test
22 procedure for on-cycle, off-cycle and off-mode

1 respectively.

2 Second, the DOE has determined
3 that the current test procedure already
4 satisfies the EISA requirement for standby
5 mode and off-mode energy consumption as it
6 relates to fossil fuel. AFUE is a current
7 metric and it captures fossil fuel over an
8 entire full year cycle. To satisfy EISA
9 requirement, however, DOE believes it must
10 develop test methods for electrical power
11 consumption and this applies to both fossil
12 fuel and electric furnaces and boilers.

13 Okay, before John comes up and
14 provides additional details, I want to make
15 some other points very clear. AFUE is the
16 current regulatory metric. This rulemaking
17 does not propose to alter AFUE in any way and
18 does not impact a manufacturer's ability to
19 demonstrate compliance with current standards.

20 Also, the current energy conservation
21 standards do not stipulate standby and off-
22 mode. However, standards promulgated after

1 July 1st, 2010 shall incorporate requirements
2 for both standby and off-mode. John?

3 FACILITATOR BROOKMAN: Yes, please.
4 Frank Stanonik.

5 MR. STANONIK: Frank Stanonik,
6 AHRI. Mohammad, I have a question before you
7 leave. Your second bullet there clearly
8 indicates that DOE felt they had to address
9 the question of fossil fuel standby mode and
10 off-mode energy consumption. If you look at
11 the Energy Independence Security Act 2007, and
12 in particular note that it referenced an IEC
13 standard, I think the -- I'm fairly certain
14 the legislative history would indicate that
15 they were looking at standby and off-mode
16 electrical energy consumption. So I'm a
17 little curious why DOE felt that they had to
18 answer this question relative to fossil fuel
19 because I don't think that was the intent of
20 the Energy Independence Security Act of 2007?

21 FACILITATOR BROOKMAN: Were you a
22 part of that negotiation, Frank?

1 MR. STANONIK: We were, yes.

2 FACILITATOR BROOKMAN: Okay, just
3 wanting to get a little more information
4 there.

5 MR. KHAN: Okay, I'm going to
6 respond to that and then I'll let general
7 counsel add, if need be, as well. The way we
8 interpreted it, Energy was -- I don't think it
9 spelled out or segregated electrical versus
10 any kind of fossil fuel. So we interpreted
11 that as meaning all forms of energy that any
12 particular covered appliance would end up
13 using. What we were pointing out here is that
14 AFUE already incorporates standby and off-mode
15 for the fossil fuel part of it only but it's
16 the electrical portions that we are proposing
17 here today for measuring in a test procedure.

18 FACILITATOR BROOKMAN: Go ahead,
19 Frank.

20 MR. STANONIK: Frank Stanonik. And
21 by the way, I agree with the conclusion. I'm
22 just concerned about the possibility that this

1 sets some precedent that this whole question
2 of standby mode and off-mode somehow needs to
3 look at something other than the electrical
4 energy consumption, which I believe again, was
5 the intent of that change in the law.

6 MR. STAS: Eric Stas, DOE. I mean,
7 unfortunately EISA has written on it quite
8 broadly. It just says standby mode and off-
9 mode energy consumption. So if that
10 distinction is there, it didn't make it into
11 the statute.

12 MR. STANONIK: But it specifically
13 in fact, says -- it references, as you can
14 see, using the IEC standard, whatever the
15 number is which is a standard for measuring
16 electrical energy. So, I mean, well, it's --
17 again, I'd just note that there's some concern
18 about that precedent but we think it really
19 was specific electrical energy. Perhaps
20 there's a way to research that. I don't know.

21 FACILITATOR BROOKMAN: Thank you,
22 Frank. Gary Fernstrom.

1 MR. FERNSTROM: Gary Fernstrom,
2 PG&E. PG&E agrees with DOE's interpretation
3 and believes it's important that we consider
4 standby energy use for both gas and electric
5 where those measures are applicable. Clearly
6 in this case, the gas fuel is accounted for in
7 AFUE but there might be a case with standing
8 pilot lights where it might not be. And I
9 think it's important that standby energy use
10 be considered holistically.

11 MR. STAS: I'll just add one thing,
12 Eric Stas, DOE. I mean, DOE did consider the
13 relevant IEC provisions but the statute
14 doesn't say we're limited just to that.

15 FACILITATOR BROOKMAN: Okay. Yes,
16 please, Roger.

17 MR. MARRAN: Yes, Roger Marran from
18 Energy Kinetics. Our opinion is that the
19 standby or the idle losses that are associated
20 with the off-cycle period are not accounted
21 for accurately relative to real world
22 applications. So although it does exist in

1 the standard, it doesn't properly reflect the
2 real consumption for residential boilers.

3 FACILITATOR BROOKMAN: Okay. Okay.

4 So any additional comments on this stream
5 here? No? Okay.

6 MR. KHAN: Thank you.

7 MR. TALBOTT: Okay, my name is John
8 Talbott and I'm a consultant for NIST, helping
9 out on the EISA test procedure amendments.
10 And I used to work at DOE and I was here when
11 the original test procedures were developed.

12 I'm going to get into the details
13 of what the proposal outlines to satisfy the
14 EISA requirements. The first thing that had
15 to be done is that measurement provisions had
16 to be added to the test procedures and in this
17 case we utilized the international standard to
18 obtain the measurement of the actual power in
19 standby and off-mode.

20 And we titled them P sub SB for
21 Power in the Standby Mode and P sub Off, the
22 Power in the Off-mode. The second thing that

1 had to be done, we had to add an equation for
2 the annual standby mode and off-mode energy,
3 energy use and I'll show you that equation.
4 So that incorporates an actual measure of the
5 standby and off-mode energy consumption.

6 And then thirdly, we had to
7 integrate that into the overall test
8 procedure. We integrated it into the annual
9 standby -- the annual energy use equations and
10 then also without specific amendment,
11 incorporates itself into an energy efficiency
12 quotient. So we think we satisfied everything
13 that EISA has asked us to do. This slide more
14 or less sums it all up on one slide. We had
15 to make some assumptions along the way and
16 we'll discuss this more in detail but the
17 active mode as defined in EISA can be
18 approximated by a test procedure term which is
19 called burner operating hours. Burner
20 operating hours are generally the on period of
21 the furnace of boiler.

22 The non-heating season can be

1 estimated as the duration of 4600 hours. That
2 number is in the existing test procedures. It
3 was used for the pilot light accounting that's
4 in the test procedure for fossil fuel, so we
5 said let's use that and we'll have the same
6 accounting across fossil fuel and electricity.

7 So there's a separate equation that's added
8 to the procedures by today's amendments and it
9 quantifies the annual standby and off-mode
10 electrical energy use and we call it E sub SO,
11 the electrical energy in the standby and off-
12 mode.

13 And as you can see, it's the sum
14 of two terms and it's the wattage measurements
15 that were mentioned before times their
16 duration across a portion of the year, and if
17 you add it all together, you'll get 8,760
18 hours for the year. So this is the annual
19 accounting of the energy use. So it's not
20 wattage, it's watt hours. And then for the
21 next part of the integration, we incorporate
22 that into the already existing annual

1 accounting of electricity and some of the test
2 procedure jockeys out here know all these
3 terms but that's all the existing equation is
4 the energy of auxiliary electric, E sub AE,
5 which previously was the first part of this
6 equation, the burner operating hours times the
7 active mode electricity measurements of the
8 blower, the power burner and the electrical,
9 the intermittent ignition device.

10 We're keeping those equations just
11 as they are. That's the active mode
12 accounting and we're adding the newly
13 developed standby and off-mode electrical
14 energy consumption. And that's it. Now, the
15 implication there is since E sub AE is used in
16 annual operating costs, the operating cost is
17 going to change. Also, since E sub AE is used
18 in an energy efficiency quotient of energy
19 factor, that quotient is going to change. But
20 remember, energy factor is not the regulating
21 metric. AFUE is and AFUE doesn't change
22 because AFUE does not use an E sub AE. We're

1 going to emphasize that again.

2 Okay, so the next discussion item
3 in the preamble is the discussion about
4 standards and there's much more detail there,
5 but --

6 FACILITATOR BROOKMAN: Let's pause.

7 MR. TALBOTT: Okay, all right.

8 FACILITATOR BROOKMAN: Okay, let's
9 pause and see if there are any questions at
10 this point. I've seen more complicated
11 equations. See if there are any questions at
12 this point and then we'll take them. Frank.

13 MR. STANONIK: Frank Stanonik,
14 AHRI. John, the standby mode is defined as
15 essentially the furnace -- well, it's starting
16 the heating season and you don't have anything
17 let's say electrically operating, okay, to
18 include the blower on the furnace as an
19 example. But on a furnace, the typical cycle
20 you have some delay in the blower, right?

21 MR. TALBOTT: Yes.

22 MR. STANONIK: So when the burner

1 goes off, you're still going to have blower
2 operating. So the fact that using burner
3 operating hours, is that any significant --
4 are we introducing any significant error
5 there?

6 MR. TALBOTT: That's one of the
7 technical points that we're going to get to
8 and discuss in more detail.

9 MR. STANONIK: Okay, okay.

10 FACILITATOR BROOKMAN: Okay, Gary.

11 MR. FERNSTROM: Gary Fernstrom,
12 PG&E. So as long as Frank asked that
13 excellent question which was on my mind as
14 well, the furnace normally drives the
15 thermostat and how may or may not the
16 thermostat load be considered?

17 MR. TALBOTT: I'm not sure I get
18 the distinction.

19 MR. FERNSTROM: Well, there's some
20 load placed on the furnace by the thermostat.

21 There thermostat varies because people use
22 different thermostats than that normally

1 supplied by the manufacturer. So the question
2 is, in standby mode, how may or may not the
3 electrical load of the thermostat be
4 considered?

5 MR. TALBOTT: Okay, I think there's
6 two points in there. You're asking about the
7 electrical energy to run the thermostat to be
8 accounted for in here. We also are going to
9 get to that in later discussions. It's an
10 important point, but then you're also talking
11 about maybe there's some operational stuff
12 that we might be missing. You have to
13 remember that the AFUE test procedure is a
14 more laboratory based. It doesn't even do a
15 complete cycle. It infers the efficiency from
16 limited testing data and so we're not really -
17 - AFUE doesn't get into the complications of
18 different cycling rates or thermostat
19 controls.

20 MR. FERNSTROM: Okay, I was simply
21 asking about the straightforward electrical.

22 MR. TALBOTT: Just the electrical

1 consumption. We'll get to that.

2 FACILITATOR BROOKMAN: Okay, yes.

3 Jim, right?

4 MR. RANFONE: Jim Ranfone, American
5 Gas Association. Good morning. John, just a
6 question. You said that this new factor is
7 not going to impact the standard level but the
8 E sub SO is going to increase the electrical
9 consumption measurement, correct?

10 MR. TALBOTT: Yes.

11 MR. RANFONE: So that the operating
12 costs will also be changed.

13 MR. TALBOTT: Yes, yes.

14 MR. RANFONE: And will that also
15 impact the emissions numbers when you come up
16 with your final calculations because you will
17 be considering more electrical consumption
18 totally?

19 MR. TALBOTT: Yes, yes.

20 MR. RANFONE: Okay, thanks.

21 FACILITATOR BROOKMAN: Okay, let's
22 proceed.

1 MR. TALBOTT: Thank you. Again,
2 the preamble discussion at this point starts
3 to talk about the -- what -- the relationship
4 with standards. And of course, there are the
5 three major points that EISA outlines for
6 standards for this standby and off-mode issue
7 and first off is that it cannot be included in
8 or determined in compliance through current
9 standards. And since AFUE is not changing and
10 AFUE is the current basis of the current
11 standard, then we're safe there.

12 However, after July 1st, 2010, any
13 final standard shall incorporate standby mode
14 and off-mode energy use into a single amended
15 or new standard. And then it also adds that
16 if it's determined not feasible rather than an
17 incorporated metric, you could use a separate
18 standard. So what we're outlining here is the
19 proposed amendments for us. They don't change
20 AFUE so we're okay on the first point. And
21 that these extra measures that are added and
22 the incorporation into the test procedure will

1 allow DOE to address standby mode and off-mode
2 in subsequent standards either by an
3 incorporated metric or a separate standard.

4 FACILITATOR BROOKMAN: Gary
5 Fernstrom.

6 MR. FERNSTROM: So I'm confused
7 about that. If the standby is included in an
8 incorporated metric, would not that be AFUE or
9 are there presently two different metrics that
10 are used?

11 MR. TALBOTT: There's another
12 metric in the test procedure that's not used
13 for standards regulations and it's called
14 energy factor and that would include this
15 extra energy consumption. There could be a
16 possibility that the format of the proposed
17 standard could incorporate an adjustment to
18 the efficiency quotient to account for this.
19 We're saying that the amendments as proposed
20 today can accommodate that and your comments
21 on what would be the best format would be
22 welcomed.

1 MR. STANONIK: Frank Stanonik.

2 FACILITATOR BROOKMAN: Frank,
3 pardon me, let's let Mohammed follow on.

4 MR. KHAN: Mohammed Khan, DOE. I
5 just want to point out that the Department is
6 in its beginning stages of reconsidering the
7 current standards and as we've already
8 indicated, too, after July 1st, 2010, the
9 standby and off-mode needs to be accounted
10 for. So particularly during that period, you
11 know, we invite folks to provide comment on
12 the best ways or approaches to implement a
13 particular descriptor or change to AFUE that
14 would accommodate all of that.

15 FACILITATOR BROOKMAN: Frank.

16 MR. STANONIK: Frank Stanonik from
17 AHRI and I guess, it is the time to ask the
18 question. As Mohammed just mentioned, I think
19 most of us are aware that the furnace
20 rulemaking has been, in one way or another,
21 remanded back to DOE and I just wonder if at
22 this time DOE has a projected schedule as to

1 when the -- this work would be done. Would it
2 be before or after July 1, 2010?

3 MR. KHAN: It's going to be after.

4 So it's going to have to include that to get
5 passed it. That's the answer you're looking
6 for, yes.

7 FACILITATOR BROOKMAN: Okay.

8 MR. STANONIK: Well, not what I was
9 looking for.

10 (Laughter.)

11 FACILITATOR BROOKMAN: Okay, so
12 additional thoughts before we proceed?

13 MR. TALBOTT: Well, this is where
14 Doug broke at that point appropriately because
15 we were sort of saying, you know, just think
16 through it and the concepts have been
17 presented here. The technical details I'm
18 going to get into next. But the concept is
19 we're adding measurement provisions. We're
20 providing an equation for annual accounting.
21 We're integrating it into the existing energy
22 use and efficiency descriptors and you already

1 heard that the next standard is probably going
2 to be after July 1, 2010, so it's got to have
3 something in there about standby and off-mode.

4 And if you're ready, I think we can go, we'll
5 go to the technical details. It's time for
6 some people to nap.

7 All right, the first issue is the
8 burner operating hours approximation. We are
9 proposing that burner operating hours, a test
10 procedure measure, can be used to approximate
11 the active mode duration. Some of the points
12 that Frank made are realized that some of the
13 electrical auxiliaries can run differently
14 than the burner itself. However, the burner
15 itself has electrical components and they may
16 be exactly burner operating hours for their
17 run time. And then the ignition device is
18 something less than that.

19 Typically, the circulating air
20 blower runs longer than the burner does on an
21 average year. There's delay time for the
22 circulating blower to come on and then there

1 is overrun time. You add them up and the Y
2 factors are the test procedure adjustment for
3 that and they are typically greater than one.

4 Igniters are way below one. The burner is
5 probably close to one. Taking that all
6 together, without getting into unduly
7 complicated systems of trying to measure all
8 these standby losses separately, why not pick
9 the test procedure value of burner operating
10 hours and let that be the active mode? And
11 then the prorating of the year becomes the
12 remainder.

13 So it's 8,760 hours in a year
14 minus burner operating hours is the duration
15 of standby and off-mode.

16 FACILITATOR BROOKMAN: Yes, Gary.

17 MR. FERNSTROM: Gary Fernstrom,
18 PG&E. I have a comment on that. On the
19 surface, that seems both simple and
20 reasonable. However, the fan energy use is
21 much, much greater than the other auxiliaries
22 you pointed out. So it would make sense to me

1 to try and make some estimate of the fan run
2 time which is greater than the burn run time,
3 and have a single factor to adjust for that.

4 MR. TALBOTT: Well, that's similar
5 to what is done. Burner operating hours are
6 adjusted because of these run time
7 differences. So the Y factors that are in the
8 test procedure represents an accurate
9 accounting of those differences for active
10 mode and that's the big issue. Remember the
11 active mode electricity consumption of a
12 fossil fuel furnace is on the order of 100
13 dollars. Now, this added standby loss, the
14 previously unaccounted for, is something an
15 order of magnitude smaller. And so is it
16 really worth it to go through the extra ordeal
17 of defining these various differences?

18 Remember some furnaces don't have
19 the interrupted ignition. There are some
20 furnaces that the circulating blower is wired
21 to the burner. All those differences would
22 have to be calculated separately in the test

1 procedure to make that slight little
2 accounting difference. We haven't discussed
3 in detail where we mentioned where it said
4 about an order of magnitude difference between
5 the duration of the sum of the standby period
6 and off period compared to active mode.

7 FACILITATOR BROOKMAN: Frank
8 Stanonik.

9 MR. STANONIK: Frank Stanonik,
10 AHRI. First of all, addressing Gary a little
11 bit, we're talking about the standby so, in
12 theory, when nothing is running and so the
13 question to you, John, and this is perhaps at
14 this point, while certainly your learned
15 opinion but by using burner operating hours,
16 isn't it, I'll say, more likely that we're
17 slightly over-estimating the standby?

18 MR. TALBOTT: Yes.

19 MR. STANONIK: We're saying standby
20 starts when the burner stops, but, in fact,
21 the blower is still going.

22 MR. TALBOTT: Yes.

1 MR. STANONIK: Okay, but we've said
2 we're not -- and you know, the blower energy
3 gets counted for. That's been always
4 measured.

5 MR. TALBOTT: Yes.

6 MR. STANONIK: So we're saying that
7 when a burner turns off, that's when we're
8 going to start counting standby. It's a
9 slight overestimation of standby period.

10 MR. TALBOTT: That's right. It
11 will be slight overestimated and the magnitude
12 of it is that using a simplified assumption
13 that there's 800 burner operating hours, then
14 the remainder is 7,900 hours and maybe it's
15 only 7,800.

16 MR. STANONIK: This is obviously
17 new to most of us but for this point, we
18 certainly haven't prepared any serious concern
19 that this is significant.

20 MR. TALBOTT: It's a simplification
21 but it's up front and I think it's -- we're
22 just saying it's a justified simplification

1 considering the alternative which would be
2 multiple measurements associated with the
3 different standby of the blower compared to
4 the burner. It could get very messy quickly.

5 MR. FERNSTROM: So okay, I
6 understand. I was confusing in my question
7 active mode and standby mode. Thank you both.

8 FACILITATOR BROOKMAN: Okay, thank
9 you, Gary. Harvey Sachs?

10 DR. SACHS: John, I very much
11 appreciate the effort to keep the thing
12 understandable and to keep the measurement
13 requirements as simple as possible. I'm very
14 much in sympathy with lumping all of the
15 electrical elements that are operating at the
16 same time. I have no interest in
17 understanding the blower versus the draft
18 inducer or the control board. At the same
19 time, I worry about some potential for gaming
20 if we're not a little bit careful and
21 particularly things I might worry about and do
22 not yet understand would be things like the

1 ceramic igniters that stay on during the
2 entire burner cycle, I'm not sure if we're
3 capturing those and those can well be 400
4 watts.

5 MR. TALBOTT: I believe that's in
6 the active mode accounting that's in the
7 existing test procedures.

8 DR. SACHS: Okay.

9 MR. TALBOTT: It goes a Y factor
10 and it's got the PE Sub IG.

11 FACILITATOR BROOKMAN: Let's see,
12 you wish to comment on this? No? Okay.
13 Sorry, John.

14 MR. TALBOTT: Okay.

15 DR. SACHS: The question is really
16 a hypothetical but what -- at some point as
17 the electronics proliferate, we might not need
18 a trace of electricity used through a complete
19 cycle. Yet, I'm not making this as a formal
20 comment. I'm just not sure that I really have
21 a good insight into what's happening without
22 that beyond your assurances that all the

1 electricity is in the non-operating, non-
2 burner operating powers is really burning very
3 small.

4 MR. TALBOTT: Well, no, we're not
5 missing anything that you're mentioning there
6 about the active mode accounting. We're
7 catching it all and that's in the existing
8 test procedure. What we're only focusing on
9 here by making this assumption is how long is
10 the off and standby period? Is it -- out of
11 the 8,760 hours a year, how much is it and
12 this says it's 7,900. And if it should be
13 7,880 because the blower runs a little longer
14 --

15 DR. SACHS: That's very helpful,
16 John.

17 FACILITATOR BROOKMAN: Okay,
18 additional thoughts on this? Okay.

19 MR. TALBOTT: All right, then
20 there's one complication with this assumption
21 (Laughter). It doesn't work for electric
22 furnaces. Electric furnaces don't have a

1 burner operating test procedures. So we
2 included equations within the amendments today
3 that allow them to get something like burner
4 operating hours, it's "on hours," and I can
5 just -- this is such an informed group, I can
6 just show you what that equation is.

7 And it's a -- for electric
8 furnaces and boilers, it has a burner
9 operating calculation which is essentially the
10 old heating load, the old famous 2,080 heating
11 load hours times the regular adjustments and
12 the oversizing, divided by the capacity of the
13 unit in BTUs. And that's an approximation of
14 the on time for electric furnace. And that's
15 what you use to do the accounting in the
16 electric furnace provisions.

17 Okay. The next little technical
18 detail is how are we going to use this
19 international standard, and our reading of it
20 is pretty straightforward. It's only a four-
21 page standard and we feel that the furnace and
22 boilers industry is sophisticated enough to

1 handle it. However, we had to make a couple
2 clarifications and the first one is that for
3 most furnaces and boilers, the standby mode
4 and off-mode, even though the statute asks to
5 make a distinction, sometimes there just isn't
6 a distinction. It's when everything is off,
7 it's the same reading whether it's heating
8 season or non-heating season. And so we say,
9 well, look you don't have to measure it twice.
10 Just measure it once and you're done.

11 The other clarification we made is
12 that we want to make it clear that what we're
13 trying to capture here and what EISA is
14 intending us to capture is all the possible
15 electrical standby loss in the -- onboard the
16 appliance and not to measure something
17 internal into the appliance that wouldn't
18 capture transformers and control circuits that
19 might not be obvious. So we're saying
20 directly in the provision itself that you have
21 to measure the total standby and off-mode.

22 And then another clarification we

1 had to do is that the accuracy requirements
2 spelled out in the International Standard are
3 to be used for this measure and not the
4 accuracy requirements that are in the ASHRAE
5 standard. So just to clarify on that, the
6 ASHRAE standard specifies that electricity be
7 measured with an error no greater than one
8 percent. That's fine for the active mode, the
9 high wattage measurements that are going on in
10 furnace testing and but when we get down to
11 this low wattage measurement, we're deferring
12 to the International Standard for their
13 guidance on how to specify the accuracy and
14 the precision.

15 And so there are differences there
16 and generally, it's a more precise requirement
17 in the International Standard because it's low
18 wattage and we defer to their judgment on when
19 the wattage is so low that you have to really
20 take some different precision steps. So
21 other than those three clarifications, we
22 think the standard, the International Standard

1 is fine and I think we think the furnace
2 industry can handle it. But if there are
3 problems, we defer to the experts out there
4 testing furnaces, if they want to send in some
5 clarifying -- further need for clarification
6 or some real problems with that standard, we
7 would welcome them in the comment period.

8 FACILITATOR BROOKMAN: Yes, please,
9 Cyril.

10 MR. FOWBLE: Cyril Fowble with
11 Lennox International. The only comment I
12 would have to that is that there is a tighter
13 temperature room ambient condition in the IEC
14 standard than there is in the Furnace Test
15 Procedure Standard. So that's something we
16 need to consider especially now it's five
17 degrees CF.3 in the first Furnace Test
18 Procedure, five numbers, I think. It's closer
19 to 20 so that may be something we need to
20 consider.

21 FACILITATOR BROOKMAN: I couldn't
22 tell from your comment what you were advising

1 the Department to do about that.

2 MR. FOWBLE: Oh, sorry, I'm
3 requesting the Department to look into the
4 general condition and the temperature, the
5 ambient temperature requirements of IEC 63.01
6 versus what's the actuary Federal Register
7 requirement for instance.

8 FACILITATOR BROOKMAN: And would
9 you recommend what they do?

10 MR. FOWBLE: My guidance would have
11 them be the same, if you can make them the
12 same, preferably wider for such a procedure
13 standard.

14 FACILITATOR BROOKMAN: Okay.

15 MR. TALBOTT: Okay, so you were
16 involved in the testing of the furnace.

17 MR. FOWBLE: Yes, yes.

18 MR. TALBOTT: Yes, and use the
19 ambient conditions in the ASHRAE standard.

20 MR. FOWBLE: Correct, for this.

21 MR. TALBOTT: Okay, and do you
22 think there is any problem with the accuracy

1 of executing the International Standard at
2 those conditions?

3 MR. FOWBLE: None that I'm aware
4 of.

5 MR. TALBOTT: Thank you.

6 FACILITATOR BROOKMAN: Well, thank
7 you. Okay, so that exchange was John and then
8 Cyril back and forth a few times for the
9 record. Other comments? Frank, did you have
10 a comment on this?

11 MR. STANONIK: Yes, I did, just a -
12 - Frank Stanonik, AHRI. I have a question for
13 John. And, again, I just -- I guess I want to
14 take advantage of the opportunity to make sure
15 I'm understanding what I think I understand.
16 The IEC talks about this -- your uncertainty
17 shall be no more than two percent at the 95
18 percent confidence level. Doesn't that imply
19 you're going to have to take multiple
20 measurements of this?

21 MR. TALBOTT: Yes.

22 MR. STANONIK: Okay.

1 MR. TALBOTT: And there's an
2 appendix in the standard that describes that.

3 And that's what they feel is appropriate for
4 these low measurements that, take a few
5 measurements and then exercise the statistical
6 techniques, framework.

7 MR. STANONIK: So for all the other
8 measurements for this Furnace Test Procedures,
9 you take a measurement with our precise
10 instruments. And so for this one where we
11 might be measuring maybe a watt or something
12 like that, you're going to take several of
13 them. There seems to be some -- I'll say
14 illogic there but maybe not.

15 FACILITATOR BROOKMAN: Harvey
16 Sachs.

17 DR. SACHS: Harvey Sachs, ACEEE.
18 There's relatively little measurement of
19 standby and off-mode energy in the field. The
20 most recent work I'm aware of is by Scott Pigg
21 a few years ago and he reported, as I recall,
22 a median for about 30 furnaces in the field of

1 something like eight watts standby and for
2 those furnaces with permanent magnet motors
3 with feedback, the air handler was an
4 additional four watts, so an average of about
5 12. So when you run those numbers out over
6 8,760 hours, we are talking about an amount of
7 electricity that's in the same order of
8 magnitude as the air handler itself.

9 So the magnitudes are not trivial
10 to what Congress has asked the Department to
11 do. The question though is, that I didn't
12 hear an explicit answer, maybe I'm just too
13 dense, to Gary's question, that unlike a water
14 heater, the controller for a furnace is
15 typically remoted to a living space, we call
16 it a thermostat, and that's not always under -
17 - the selection of thermostat is not always
18 under the control of the OEM that provides the
19 furnace.

20 The amount of electricity that
21 thermostat draws should be small but depending
22 on the power supply for that 24 volt or

1 whatever it's using, I just -- I don't hear a
2 specification for how we're including or
3 excluding that thermostat.

4 MR. TALBOTT: Thank you. That was
5 an oversight. We didn't get to that issue in
6 that much detail but the part of the
7 discussion where we said we want the
8 measurement of all the electrical energy,
9 standby and off-mode present, of the
10 appliance, remember this is a program directed
11 at the manufactured covered product.

12 DR. SACHS: I understand that.

13 MR. TALBOTT: Now, that issue that
14 you've raised that the thermostat control
15 energy, may not even be present in the testing
16 lab. They could do the switches by manual
17 control to get through the test procedure.
18 And there is nothing that the manufacturer can
19 do to improve the amount of energy that that
20 thermostat cycle is consuming. So the only --
21 if we want to capture that and the
22 manufacturers aren't capturing it with this

1 measurement procedure, we would have to add it
2 in on a representative basis which wouldn't
3 distinguish anything between -- from one
4 manufacturer to the other.

5 So if we want to put in a default
6 value for the thermostat control energy of a
7 furnace, we could do that, just to improve the
8 accounting. The only thing that EISA is
9 asking for here is what have you not accounted
10 for that is going to be present in that
11 manufactured device.

12 DR. SACHS: Harvey Sachs, ACEEE. I
13 appreciate that but let me sketch out a
14 scenario that's based on a very, very
15 superficial knowledge and I'm hoping that some
16 of the manufacturers and other experts here
17 can help me but one way I can support that
18 thermostat is with an old style 24-volt bell
19 transformer and that will give me 24 volt AC
20 and some rather significant core losses, 24 by
21 seven in that transformer.

22 Alternatively, I could move to a

1 solid state device that synthesizes the 24
2 volt or whatever other form I want for my
3 transformer and greatly reduce those losses.
4 We see that in various power supplies today.
5 Because of the national energy use impact, not
6 the individual consumer, we certainly would
7 like at ACEEE to see manufacturers having some
8 small incentive to have the most efficient
9 power supplies possible. I don't know exactly
10 how to do that but I'm not sure it's something
11 we'd just want to sweep away as
12 inconsequential.

13 MR. TALBOTT: I'd like to hear the
14 manufacturer's experience on how the unit is
15 tested and whether they can capture the design
16 difference in that energy consumption through
17 these test procedures.

18 FACILITATOR BROOKMAN: Frank
19 Stanonik.

20 MR. STANONIK: Frank Stanonik, AHRI
21 and John, I'm not going to talk about the
22 experience but more -- I think the more

1 relevant issue is this is not part of the
2 furnace or boiler design. The thermostat is
3 not in the manufacturer's control. It's not
4 part of his design. It is -- recognize, it's
5 part of -- a necessary part of the system, but
6 it's never been something that was in the
7 manufacturer's ability to control. And I
8 think you've captured it properly. If you
9 wanted to somehow account for thermostat
10 energy consumption, you'd probably have to
11 come up with just an assumed fixed value which
12 really doesn't make any difference here.

13 And by the way, I'm not
14 disagreeing with Harvey that, perhaps, there
15 is some need for perhaps a -- I mean, if we're
16 going to look at standby losses or standby
17 energy consumption, perhaps there should be a
18 standby energy consumption criteria for wall
19 thermostats, but I would object to imposing
20 that burden on the furnace and boiler
21 industry.

22 DR. SACHS: Harvey Sachs, again. I

1 very much appreciate that and you may have
2 helped me, Frank, in a way that you wouldn't
3 have wanted to or imagined. If -- let me
4 agree but disagree that the thermostat is an
5 essential component even though the
6 manufacturer does not select it much in the
7 way the air handler is an essential component
8 of the air conditioning system even though the
9 air handler is not directly controlled by the
10 manufacturer in most cases and we run into
11 that problem on the air conditioner side.

12 The point that I'm trying to make
13 is not so much the thermostat's electricity
14 consumption because today there is -- there
15 are marketing reasons why I want to minimize
16 that just to minimize the battery backup on
17 these crazy programmable things. What I'm
18 worried about is the inherent losses depending
19 on the power supply, for the thermostat that
20 is an integral part of the furnace. But I
21 think that may be captured --

22 FACILITATOR BROOKMAN: Let's let

1 this gentleman -- Jim. Jim, say it again. We
2 didn't hear you.

3 MR. VERSHAW: Jim VerShaw with
4 Trane.

5 FACILITATOR BROOKMAN: Thank you.

6 (Off-mic comment.)

7 FACILITATOR BROOKMAN: Jim, you
8 need to get closer to the microphone. Sorry.

9 Thanks very much.

10 MR. VERSHAW: I think that's -- the
11 power supply is usually in the furnace so you
12 know, we don't have any control over what
13 thermostat goes on there. So you can use --
14 and in the testing process and you asked about
15 that, we usually use manual switches because
16 you're measuring times and whatnot. You don't
17 have a thermostat involved and it just doesn't
18 work out in the testing process.

19 So it would make sense to me for
20 this measurement of standby loss that we would
21 be measuring just the power that the furnace
22 is using and the thermostat's got a big color

1 screen on it. That's going to take a little
2 more power but we can't control that and
3 that's not -- shouldn't be part of the furnace
4 standard. But the transformer doesn't get
5 changed out if you change thermostats, so
6 whatever that's sitting there drawing when
7 there's nothing happening is there.

8 DR. SACHS: Thank you very much.

9 That's what I was hoping. Thank you.

10 FACILITATOR BROOKMAN: Thank you.

11 Gary, do you have a comment or a question?

12 MR. FERNSTROM: Well, regardless --
13 yes, thank you. Regardless how small the
14 thermostat load is, the furnace won't operate
15 without it and I agree, it's beyond the
16 manufacturer's control but I think some
17 assumption ought to be made about it and
18 included because that's part of the real world
19 performance of these things, and that's really
20 what I want to know out of the tests and the
21 standards and the performance information
22 that's published.

1 FACILITATOR BROOKMAN: Okay, thank
2 you.

3 DR. AMRANE: Karim Amrane, AHRI.
4 Before you go, John, I guess I understand from
5 your comment that DOE has not tested furnaces
6 based on the test procedures you're proposing.

7 MR. TALBOTT: Well, we've got the
8 data from other sources like ACEEE to get the
9 magnitude and Lawrence Berkeley Labs have done
10 some measurements as well.

11 DR. AMRANE: But whether they're
12 used now, they are --

13 MR. TALBOTT: I don't think there's
14 reports directly using the international
15 standard, you're right.

16 DR. AMRANE: Okay, so are you
17 planning to go to testing?

18 MR. TALBOTT: That's up to DOE.

19 DR. AMRANE: So basically DOE is
20 counting on manufacturers trying test
21 procedures and then that issue is come back to
22 DOE within 75 days?

1 FACILITATOR BROOKMAN: Mohammed.

2 MR. KHAN: Mohammed Khan, DOE.

3 Currently, the Department has no plans for
4 doing any kind of exploratory testing to, I
5 guess, validate, if you will, the
6 appropriateness of the proposed amendments
7 today. But of course, as always, any data,
8 any kind of additional information through the
9 comment submittal process that you would be
10 able to provide is helpful and is needed.

11 FACILITATOR BROOKMAN: Okay, so
12 then we're moving to the next slide. Yes,
13 Mohammed, you're going to set this one up?

14 MR. KHAN: Actually, no, I thought
15 you were going to do that.

16 FACILITATOR BROOKMAN: So then you
17 can see, this is the final substantive slide.

18 And you can see the two bulleted points
19 there. Other than the mentioned
20 clarifications the IEC Standard 62301 is
21 adopted without modification. DOE believes
22 IEC 62301 procedure is appropriate for

1 measuring the low wattage that would be
2 encountered when testing furnaces and boilers
3 and reviewing the IEC provisions.

4 DOE sees no conflicts or
5 difficulties for the F&B industry when testing
6 their products and specifically the Department
7 would seek comment on those two points, the
8 adequacy and appropriateness of IEC Standard
9 62301 in general and whether there's a need to
10 modify the part from the provisions by IEC
11 62301 with regard to residential furnaces and
12 boilers.

13 Okay, this is your chance to make
14 more specific comments related to those IEC
15 standard -- that IEC standard. Harvey Sachs.

16 DR. SACHS: Harvey Sachs, ACEEE.
17 I guess my only remaining question is an
18 information item. It wasn't clear to me in my
19 reading of the proposed rule because I don't
20 think it's covered, what manufacturers will
21 actually report to DOE and consumers with
22 respect to standby and off-mode electricity

1 released? Will it simply be folded into the
2 global metrics or will it be separately
3 reported?

4 MR. KHAN: Mohammed Khan, DOE. I
5 guess with any regulatory descriptors, as of
6 right now we have a AFUE. Manufacturers are
7 going to be required to comply with that and
8 then also report that. As to your question
9 about whether it be combined or lumped in with
10 AFUE or be a separate, that's something that,
11 you know, we're still going to be working on
12 as we go through the rulemaking process. But
13 just to be clear, whatever the regulatory or
14 whatever regulation for the standby or off-
15 mode in addition to the active mode which is
16 now AFUE, will need to be complied with and
17 also reported.

18 DR. SACHS: Harvey Sachs again.
19 I'm a little confused. Are you saying that
20 manufacturers will report the P sub SB and P
21 sub O to you?

22 MR. KHAN: I'm sorry, those

1 particular values, no, but you know, if for
2 example, we have a certain value that would be
3 the regulatory value for standby or off-mode
4 is those values that would be reported.

5 DR. SACHS: That would be the time
6 and motion over the year.

7 MR. KHAN: Correct.

8 FACILITATOR BROOKMAN: Additional
9 comments?

10 No? Go ahead.

11 MR. STANONIK: If I could go off on
12 something -- Frank Stanonik, AHRI. Mohammed,
13 you indicated that DOE at least at this stage,
14 didn't have any intent to do some of its own
15 testing using 60 -- IEC 62301. And yet, we
16 have determined that when the next -- or not
17 when -- when the final rulemaking of the
18 furnace requirements comes out some time in
19 the second half of 2010, that it will include
20 some -- address in some way the standby
21 consumption.

22 I see a disconnect there. How

1 will DOE be able to get some idea of what
2 would be an appropriate standard for standby
3 consumption unless you run some of your own
4 tests to see what is representative of
5 equipment?

6 MR. KHAN: Mohammed Khan, DOE.
7 Frank, that's actually a very valid point. I
8 guess I really can't answer that with definity
9 for this point but in some manner they
10 probably will investigate that and incorporate
11 in its analysis process as it normally does to
12 come up with a level of a standard which would
13 be deemed appropriate.

14 FACILITATOR BROOKMAN: Lance?

15 MR. DeLAURA: Lance DeLaura, with
16 the Sempra Energy Utilities. This is not a
17 comment but more of a question. I've heard a
18 lot of clarifying questions and discussion but
19 I guess my question is from the lack of
20 additional discussion is it workable from the
21 customer's perspective? I'm interested for
22 the end use customer. Is any of this

1 rulemaking going to impact our customers
2 adversely?

3 FACILITATOR BROOKMAN: I note that
4 Lance is looking at the manufacturers in the
5 room at this moment. Yes, Cyril.

6 MR. FOWBLE: Cyril Fowble from
7 Lennox International. You know, from our
8 analysis, we fail to see any effects at all.

9 FACILITATOR BROOKMAN: Okay, thank
10 you.

11 MR. VERSHAW: Jim VerShaw with
12 Trane. This is a measurement procedure,
13 right, it has nothing to do with what gets
14 reported, so we'll have to wait and see what
15 comes out in the revised standards and see how
16 that's going to effect customers and
17 everything else. Jim VerShaw again with
18 Trane; one more comment.

19 In reading through this before the
20 meeting, it wasn't clear and it was talked
21 about with the thermostat thing, but I would
22 recommend that the standard be made very

1 explicit on the setup procedure for the
2 measurement of the standby power. I mean, you
3 look through the international standard and
4 you got A through F of different types and you
5 looking through there and they're talking
6 about breadmakers and radar ranges and the
7 like. And I'm going, I don't see a furnace in
8 here, and if you know how furnaces are
9 installed around the country, sometimes there
10 is a power switch next door, that's Type B.

11 Other ones have a thermostat, that's Type C.

12 A thermostat is not in the
13 appliance. So, I mean, I think you need to
14 take a look at that international standard and
15 look at what you're going to finally publish
16 and make sure it's very explicit how everybody
17 needs to test this so that there's no way that
18 somebody can test it differently than somebody
19 else. So it's always done the same way and
20 that seems to be the most gray area that I saw
21 going through there.

22 FACILITATOR BROOKMAN: Excellent.

1 I couldn't tell from your comment, is the
2 international standard as written, is it
3 explicit and specific enough?

4 MR. VERSHAW: No.

5 FACILITATOR BROOKMAN: No, right,
6 okay. And so would you then be able to say
7 that such things that should be listed
8 enumerated?

9 MR. VERSHAW: The standard that DOE
10 publishes ought to be explicit on how to turn
11 the furnace on and off for the power mode and
12 be explicit about the thermostat requirements,
13 whether there is -- either you do it without
14 thermostat or whatever you decide to do. I
15 would recommend you would not have a
16 thermostat on the thing. Just measure the
17 power that the furnace has on standby.

18 FACILITATOR BROOKMAN: Okay, that's
19 a helpful comment. Thank you. Yes, Mohammed.

20 MR. KHAN: Mohammed Khan, DOE. I
21 appreciate that very much and those kinds of
22 comments specifically are welcome in the

1 written comments. So, please submit those
2 kind of comments.

3 FACILITATOR BROOKMAN: Yes, and I
4 think just to be more specific, the Department
5 would really enjoy as specific as you can be
6 on these points because they rely on your
7 experience. Gary.

8 MR. FERNSTROM: Gary Fernstrom from
9 PG&E. I would agree that it makes sense to do
10 the test without any thermostat connected
11 because it seems like that's the way they're
12 going anyway. However, I think some factor
13 might want to be considered to account for
14 what that energy use might be. And I'd like
15 to make a comment going back to Lance's
16 question about how the outcome of this
17 proceeding may or may not adversely effect
18 customers.

19 I think to the contrary, there is
20 a way where customers can be favorably
21 effected and that would be if the standby
22 power in furnaces could be reduced with say

1 electronic power supplies as opposed to
2 magnetic transformers as Harvey suggested.
3 That would reduce annual electric standby use
4 and if that could be properly measured, and
5 then incorporated into the standard, that
6 would be a good thing and something that would
7 benefit customers.

8 FACILITATOR BROOKMAN: Okay, thank
9 you. Harvey Sachs.

10 DR. SACHS: This is Harvey Sachs,
11 ACEEE. Mohammed, I think that Jim VerShaw has
12 raised a very important point. I have mumbled
13 a little bit to Karim Amrane, who is sitting
14 next to me and we, outside AHRI, are certainly
15 willing to work with the manufacturers on a
16 quick effort to establish the conditions of
17 test, as Jim is suggesting if that would be
18 helpful. We think everybody has a common
19 interest in having that set of rules clear and
20 consistent so we now have a game plan.

21 MR. KHAN: Mohammed Khan, DOE.
22 Harvey, any such activity like that, that

1 would result in very meaningful and useful
2 information as always, will be very
3 appreciated. Thank you.

4 FACILITATOR BROOKMAN: Frank
5 Stanonik.

6 MR. STANONIK: Frank Stanonik,
7 AHRI. Just a different point and I just want
8 to, I guess, confirm something. The
9 definition of the seasonal off-switch, it just
10 says a switch and I guess I just want to
11 confirm that DOE recognizes that might be
12 either a manual or an automatically operated
13 switch? That was a question, not very well,
14 but --

15 FACILITATOR BROOKMAN: John, can
16 you take that one?

17 MR. TALBOTT: Okay, I just put the
18 actual provision that's in the test procedure
19 up there. This is what you're talking about
20 now. There may be some clarification or
21 expansion. I would love to see the industry
22 recommend something right here, right now and

1 we could mark it up. But we're under the
2 impression that again, we don't know but are
3 there designs that are clearly marked to say
4 that the summertime use of a furnace not
5 connected to an air conditioner, could be
6 truly off, disconnected from the power source
7 and that's what that's about. And if you have
8 a design feature that exactly does that, and
9 this is a precedent that is already
10 established in all test procedures.

11 The manual control, gas manual
12 heater, we specify that if there's a switch
13 that says, "OFF" and it's right there, we're
14 not going to measure that off season loss.
15 And there's a couple other test procedures
16 across a whole suite of test procedures that
17 makes that determination. Similar to that, if
18 you've got a clear enough indication to the
19 user that you can turn this thing truly off,
20 don't measure the -- don't account for the
21 off-mode, standby loss.

22 MR. KHAN: Mohammed Khan, DOE.

1 Frank, I just want to get to your point about
2 the definition and whether DOE has any
3 concerns for the distinction of it being a
4 manual switch or an automatic switch. The
5 definition as proposed in 2.9 says, "When
6 activated". It does not make any distinction
7 about how that activation is done. So whether
8 it be manual or automatic, I don't think it
9 matters.

10 MR. STANONIK: Okay, well, thanks
11 Mohammed. That's how I was reading it. I was
12 just kind of looking to make sure that's what
13 the intent was.

14 MR. KHAN: Yes, that's it.

15 FACILITATOR BROOKMAN: Harvey?

16 DR. SACHS: Harvey Sachs, ACEEE. I
17 understand what this says. I'm trying to map
18 it into my experience and if, for example,
19 there were a hard switch on the furnace that
20 turns it off, I can actually do at my house,
21 that also means I'm turning off the power
22 supply to the thermostat. And if I think of

1 that as a seasonal switch, it's saying, you
2 can turn it off and come October, you will
3 need to reprogram that thermostat. The day of
4 the round funny one is almost over. That's
5 another story, Jim.

6 But let me say for the record that
7 my wife and I have had four programmable
8 thermostats in the last 30 years and were able
9 to program the first one. It had little
10 buttons you stuck around the perimeter. My
11 wife has a graduate degree in controls
12 engineering. (Laughter).

13 But leaving that point aside, it's
14 just not clear to me operationally what it
15 means to have a seasonal switch in 2009 and
16 beyond given the level of support the
17 thermostat requires 365 days a year.

18 MR. TALBOTT: But you do encourage
19 its existence if it can be worked out and this
20 provision is encouraging it.

21 DR. SACHS: Okay.

22 MR. TALBOTT: And if it needs to be

1 clarified, that's what we'd be interested in
2 hearing.

3 FACILITATOR BROOKMAN: Frank
4 Stanonik.

5 MR. STANONIK: Frank Stanonik,
6 AHRI. To Harvey's question and I suggest
7 maybe it's a little easier if you think of a
8 boiler, and particularly since regulations are
9 in place that not too far off boilers will be
10 provided with what is shorthandily called an
11 outdoor temperature reset, and let's just
12 imagine that somebody is clever enough to
13 incorporate into the outdoor temperature reset
14 something that says, "Oh, if I see a
15 temperature above 60 degrees for X number of
16 days or hours, I'm assuming it's no longer
17 winter", and deactivates the boiler, that
18 would be a seasonal switch.

19 DR. SACHS: Of course, I'm --
20 Harvey Sachs again. I'm living in Roger
21 Marran's world in which all boilers are
22 integrated with a water heater.

1 MR. STANONIK: Well, they're not
2 all.

3 FACILITATOR BROOKMAN: Mohammed?

4 MR. KHAN: Mohammed Khan, DOE.
5 Frank, I just want to make a point about the
6 automatic temperature reset control device
7 that you were talking about regarding the
8 boilers. In our definition, when we were
9 talking about the switch, we were talking
10 about a switch that would be integral to the
11 appliance, something that's shipped with it,
12 it's manufactured that way, it was built that
13 way, shipped that way, installed that way. I
14 just want to be clear that I don't think at
15 this point the Department would be recognizing
16 an automatic temperature reset device on a
17 boiler as part of that definition unless it is
18 an integral component of the boiler, meaning
19 that it's going to be supplied with it,
20 installed with it, and that the boiler won't
21 function unless that particular device is
22 connected to it.

1 I actually want to make that
2 clear.

3 MR. STANONIK: Frank Stanonik,
4 AHRI. I think you just described what is the
5 impending regulation. It will come with it.
6 The boiler won't operate unless it's installed
7 and I expect the manufacturers will be
8 providing it because otherwise it's an unknown
9 that they, in fact, will now need to control

10 DR. SACHS: Harvey Sachs, ACEEE.
11 It was, as I recall, a feature that was a
12 consensus among many parties, including the
13 manufacturers and everybody loved it except
14 OGC but that's a political statement.

15 FACILITATOR BROOKMAN: The first
16 one of the day. Okay, moving back to the
17 technical content. Roger Marran, yes.

18 MR. MARRAN: Thanks, Doug. Roger
19 Marran with Energy Kinetics, just a follow on
20 statement. One of the things I think that
21 goes back to my opening remarks on this is
22 we're moving forward to have energy saving

1 controls on residential boilers. These energy
2 saving controls can have an overarching impact
3 on the real delivered energy efficiency the
4 conditioned space and hot water. These
5 controls, in themselves, do have an energy
6 consumption with them, electrically. So we're
7 now in a position where there's going to be a
8 mandate to put better controls on boilers to
9 help improve the real delivered efficiency but
10 because AFUE specifically accepts the use of
11 controls in the test standard, so they don't
12 have any impact on the standard, that you'd
13 get a better efficiency in efficiency control,
14 but you'll get a lower efficiency in this test
15 because now you're going to have an electrical
16 consumption that's associated with it.

17 So it really is imperative that we
18 have a better test standard that's going to
19 reflect the impact of higher efficiency
20 controls to be able to not only distinguish
21 between the controls, but why it's so
22 important to have these controls on the

1 equipment to get better performance moving
2 forward.

3 FACILITATOR BROOKMAN: Okay, John
4 Talbott?

5 MR. TALBOTT: That's a bigger point
6 than I was going to make. Just to clarify this
7 provision that we are including and that
8 business about the off-switch and seasonal
9 differences, it's a difference we're looking
10 for there. If there is an expected difference
11 between the off-mode that there's something
12 done between the heating season and the non-
13 heating season. It could be a lower wattage
14 in that, for instance, the manufacturers
15 decide, "I'm going to shut down with this
16 switch only the components that are associated
17 with the heating and I'm going to leave the
18 thermostat hot", or something like that. That
19 would be an off-mode wattage that is
20 considerably less than the standby wattage and
21 then those differences would be reflected in
22 the annual accounting.

1 So it's not just an on and off
2 issue. It's an expected difference between
3 standby mode and off-mode.

4 FACILITATOR BROOKMAN: Okay, thanks
5 for that clarification. Okay, so then I would
6 refer you again to Slide 15. Any additional
7 and perhaps final comments in IEC Standard
8 62301 and these last items that people have
9 been raising? Then now is an opportunity for
10 anybody that wishes to do so to make a closing
11 remark, summary comments, any additional
12 issues that people wish to raise at this time?

13 Yes, Jim.

14 MR. RANFONE: Jim Ranfone, AGA,
15 just a question of scope. I realize you're
16 going to be requiring this on electric
17 furnaces now. Would that also apply to an air
18 handler that has a heating element to it, for
19 example, a heat pump? Are they considered
20 electric furnaces? Was that within the scope
21 of this rulemaking? I guess that's a DOE
22 question.

1 MR. KHAN: I can try. Mohammed
2 Khan, DOE. Heat pumps are not part of this
3 rulemaking, it's fossil fuel furnaces and
4 electric furnaces.

5 MR. RANFONE: But the electric, Jim
6 Ranfone again. The electric segment of a heat
7 pump which would be an air handler with an
8 electrical, you know, element in it, is that
9 considered an electric furnace by DOE and
10 would that be considered -- included in this
11 rulemaking as another measurement that has to
12 be taken for that product line, for the air
13 handler?

14 MR. KHAN: Yes, Mohammed Khan, DOE.
15 The intention here is not to separate or pull
16 out any portions of any particular product.
17 And since the heat pump, I believe is covered
18 under the AC line of products, it would be
19 looked at there.

20 MR. RANFONE: Again, Jim Ranfone.
21 I'm not sure I understand. So is the air
22 handler that has an electric element to it,

1 considered an electric furnace and included in
2 the current DOE test procedure? I guess
3 that's really the basic question because it
4 operates as an electric furnace.

5 MR. KHAN: Yes.

6 MR. RANFONE: It's got a blower,
7 it's got heating elements.

8 MR. KHAN: Okay, well, basically,
9 I'm going to have to say no at this point.

10 MR. RANFONE: Okay.

11 MR. KHAN: It will not be covered.

12 MR. RANFONE: Is there a reason for
13 that because it's not part of this test
14 procedure or --

15 MR. KHAN: Well, as I was trying to
16 explain, because that is a -- I guess a sub-
17 component or component of the heat pump, which
18 is covered under the AC rule, it will not be
19 covered here.

20 MR. RANFONE: Okay. The second
21 question -- oh, I'm sorry, go ahead.

22 FACILITATOR BROOKMAN: That's it.

1 Eric Stas.

2 MR. STAS: Eric Stas, DOE. Let me
3 just add that the standby provisions apply to
4 all of our covered products so just because
5 you're not covered under the furnace and
6 boiler test procedure in pursuing standards,
7 you'll probably be caught in the AC heat pump
8 section, so it's not -- I don't think it's a
9 free pass.

10 MR. RANFONE: For water heaters or
11 any other product then.

12 MR. STAS: Standby is going to
13 apply to everything after July 1st, 2010.

14 MR. RANFONE: Okay, thank you. The
15 second question is, a few years ago the
16 Department proposed an energy factor for
17 electrical consumption of fossil furnaces, oil
18 and gas to measure electrical consumption. I
19 think we used to call it SUF factor but they
20 weren't applying it to electric furnaces at
21 that time. They took that electrical
22 consumption back to source. I don't see that

1 as part of this rulemaking. I think the
2 argument back then was that DOE did not have
3 the authority to measure electrical
4 consumption back to source. Is that still the
5 case today or could this rulemaking be
6 included to add that separate energy factor
7 which wouldn't be part of a minimum efficiency
8 program to include source electrical
9 consumption?

10 FACILITATOR BROOKMAN: John
11 Talbott.

12 MR. TALBOTT: As you know, there is
13 an energy factor in the existing test
14 procedure and that applies to electric
15 furnaces. But and these amendments would
16 change that quotient but for electric
17 furnaces, it's assigned 100 percent efficiency
18 and AFUE equals energy factor. And that's
19 unfortunate because it probably shouldn't but
20 that was simplifying an assumption that was
21 made early in the test procedure development
22 and the ASHRAE standard 103 does incorporate a

1 different energy factor for electric furnaces,
2 but that's not on DOE's list, I don't believe,
3 to address within this topic.

4 MR. RANFONE: This is Jim Ranfone,
5 AGA, I think with some of the recent studies
6 like the National Academy of Science came out
7 and basically said that, you know, energy use
8 should be measured at the source. And I was
9 asking DOE to consider that. I think perhaps
10 that may be something that should be
11 considered at least as part of this rulemaking
12 to put it on the table and see where we go
13 from there, because if we're all interested
14 in, you know, reducing energy consumption,
15 then it should be done totally not just on the
16 site. Thank you.

17 FACILITATOR BROOKMAN: So that sort
18 of comment would be very helpful in your
19 written comments, Jim.

20 MR. RANFONE: Okay, thank you.

21 FACILITATOR BROOKMAN: Thank you,
22 yes, Gary.

1 MR. FERNSTROM: PG&E has advocated
2 for that over many rulemakings.

3 FACILITATOR BROOKMAN: Thank you
4 for that voice of support. Any -- then, now
5 is the opportunity for people to make
6 additional comments, raise additional issues,
7 ask additional questions. I think we're now -
8 - have now completed the presentation material
9 and the material that the Department wanted to
10 cover. Okay, yes.

11 MR. KHAN: Thank you. As Doug
12 already mentioned at the onset, this was --
13 the whole thing was captured via transcript
14 which will be available in the next upcoming
15 weeks. Again, I want to remind you about the
16 importance of the written comments. There
17 were a lot of good points made today and the
18 Department would definitely appreciate a
19 follow-up as a written form, and this
20 information here is just to remind you once
21 again how to submit that.

22 And again, I want to point out and

1 remind you please, that the cutoff date for
2 receiving those comments are October 13, 2009
3 and when you do submit that, please include
4 the pertinent information. And again, thank
5 you very much and it looks like one other
6 question.

7 MR. STANONIK: Yes, in the mail
8 address, the note for ASHRAE Standard Cooling
9 equipment, I assume that's a typo?

10 MR. KHAN: Why did you have to
11 point that out, Frank?

12 (Laughter)

13 MR. STANONIK: Because if I send my
14 comments in, they get lost. (Laughter)

15 MR. KHAN: I will make sure that
16 gets fixed and -- yes, thank you.

17 FACILITATOR BROOKMAN: And the
18 evaluation form is a part of your packet.
19 Please take 30 seconds and fill out the
20 evaluation form. Thanks to all.

21 (Whereupon, at 10:35 a.m. the
22 above-entitled matter concluded.)

A	<p>Adam 1:16 6:2,6 add 10:22 25:7 27:11 29:1 30:17 41:1 57:1 86:3 87:6 added 28:16 30:7 36:21 42:13 adding 31:12 39:19 addition 66:15 additional 8:2 19:7 20:7 23:14 28:4 39:12 47:18 55:4 64:8 67:8 68:20 83:6,11 89:6,6,7 Additionally 10:22 address 24:8 37:1 67:20 88:3 90:8 addressing 43:10 adds 36:15 adequacy 65:8 adequate 16:11 Adjourn 3:9 adjust 42:3 adjusted 42:6 adjustment 37:17 41:2 adjustments 48:11 adopted 64:21 advancing 12:17 advantage 11:17 53:14 adversely 69:2 72:17 advised 12:12 advising 51:22 advocated 89:1 AE 31:4,15,17,22 affiliation 4:18 AFUE 12:3,15,16 13:6,11 15:14,18 16:11 19:12 21:6 21:13 23:6,15,17 25:14 27:7 31:21 31:21,22 34:13,17 36:9,10,20 37:8 38:13 66:6,10,16 81:10 87:18</p>	<p>AFUE's 17:5 AGA 83:14 88:5 agenda 3:2,4 6:22 7:8,9 ago 20:4 54:21 86:15 agree 25:21 60:4 62:15 72:9 agreed 15:6 agreement 12:13 agrees 27:2 ahead 25:18 67:10 85:21 AHRI 1:14 2:5 24:6 32:14 38:17 43:10 53:12 58:20 63:3 67:12 73:14 74:7 78:6 80:4 air 5:7 40:19 55:3,8 60:7,8,9,11 75:5 83:17 84:7,12,21 Air-Conditioning 1:13 2:5 Alek 6:11 ALEX 2:1 allow 37:1 48:3 alter 23:17 alternative 45:1 Alternatively 57:22 ambient 51:13 52:5 52:19 amended 36:14 amendment 29:10 amendments 3:8 7:18,21 9:20 10:7 21:9 28:9 30:8 36:19 37:19 48:2 64:6 87:15 American 2:3,4 5:10 12:8 35:4 amount 17:20 55:6 55:20 56:19 Amrane 1:13 5:7,7 63:3,3,11,16,19 73:13 analysis 16:9 68:11 69:8</p>	<p>analyzed 20:21 ANDERSEN 1:14 Anderson 6:17,17 annual 14:18 18:6 29:2,8,9 30:9,18 30:22 31:16 39:20 73:3 82:22 answer 24:18 39:5 55:12 68:8 anticipate 10:17 anybody 83:10 anyway 72:12 appendix 21:8 54:2 appliance 15:18 18:4 25:12 49:16 49:17 56:10 70:13 79:11 appliances 18:2,14 22:9 applicable 21:5,10 22:10 27:5 application 15:18 applications 18:21 27:22 applied 10:8 applies 23:11 87:14 apply 83:17 86:3 86:13 applying 86:20 appreciate 45:11 57:13 60:1 71:21 89:18 appreciated 74:3 approach 22:15 approaches 38:12 appropriate 54:3 64:22 68:2,13 appropriately 39:14 appropriateness 64:6 65:8 approximate 40:10 approximated 29:18 approximation 40:8 48:13 area 70:20</p>	<p>argument 87:2 Armstrong 1:15 6:9,9 Ashley 1:15 6:9 ASHRAE 15:16 16:6 50:4,6 52:19 87:22 90:8 aside 77:13 asked 29:13 33:12 55:10 61:14 asking 34:6,21 57:9 88:9 asks 49:4 assigned 87:17 associated 10:13 27:19 45:2 81:16 82:16 Association 2:3 35:5 assume 90:9 assumed 59:11 assuming 78:16 assumption 44:12 47:9,20 62:17 87:20 assumptions 29:15 assurances 46:22 AUGUST 1:6 authority 87:3 automatic 76:4,8 79:6,16 automatically 74:12 auxiliaries 40:13 41:21 auxiliary 31:4 available 8:18 16:12 20:2 89:14 Avenue 1:10 average 40:21 55:4 aware 38:19 53:3 54:20 a.m 1:9 4:2 90:21</p> <hr/> <p style="text-align: center;">B</p> <hr/> <p>B 2:2 21:8 70:10 back 11:14 15:5</p>
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38:21 53:8 63:21 72:15 80:16,21 86:22 87:2,4 backup 60:16 Baltimore 4:9 based 7:20 12:8 21:13 34:14 57:14 63:6 basic 85:3 basically 63:19 85:8 88:7 basis 36:10 57:2 battery 60:16 beginning 38:6 belief 16:13 believe 12:2 26:4 46:5 84:17 88:2 believes 23:9 27:3 64:21 BELINDA 1:16 bell 57:18 benefit 73:7 Berkeley 2:1 6:12 63:9 best 8:13 37:21 38:12 better 10:2 14:21 17:8 18:5,12 19:22 81:8,13,18 82:1 beyond 46:22 62:15 77:16 big 42:10 61:22 bigger 82:5 Bill 6:1 bit 19:21,22 43:11 45:20 73:13 blower 31:8 32:18 32:20 33:1 40:20 40:22 42:20 43:21 44:2 45:3,17 47:13 85:6 board 19:16 45:18 boiler 12:5 14:20 14:22 16:7 17:15 20:12 29:21 59:2 59:20 78:8,17	79:17,18,20 80:6 86:6 boilers 1:4 4:8 9:8 9:15 10:10 12:6,7 12:15,16,20 13:16 14:4 15:9,13 17:2 17:6 18:1 21:3 22:18 23:12 28:2 48:8,22 49:3 65:2 65:12 78:9,21 79:8 81:1,8 breadmakers 70:6 break 7:18 BRENDA 1:18 brief 3:6 6:22 7:10 7:13 9:10 11:11 broadly 26:8 broke 39:14 Brookman 1:10,12 4:3,8 5:20 6:4,8 6:13,19 11:7 19:1 19:3 20:5 24:3,21 25:2,18 26:21 27:15 28:3 32:6,8 33:10 35:2,21 37:4 38:2,15 39:7 39:11 41:16 43:7 45:8 46:11 47:17 51:8,21 52:8,14 53:6 54:15 58:18 60:22 61:5,7 62:10 63:1 64:1 64:11,16 67:8 68:14 69:3,9 70:22 71:5,18 72:3 73:8 74:4,15 76:15 78:3 79:3 80:15 82:3 83:4 85:22 87:10 88:17 88:21 89:3 90:17 BTUs 48:13 Building 8:19 built 79:12 bullet 24:7 bulleted 64:18 burden 59:20 burn 42:2	burner 29:19,19 31:6,8 32:22 33:2 40:8,9,14,14,16 40:20 41:4,9,14 42:5,21 43:15,20 44:7,13 45:4 46:2 47:2 48:1,3,8 burning 47:2 business 82:8 buttons 77:10 <hr/> C <hr/> C 70:11 calculated 42:22 calculation 48:9 calculations 35:16 California 1:17 15:4 call 30:10 55:15 86:19 called 29:19 37:13 78:10 capacity 48:12 capture 49:13,14 49:18 56:21 58:15 captured 59:8 60:21 89:13 captures 23:7 capturing 46:3 56:22 careful 45:20 CARR 1:16 case 27:6,7 28:17 87:5 cases 60:10 catching 47:7 caught 86:7 causes 12:3 cell 8:20 century 20:4 ceramic 46:1 certain 24:13 67:2 certainly 43:14 44:18 58:6 73:14 CFR 21:7 CF.3 51:17 chance 4:15 8:8	65:13 change 26:5 31:17 31:19,21 36:19 38:13 62:5 87:16 changed 35:12 62:5 changing 13:17 36:9 chime 11:10 circuits 49:18 circulating 40:19 40:22 42:20 clarification 49:11 49:22 51:5 74:20 83:5 clarifications 49:2 50:21 64:20 clarified 78:1 clarify 50:5 82:6 clarifying 22:17 51:5 68:18 clear 23:15 49:12 65:18 66:13 69:20 73:19 75:18 77:14 79:14 80:2 clearly 24:7 27:5 75:3 clever 78:12 close 8:15 41:5 closer 9:22 51:18 61:8 closes 11:3 closing 83:10 codified 21:7 color 61:22 combination 13:3 18:3 combine 16:2 combined 15:17 66:9 combustion 13:9 13:12 come 35:15 40:22 59:11 63:21 68:12 77:2 80:5 comes 23:13 67:18 69:15 comment 4:11 11:2	20:20 38:11 41:18 46:12,20 51:7,11 51:22 53:10 61:6 62:11 63:5 64:9 65:7 68:17 69:18 71:1,19 72:15 88:18 comments 10:20 11:1 20:7,21 28:4 37:20 53:9 65:14 67:9 71:22 72:1,2 83:7,11 88:19 89:6,16 90:2,14 Commerce 1:20 commercial 16:6 Commission 15:5 22:5 common 73:18 Company 1:17 5:4 comparative 16:19 18:6 compared 43:6 45:3 comparing 18:1 complete 34:15 46:18 completed 89:8 compliance 23:19 36:8 complicated 32:10 41:7 complication 47:20 complications 34:17 complied 66:16 comply 66:7 component 60:5,7 79:18 85:17,17 components 40:15 82:16 concept 12:9 39:18 concepts 10:13 39:16 concern 26:17 44:18 concerned 25:22 concerning 22:15
---	--	---	---	---

concerns 7:14 10:15 15:3 19:5 76:3	consistently 12:19	cost 31:16	Darlington 1:16 6:2,2,6,6	60:18
concluded 11:18 90:22	consultant 28:8	costs 31:16 35:12	data 16:20 34:16 63:8 64:7	describe 10:16
conclusion 16:14 25:21	Consulting 1:15,16 2:6 5:22 6:3,7,10 9:18	Council 2:4 5:11	date 90:1	described 80:4
condition 51:13 52:4	consumed 17:22	counsel 25:7	day 4:13 7:5 8:5 77:3 80:16	describes 54:2
conditioned 17:10 17:21 81:4	consumer 58:6	Counsel's 5:18	days 63:22 77:17 78:16	descriptor 22:2 38:13
conditioner 60:11 75:5	consumers 17:9 18:7 65:21	count 14:14	deactivates 78:17	descriptors 39:22 66:5
conditioning 5:8 60:8	consuming 56:20	counted 44:3 63:20	decide 71:14 82:15	design 58:15 59:2,4 75:8
conditions 52:19 53:2 73:16	consumption 9:15 11:20 18:19 21:20 22:1,8 23:5,11 24:10,16 26:4,9 28:2 29:5 31:14 35:1,9,17 37:15 42:11 58:16 59:10 59:17,18 60:14 67:21 68:3 81:6 81:16 86:17,18,22 87:4,9 88:14	country 70:9	Decree 19:18	designs 75:3
conducting 20:19	CONTENT 3:1	course 36:4 64:7 78:19	deducted 15:7	detail 29:16 32:4 33:8 43:3 48:18 56:6
confidence 53:18	context 10:9 22:17	cover 89:10	deemed 68:13	detailed 7:20 20:8
confirm 74:8,11	contrary 72:19	covered 25:12 56:11 65:20 84:17 85:11,18,19 86:4 86:5	default 57:5	details 9:19 23:14 28:12 39:17 40:5
conflict 15:19	content 19:9 80:17	covers 22:11	defer 50:18 51:3	determination 75:17
conflicts 65:4	CONTENTS 3:1	crazy 60:17	deferring 50:11	determined 23:2 36:8,16 67:16
confused 37:6 66:19	control 45:18 49:18 55:18 56:14,17 57:6 59:3,7 61:12 62:2,16 75:11 79:6 80:9 81:13	creates 15:19 16:3	defined 29:17 32:14	develop 15:17 17:7 23:10
confusing 45:6	contribute 14:11 15:14	criteria 59:18	defining 42:17	developed 16:14 17:8 28:11 31:13
Congress 55:10	contribution 17:4	cuing 8:12	definitely 89:18	developers 20:3
connected 72:10 75:5 79:22	control 45:18 49:18 55:18 56:14,17 57:6 59:3,7 61:12 62:2,16 75:11 79:6 80:9 81:13	curious 24:17	definition 16:7 74:9 76:2,5 79:8 79:17	development 16:10 87:21
consensus 80:12	controlled 60:9	current 12:2,16 14:19 15:10 16:11 16:17,18,20 21:4 21:11,17 22:4 23:3,6,16,19,20 36:8,10,10 38:7 85:2	definitions 22:16 22:20	device 31:9 40:17 57:11 58:1 79:6 79:16,21
Consent 19:18	contribution 17:4	Currently 64:3	definity 68:8	devices 13:16
conservation 13:5 17:4 21:10,14 23:20	control 45:18 49:18 55:18 56:14,17 57:6 59:3,7 61:12 62:2,16 75:11 79:6 80:9 81:13	customer 68:22	degrees 51:17 78:15	difference 43:2,4 58:16 59:12 82:9 82:10 83:2
consider 22:3 27:3 27:12 51:16,20 88:9	contribute 14:11 15:14	customers 69:1,16 72:18,20 73:7	DeLAURA 1:17 5:5,5 68:15,15	differences 17:11 42:7,9,17,21 50:15 82:9,21
considerably 82:20	controls 14:17 34:19 77:11 81:1 81:2,5,8,11,20,21 81:22	customer's 68:21	delay 32:20 40:21	different 18:8 33:22 34:18 37:9 45:3 50:20 70:4 74:7 88:1
consideration 8:10 8:20	controller 55:14	cutoff 90:1	delivered 17:9,21 18:10,18 81:3,9	differently 40:13 70:18
considered 15:21 27:10 33:16 34:4 72:13 83:19 84:9 84:10 85:1 88:11	controls 14:17 34:19 77:11 81:1 81:2,5,8,11,20,21 81:22	cycle 23:8 32:19 34:15 46:2,19 56:20	demonstrate 23:19	difficulties 65:5
considering 35:17 45:1	convened 1:8	cycling 34:18	dense 55:13	directed 56:10
considers 15:22	conventional 17:17	Cyril 1:19 5:15 51:9,10 53:8 69:5 69:6	Department 1:1,9 1:18,20,22 2:3,6 4:5 5:2 9:5 10:17 13:1 14:9 38:5 52:1,3 55:10 64:3 65:6 72:4 79:15 86:16 89:9,18	direction 11:21
consistent 73:20	convey 10:12		Department's 10:6 20:13 22:15	
	Cooling 2:2 90:8		depending 55:21	
	copy 7:3,6 11:14			
	core 57:20			
	correct 35:9 52:20 67:7			
		D		
		D 2:2		

18:13 directly 49:20 60:9 63:14 directs 21:18,21 disagree 60:4 disagreeing 59:14 disconnect 67:22 disconnected 75:6 discuss 29:16 33:8 discussed 43:2 discussion 3:8 7:5 7:17,20 10:12 22:14 32:2,3 36:2 56:7 68:18,20 discussions 34:9 distinction 26:10 33:18 49:5,6 76:3 76:6 distinguish 57:3 81:20 distribution 17:16 17:17,18,19 18:5 divided 48:12 DOE 1:18,22 2:6 5:17,19 9:13 10:8 19:17 20:17,20 21:4,18,21 22:3 23:2,9 24:8,17 26:6 27:12,12 28:10 37:1 38:4 38:21,22 63:5,18 63:19,22 64:2,21 65:4,21 66:4 67:13 68:1,6 71:9 71:20 73:21 74:11 75:22 76:2 79:4 83:21 84:2,9,14 85:2 86:2 87:2 88:9 DOE's 9:9 27:2 88:2 doing 64:4 dollars 42:13 domestic 12:21 door 70:10 Doug 1:10,12 4:8 11:12 39:14 80:18	89:11 DR 5:7,10 6:1 19:10 45:10 46:8 46:15 47:15 54:17 56:12 57:12 59:22 62:8 63:3,11,16 63:19 65:16 66:18 67:5 73:10 76:16 77:21 78:19 80:10 draft 45:17 drawing 62:6 draws 55:21 drives 33:14 ducted 17:17 due 15:3 17:9 duration 30:1,16 40:11 41:14 43:5 D.C 1:10 <hr/> E E 1:19,19 30:10 31:4,15,17,22 35:8 early 87:21 easier 78:7 economically 16:12 Economy 2:4 5:11 EDWARDS 1:18 effect 69:16 72:17 effected 72:21 effective 13:2 effects 69:8 efficiency 12:2,4,7 12:20 13:9,12 14:14,19 16:9 17:13,15,19 18:4 18:5,6,10,13,18 21:7 29:11 31:18 34:15 37:18 39:22 81:3,9,13,13,14 81:19 87:7,17 efficient 12:18 58:8 effort 9:11 45:11 73:16 efforts 20:15 eight 55:1 EISA 10:9 21:16,17	21:20 22:16,19 23:4,8 26:7 28:9 28:14 29:13,17 36:5 49:13 57:8 either 37:2 71:13 74:12 electric 1:18 5:4 23:12 27:4 31:4 47:21,22 48:7,14 48:16 73:3 83:16 83:20 84:4,5,6,9 84:22 85:1,4 86:20 87:14,16 88:1 electrical 21:14 23:10 24:16 25:9 25:16 26:3,16,19 30:10,11 31:8,13 34:3,7,21,22 35:8 35:17 40:13,15 45:15 49:15 56:8 81:15 84:8 86:17 86:18,21 87:3,8 electrically 22:8 32:17 81:6 electricity 30:6 31:1,7 42:11 46:18 47:1 50:6 55:7,20 60:13 65:22 electronic 73:1 electronics 46:17 Electrotechnical 22:5 element 83:18 84:8 84:22 elements 45:15 85:7 emissions 35:15 emphasize 32:1 encountered 65:2 encourage 17:2 77:18 encouraged 10:21 encourages 15:11 encouraging 77:20 Energetics 1:16	energy 1:1,9,17,18 1:22 2:2,6 4:20 5:6 7:7 9:12,14 11:13,19 12:18 13:2,5 14:9,17 15:4 16:8 17:4,9 17:13,13,14,21,22 21:6,10,14,19,22 22:2,7 23:5,20 24:10,11,16,20 25:8,11 26:4,9,16 26:19 27:4,9,18 29:2,3,5,9,11 30:10,11,19 31:4 31:14,18,18,20 34:7 36:14 37:14 37:15 39:21 41:20 44:2 54:19 56:8 56:15,19 57:6 58:5,16 59:10,17 59:18 68:16 72:14 80:19,22 81:1,3,5 86:16 87:6,13,18 88:1,7,14 Energy's 4:5 9:6 Energy-Efficient 2:4 5:11 engineering 16:3 77:12 enjoy 72:5 entire 8:17 23:8 46:2 enumerated 71:8 envisioned 16:5 equal 13:9 equals 87:18 equated 22:19 equation 29:1,3 30:7 31:3,6 39:20 48:6 equations 29:9 31:10 32:11 48:2 equipment 18:21 68:5 82:1 90:9 Eric 1:14 2:6 5:17 6:17 26:6 27:12 86:1,2	error 33:4 50:7 especially 51:16 essential 60:5,7 essentially 13:8 16:21 32:15 48:9 establish 9:13 73:16 established 75:10 estimate 42:1 estimated 30:1 evaluation 90:18 90:20 everybody 4:4 8:7 19:6 70:16 73:18 80:13 exactly 40:16 58:9 75:8 example 32:19 67:2 76:18 83:19 excellent 33:13 70:22 exchange 10:22 53:7 excluding 56:3 executing 53:1 exercise 54:5 exist 27:22 existence 77:19 existing 30:2,22 31:3 39:21 46:7 47:7 87:13 expansion 74:21 expect 80:7 expected 82:10 83:2 experience 14:4 58:14,22 72:7 76:18 experts 51:3 57:16 explain 10:7 85:16 explanation 20:9 explicit 55:12 70:1 70:16 71:3,10,12 exploratory 64:4 extra 36:21 37:15 42:16
---	---	--	---	--

F							
F 70:4	felt 24:8,17	25:10,15 30:4,6	23:12 42:18,20	39:18 40:1 43:21			
faces 4:10	Fernstrom 1:18 5:3	42:12 84:3 86:17	47:22,22 48:8	44:8 48:18 50:9			
Facilitator 1:10,12	5:3 9:21,21 10:3	four 13:5 22:13	49:3 51:4 54:22	53:19 54:12 57:10			
4:3 5:20 6:4,8,13	26:22 27:1,1	48:20 55:4 77:7	55:2 63:5 65:2,11	58:21 59:16 62:1			
6:19 11:7 19:1,3	33:11,11,19 34:20	Fowble 1:19 5:15	70:8 72:22 83:17	64:13,15 66:7,11			
20:5 24:3,21 25:2	37:5,6 41:17,17	5:15 51:10,10	83:20 84:3,4	69:1,16 70:7,15			
25:18 26:21 27:15	45:5 62:12 72:8,8	52:2,10,17,20	86:17,20 87:15,17	70:21 72:12,15			
28:3 32:6,8 33:10	89:1	53:3 69:6,6	88:1	75:14 79:19 81:7			
35:2,21 37:4 38:2	field 20:2 54:19,22	framework 54:6	further 11:21 51:5	81:15,18 82:6,15			
38:15 39:7,11	fill 90:19	Frank 2:5 24:4,5	F&B 65:5	82:17 83:16 85:9			
41:16 43:7 45:8	final 8:4 20:22	24:22 25:19,20		86:12			
46:11 47:17 51:8	21:16 35:16 36:13	26:22 32:12,13	G	good 4:3 9:3 18:16			
51:21 52:8,14	64:17 67:17 83:7	33:12 38:1,2,15	gain 16:1	18:16 35:5 46:21			
53:6 54:15 58:18	finally 17:5 22:3	38:16 40:12 43:7	game 73:20	73:6 89:17			
60:22 61:5,7	70:15	43:9 53:9,12	gaming 45:19	graduate 77:11			
62:10 63:1 64:1	find 19:19	58:18,20 60:2	Gary 1:18 5:3 9:21	gray 70:20			
64:11,16 67:8	fine 50:8 51:1	67:12 68:7 74:4,6	26:22 27:1 33:10	greater 41:3,21			
68:14 69:3,9	first 10:5 11:16	76:1 78:3,5 79:5	33:11 37:4 41:16	42:2 50:7			
70:22 71:5,18	12:1 13:14 21:3	80:3 90:11	41:17 43:10 45:9	greatly 58:3			
72:3 73:8 74:4,15	22:13,14 28:14	free 86:9	62:11 72:7,8	group 48:5			
76:15 78:3 79:3	31:5 36:7,20 40:7	friendly 19:21	88:22	guess 38:17 53:13			
80:15 82:3 83:4	43:10 49:2 51:17	front 44:21	Gary's 55:13	63:4 64:5 65:17			
85:22 87:10 88:17	77:9 80:15	fuel 11:19 18:18	gas 1:17,18 2:3 5:4	66:5 68:8,19 74:8			
88:21 89:3 90:17	five 15:2 51:16,18	23:6,7,12 24:9,18	15:15 27:4,6 35:5	74:10 83:21 85:2			
fact 14:14 26:13	fixed 12:16 59:11	25:10,15 27:6	75:11 86:18	85:16			
33:2 43:20 80:9	90:16	30:4,6 42:12 84:3	general 5:17 25:6	guidance 50:13			
factor 21:6 31:19	flue 15:15	full 23:8	52:4 65:9	52:10			
31:20 35:6 37:14	focus 7:4	fully 8:16	generally 29:20				
42:3 46:9 72:12	focused 8:11,22	function 12:21	50:16	H			
86:16,19 87:6,13	focusing 47:8	22:19 79:21	gentleman 61:1	half 67:19			
87:18 88:1	folded 66:1	funny 77:4	getting 41:6	handle 49:1 51:2			
factors 14:22 41:2	folks 38:11	furnace 20:12 21:3	Gilley 1:19 5:14,14	handler 55:3,8 60:7			
42:7	follow 38:3 80:19	29:21 32:15,18,19	give 4:14 57:19	60:9 83:18 84:7			
fail 69:8	following 7:8,9,11	33:14,20 38:19	given 77:16	84:13,22			
fairly 24:13	7:15 8:2 9:17	42:12 48:14,16,21	global 66:2	handout 11:14			
famous 48:10	14:16 20:19	50:10 51:1,14,17	go 6:21 14:15 25:18	happening 46:21			
fan 41:20 42:1	follow-up 89:19	52:16 54:8 55:14	40:4,5 42:16 63:4	62:7			
far 16:17 78:9	form 58:2 89:19	55:19 57:7 59:2	63:17 66:12 67:10	hard 76:19			
favorably 72:20	90:18,20	59:20 60:20 61:11	67:11 85:21 88:12	Harvey 2:4 5:10			
feasible 21:22	formal 46:19	61:21 62:3,14	goal 20:13	19:9,10 20:6 45:9			
36:16	format 37:16,21	67:18 70:7 71:11	goes 33:1 46:9	54:15,17 57:12			
feature 75:8 80:11	forms 25:11	71:17 75:4 76:19	61:13 80:21	59:14,22 65:15,16			
Federal 7:6 20:18	forth 53:8	84:9 85:1,4 86:5	going 6:22 7:1,10	66:18 73:2,9,10			
52:6	forward 4:12 16:6	furnaces 1:4 4:7	7:22 8:12 15:5	73:22 76:15,16			
feedback 55:3	80:22 82:2	9:7,15 10:10 15:3	25:5 28:12 31:17	78:20 80:10			
feel 48:21 54:3	fossil 11:19 23:6,7	15:8,9 16:15 17:6	31:19 32:1 33:1,7	Harvey's 78:6			
	23:11 24:9,18	17:19 18:1 22:18	34:8 35:7,8 39:3,4	Healy 1:20 6:1,1			

<p>hear 10:14 55:12 56:1 58:13 61:2 heard 40:1 68:17 hearing 4:12 78:2 heat 13:3 15:17 17:22 83:19 84:2 84:6,17 85:17 86:7 heated 14:13 heater 16:20 55:14 75:12 78:22 heaters 86:10 heating 1:13 2:2,5 5:8 12:9,19 13:19 14:3,6,11 15:19 15:21 21:6 32:16 48:10,10 49:7 82:12,13,17 83:18 85:7 help 9:1 57:17 81:9 helped 60:2 helpful 47:15 64:10 71:19 73:18 88:18 helping 28:8 high 13:16 17:15 17:16 50:9 higher 13:11 14:21 15:14 81:19 history 3:8 7:17 21:1 24:14 holistically 27:10 home 12:19 14:11 homes 12:8 18:18 18:22 hope 19:18 hoping 57:15 62:9 hot 12:21 13:3 15:17,19 81:4 82:18 hours 14:6 29:19 29:20 30:1,18,20 31:6 33:3 40:8,9 40:16 41:10,13,14 42:5 43:15 44:13 44:14 47:11 48:4 48:4,11 55:6 78:16</p>	<p>house 76:20 hydraulic 12:9,19 14:3 17:15 hypothetical 46:16</p> <hr/> <p style="text-align: center;">I</p> <hr/> <p>idea 68:1 ideas 19:7 idle 27:19 IEC 24:12 26:14 27:13 51:13 52:5 53:16 64:20,22 65:3,8,10,14,15 67:15 83:7 IG 46:10 igniters 41:4 46:1 ignition 31:9 40:17 42:19 ignoring 12:21 illogic 54:14 imagine 78:12 imagined 60:3 immediately 7:9 impact 17:20 23:18 35:7,15 58:5 69:1 81:2,12,19 impending 80:5 imperative 81:17 implement 38:12 implication 31:15 imply 53:18 importance 10:19 89:16 important 27:3,9 34:10 73:12 81:22 imposing 59:19 impression 75:2 improve 16:19 18:17 56:19 57:7 81:9 improved 16:8 17:2 improvements 12:18 13:5 incentive 58:8 include 32:18 37:14 39:4 67:19</p>	<p>87:8 90:3 included 36:7 37:7 48:2 62:18 84:10 85:1 87:6 includes 21:5 including 15:11 56:2 80:12 82:7 incompatibility 16:4 inconsequential 58:12 incorporate 21:18 24:1 30:21 36:13 37:17 68:10 78:13 87:22 incorporated 9:18 18:11 36:17 37:3 37:8 73:5 incorporates 25:14 29:4,11 incorporation 36:22 incorrect 12:9 increase 14:18 35:8 Independence 1:9 9:12 24:11,20 indicate 24:14 indicated 38:8 67:13 indicates 17:14 24:8 indicating 13:7 indication 75:18 indicator 18:6 individual 58:6 individuals 8:4 inducer 45:18 industry 48:22 51:2 59:21 65:5 74:21 infers 34:15 information 17:8 20:2 25:3 62:21 64:8 65:18 74:2 89:20 90:4 informed 48:5 inherent 17:10</p>	<p>60:18 inhibited 12:17 innovation 19:21 input/output 16:4 16:13,16,21 insight 46:21 installation 15:6 installed 12:10 13:18 70:9 79:13 79:20 80:6 instance 52:7 82:14 instances 14:12 Institute 1:14,21 2:5 5:9 instrumentation 16:12 instruments 54:10 insulate 15:12 insulation 15:13 17:2 integral 60:20 79:10,18 integrate 21:21 29:7 integrated 29:8 78:22 integrating 39:21 integration 30:21 intending 49:14 intent 24:19 26:5 67:14 76:13 intention 8:6 84:15 interaction 20:17 interest 45:16 73:19 interested 3:7 11:5 68:21 78:1 88:13 intermittent 31:9 internal 49:17 international 1:19 1:19 22:4 28:17 48:19 50:2,12,17 50:22 51:11 53:1 63:14 69:7 70:3 70:14 71:2 interpretation 27:2 interpreted 25:8,10</p>	<p>interrupted 42:19 introduce 4:15 introduced 13:2 introducing 33:4 Introduction 3:4 investigate 68:10 invite 38:11 invited 11:1 involve 16:21 involved 22:15 52:16 61:17 issue 19:15 36:6 40:7 42:10 56:5 56:13 59:1 63:21 83:2 issues 7:14 8:3 19:5 83:12 89:6 item 3:2 12:1,11 13:1,5,14,20 14:1 14:3,9,15 15:2,10 15:16 16:4 17:1,5 17:12 18:3 32:2 65:18 items 16:10 22:14 83:8 IV 1:19</p> <hr/> <p style="text-align: center;">J</p> <hr/> <p>jacket 14:4,7,13 15:7,11,20 16:8 JAMES 2:7 Jennifer 2:7 6:14 Jim 2:3 5:12 35:3,4 61:1,1,3,7 69:11 69:17 73:11,17 77:5 83:13,14 84:5,20 88:4,19 jockeys 31:2 John 2:6 5:20,21 9:17 23:13 24:2 28:7 32:14 35:5 43:13 45:10 46:13 47:16 53:7,13 58:21 63:4 74:15 82:3 87:10 joining 6:21 judgment 50:18</p>
--	---	--	---	--

July 20:17 24:1
36:12 38:8 39:2
40:2 86:13
junction 11:4
Justice 2:3 5:2
justified 44:22

K

Karen 2:2 4:21
Karim 1:13 5:7
63:3 73:13
keep 7:22 8:10,21
45:11,12
keeping 31:10
key 10:12 21:2
22:12
Khan 1:22 5:19,19
9:3,8 10:2,4 20:11
25:5 28:6 38:4,4
39:3 64:2,2,14
66:4,4,22 67:7
68:6,6 71:20,20
73:21,21 75:22,22
76:14 79:4,4 84:1
84:2,14,14 85:5,8
85:11,15 89:11
90:10,15
kind 25:10 64:4,8
72:2 76:12
kinds 71:21
Kinetics 2:2 4:20
7:7 11:13 27:18
80:19
know 26:20 31:2
38:11 39:15 44:2
58:9 61:12 62:20
66:11 67:1 69:7
70:8 75:2 84:8
87:12 88:7,14
knowledge 57:15
Kristen 2:3 5:1
Kyle 1:19 5:14

L

lab 17:14 56:16
laboratory 1:15 2:1
2:8 6:12,16,18
34:14

Labs 63:9
lack 15:13 68:19
Lance 1:17 5:5
68:14,15 69:4
Lance's 72:15
larger 19:14
lastly 10:15
Laughter 39:10
47:21 77:12 90:12
90:14
launch 7:1 19:8
20:8
law 26:5
Lawrence 2:1 6:11
63:9
LBNL 2:1
learned 43:14
leave 24:7 82:17
leaving 77:13
legislative 24:14
Lekov 2:1 6:11,11
Lennox 1:19,19
5:14,16 51:11
69:7
let's 30:5 32:6,8,17
35:21 38:3 46:11
60:22 78:11
level 35:7 53:18
68:12 77:16
life 18:21
light 30:3
lights 27:8
limited 27:14 34:16
line 84:12,18
list 88:2
listed 71:7
listen 10:14
listing 19:4
little 9:22 19:21,22
24:17 25:3 43:1
43:10 45:20 47:13
48:17 54:18 62:1
66:19 73:13 77:9
78:7
living 55:15 78:20
load 33:16,20 34:3
48:10,11 62:14

located 14:12
location 15:7
long 33:12 47:9
longer 40:20 47:13
78:16
look 4:12 18:10
24:10 26:3 49:9
52:3 59:16 70:3
70:14,15
looked 84:19
looking 11:21
24:15 39:5,9 69:4
70:5 76:12 82:9
looks 90:5
loss 13:21 15:21
16:8 42:13 49:15
61:20 75:14,21
losses 14:4,7,11,13
14:14,18 15:7,11
15:20,22 17:17
27:19 41:8 57:20
58:3 59:16 60:18
lost 90:14
lot 68:18 89:17
love 74:21
loved 80:13
low 50:11,17,19
54:4 65:1
lower 14:20 81:14
82:13
lumped 66:9
lumping 45:14
lunch 8:1,1,2

M

M 1:20
magnet 55:2
magnetic 73:2
magnitude 42:15
43:4 44:11 55:8
63:9
magnitudes 55:9
mail 90:7
maintain 13:19
maintaining 13:20
major 20:16 22:13
36:5

majority 13:18
14:6
making 46:19 47:9
Manager 9:9
mandate 81:8
manner 68:9
manual 56:16
61:15 74:12 75:11
75:11 76:4,8
manufactured
56:11 57:11 79:12
manufacturer 34:1
56:18 57:4 60:6
60:10
manufacturers
15:12 56:22 57:16
58:7 63:20 65:20
66:6,20 69:4
73:15 80:7,13
82:14
manufacturer's
23:18 58:14 59:3
59:7 62:16
Manufacturing
4:22
map 76:17
mark 75:1
marked 75:3
market 12:5,17
marketing 60:15
Marran 2:2 4:19
4:19 11:12,13
19:2 27:17,17
80:17,18,19
Marran's 78:21
mass 13:16 14:6
material 7:2 89:8,9
matter 90:22
matters 76:9
mean 26:6,16 27:12
59:15 70:2,13
meaning 25:11
79:18
meaningful 74:1
means 76:21 77:15
measure 29:4
40:10 41:7 49:9

49:10,16,21 50:3
71:16 75:14,20
86:18 87:3
measured 44:4
50:7 73:4 88:8
measurement 22:7
28:15,18 35:9
39:19 45:12 50:11
54:9,18 56:8 57:1
61:20 69:12 70:2
84:11
measurements
16:22 30:14 31:7
45:2 50:9 53:20
54:4,5,8 63:10
measures 27:5
36:21
measuring 9:14
21:19 25:17 26:15
54:11 61:16,21
65:1
mechanisms 19:19
median 54:22
meeting 1:3,8 4:5
8:16,17 9:5 10:5
20:19 69:20
meetings 12:12
mentioned 30:15
38:18 43:3 64:19
89:12
mentioning 47:5
messy 45:4
method 21:18
methodology 10:8
methods 19:16,20
22:6 23:10
metric 17:7 22:1
23:7,16 31:21
36:17 37:3,8,12
metrics 21:7 37:9
66:2
Meyers 2:2 4:21,21
MICHAEL 2:6
microphone 8:15
10:1 61:8
microphones 4:17
mid-morning 7:18

mind 33:13	2:1,8 6:12,15,18	object 59:19	85:8,10,20 86:14	outset 19:8 20:8
minimally 15:12	17:14 58:5 88:6	observations 19:12	88:20 89:10	outside 73:14
minimize 60:15,16	Navigant 1:15,16	obtain 28:18	old 48:10,10 57:18	overall 17:22 18:17
minimum 12:2	6:3,7,10	obvious 49:19	onboard 49:15	29:7
87:7	necessary 59:5	obviously 16:3	once 49:10 89:20	overarching 17:20
minus 41:14	need 7:22 19:15	44:16	ones 70:11	81:2
missing 34:12 47:5	25:7 46:17 51:5	occurs 14:5	onset 89:12	overemphasize
mode 8:21 9:16	51:16,19 59:15	October 11:3 77:2	on-cycle 22:22	10:18
11:19 21:19 22:20	61:8 65:9 66:16	90:2	opening 3:4,6 11:6	overestimated
22:20 23:5,22	70:13 77:3 80:9	OEM 55:18	80:21	44:11
24:9 26:2,8,9	needed 64:10	offer 13:4	operate 62:14 80:6	overestimation
28:21 29:2,17	needs 12:15 26:2	Office 5:18	operated 74:12	44:9
30:12 31:7,11	38:9 70:17 77:22	officially 8:7	operates 85:4	overrating 12:20
32:14 34:2 36:13	negotiation 24:22	off-cycle 22:22	operating 29:19,20	overrun 41:1
37:1 40:11 41:10	never 59:6	27:20	31:6,16,16 32:17	oversight 56:5
42:10,11 43:6	new 4:10 35:6	Off-mic 61:6	33:2,3 35:11 40:8	oversizing 48:12
45:7,7 46:6 47:6	36:15 44:17	off-mode 9:16	40:9,16 41:9,14	overview 3:5 7:11
49:3 50:8 66:15	newly 31:12	11:19 21:14,19,22	42:5 43:15 44:13	7:11 9:10
66:15 71:11 83:3	Nice 4:9	22:16,21,22 23:5	45:15 47:2 48:1,4	over-estimating
modification 64:21	NIST 1:21 5:22 6:1	24:2,10,15 25:14	48:9	43:17
modify 65:10	28:8	26:2 28:19,22	operation 14:17	
Mohammad 24:6	non 47:1 82:12	29:2,5 30:9 31:13	22:17	P
Mohammed 1:22	non-heating 29:22	36:6,14 37:1 38:9	operational 34:11	P 28:20,21 66:20
5:19 9:2,8 20:10	49:8	40:3 41:15 49:4	operationally	66:20
38:3,4,18 64:1,2	non-operating 47:1	49:21 54:19 56:9	77:14	Pacific 1:14,18 2:7
64:13 66:4 67:12	noon 8:1	65:22 67:3 75:21	operations 9:16	5:4 6:15,18
68:6 71:19,20	NOPR 20:18 22:14	82:11,19 83:3	12:10	packet 90:18
73:11,21 75:22	NOPRs 11:18	off-switch 74:9	opinion 27:18	page 3:2 14:16
76:11 79:3,4 84:1	normally 33:14,22	82:8	43:15	48:21
84:14	68:11	OGC 80:14	opportunities	pardon 38:3
moment 69:5	Northwest 1:14 2:7	oh 52:2 78:14 85:21	18:16,17	part 21:8 24:22
morning 4:4 9:3	6:15,18	oil 86:17	opportunity 4:11	25:15 30:21 31:5
35:5	note 19:14 21:12	okay 8:9 9:1 19:1,6	7:12 8:3 11:5,9	56:6 59:1,4,5,5
motion 67:6	24:12 26:17 69:3	20:5,9 23:13 25:2	53:14 83:9 89:5	60:20 62:3,18
motors 55:2	90:8	25:5 27:15 28:3,3	opposed 73:1	65:10 79:17 84:2
move 15:2 57:22	noted 19:4	28:5,7 32:2,7,8,17	ordeal 42:16	85:13 87:1,7
moving 64:12	Notice 1:3 4:6 7:6	33:9,9,10 34:5,20	order 42:12,15	88:11 90:18
80:16,22 82:1	9:6	35:2,20,21 36:20	43:4 55:7	participating 9:4
multiple 45:2 53:19	November 21:11	39:7,11 44:1 45:5	organizational	participation 10:19
mumbled 73:12	number 26:15 30:2	45:8 46:8,12,14	4:18	particular 20:15
N	78:15	47:17,18 48:17	original 28:11	24:12 25:12 38:13
N 21:8	numbers 35:15	52:14,15,21 53:7	ought 62:17 71:10	67:1 79:21 84:16
name 4:8,17 8:11	51:18 55:5	53:22 63:1,16	outcome 72:16	particularly 38:10
8:13,13 9:8 28:7	nutshell 18:15	64:11 65:13 69:9	outdoor 78:11,13	45:21 78:8
nap 40:6	O	71:6,18 73:8	outlines 20:11	parties 3:7 11:5
national 1:14,20	O 66:21	74:17 76:10 77:21	28:13 36:5	80:12
		80:16 82:3 83:4,5	outlining 36:18	pass 86:9

passed 8:1 39:5	68:7,9 73:12 74:7	presented 39:17	77:9 87:8	pursuing 86:6
pause 32:6,9	76:1 77:13 79:5	presently 37:9	programmable	put 57:5 74:17 81:8
PE 46:10	79:15 82:5 85:9	presents 22:12	60:17 77:7	88:12
people 8:12 33:21	89:22 90:11	presiding 1:10	progress 12:4	P-R-O-C-E-E-D-...
40:6 83:8,12 89:5	pointed 41:22	pressure 15:4	Project 9:9	4:1
percent 14:8 50:8	pointing 25:13	pressures 19:17	projected 38:22	P.E 2:6
53:17,18 87:17	points 10:12 11:15	pretty 48:20	proliferate 46:17	
performance 12:7	13:8,13 21:2,16	previously 31:5	promulgated 23:22	Q
20:1 62:19,21	22:13 23:15 33:7	42:14	properly 12:6 28:1	quantifies 30:9
82:1	34:6 36:5 40:11	probably 7:19 40:1	59:8 73:4	quarter 20:3
performances	64:18 65:7 72:6	41:5 59:10 68:10	proposal 28:13	question 24:6,9,18
18:20	89:17	86:7 87:19	propose 23:17	26:1 33:13 34:1
performing 14:20	political 80:14	problem 52:22	proposed 1:3 3:8	35:6 38:18 43:13
14:21	portion 15:20,22	60:11	4:6,11 7:17,21 9:6	45:6 46:15 53:12
perimeter 77:10	30:16	problems 51:3,6	9:19 10:6 36:19	55:11,13 62:11
period 11:3 20:20	portions 25:16	procedure 4:12	37:16,19 64:6	65:17 66:8 68:17
27:20 29:20 38:10	84:16	9:20 10:7 12:6	65:19 76:5 86:16	68:19 72:16 74:13
43:5,6 44:9 47:10	position 81:7	13:6,7,15 16:5,11	proposing 25:16	78:6 83:15,22
51:7	possibility 25:22	16:18,18 20:9	40:9 63:6	85:3,21 86:15
periphery 19:13	37:16	21:5 22:22 23:3	prorating 41:11	90:6
permanent 55:2	possible 8:22 20:14	25:17 28:9 29:8	provide 8:7 10:20	questions 10:21
person 11:8	45:13 49:14 58:9	29:18 30:4 31:2	11:5,6,9 16:7 17:8	32:9,11 68:18
perspective 68:21	posted 8:18	34:13 36:22 37:12	18:5 22:6 38:11	89:7
pertinent 90:4	potential 10:15	40:10 41:2,9 42:8	64:10	quick 73:16
PG&E 1:18 9:22	13:4 45:19	43:1 47:8 51:15	provided 78:10	quickly 45:4
27:2,2 33:12	power 22:7 23:10	51:18 52:12 56:17	provides 23:14	quite 26:7
41:18 72:9 89:1	28:18,21,22 31:8	57:1 64:22 69:12	55:18	quotient 29:12
phones 8:21	55:22 58:4,9	70:1 74:18 85:2	providing 9:10,19	31:18,19 37:18
Ph.D 1:13,20 2:4	60:19 61:11,21	85:14 86:6 87:14	39:20 80:8	87:16
pick 8:15 41:8	62:2 70:2,10	87:21	provision 49:20	Q&A 7:20
Pigg 54:20	71:11,17 72:22	procedures 1:3 4:7	74:18 77:20 82:7	
pilot 27:8 30:3	73:1 75:6 76:21	9:7,14 16:20	provisions 27:13	R
place 78:9	powered 22:8	21:20 28:11,16	28:15 39:19 48:16	radar 70:6
placed 33:20	PowerPoint 7:3	30:2,8 46:7 48:1	65:3,10 86:3	raise 7:14 83:12
plan 8:5 73:20	powers 47:2	54:8 58:17 63:6	provoking 19:12	89:6
planning 63:17	preamble 32:3 36:2	63:21 75:10,15,16	public 1:3,8,12 4:5	raised 8:3 56:14
plans 64:3	precedent 26:1,18	proceed 7:15 11:4	4:8 9:5 20:16,19	73:12
please 4:17 8:10,13	75:9	20:10 35:22 39:12	publish 20:22	raising 83:9
8:20 10:1 11:2	precise 50:16 54:9	proceeding 72:17	70:15	Ranfone 2:3 35:4,4
21:12 24:3 27:16	precision 50:14,20	proceeds 4:13 7:22	published 20:17	35:11,14,20 83:14
51:8 72:1 90:1,3	preferably 52:12	process 61:14,18	21:4,11 62:22	83:14 84:5,6,20
90:19	prepared 44:18	64:9 66:12 68:11	publishes 71:10	84:20 85:6,10,12
PNNL 1:15 2:8	prescribed 17:5	product 56:11	pull 84:15	85:20 86:10,14
point 22:9 32:10,12	present 1:11 10:6	84:12,16 86:11	pump 83:19 84:7	88:4,4,20
34:10 36:2,20	56:9,15 57:10	products 22:11	84:17 85:17 86:7	range 14:7
38:5 39:14 43:14	presentation 7:5,16	65:6 84:18 86:4	pumps 84:2	ranges 70:6
44:17 46:16 60:12	7:20 89:8	program 56:10	purposes 10:5	rates 34:18
				rating 12:5,14,15

12:16 13:2,8 14:19,21 15:14 16:5 19:15,20 ratings 15:8 16:19 Raymond 2:3 5:1,1 reading 48:19 49:7 65:19 69:19 76:11 ready 40:4 real 12:7 18:16,21 18:22 27:21 28:2 51:6 62:18 81:3,9 realize 19:17 83:15 realized 40:12 really 12:15 18:11 18:19 26:18 34:16 42:16 46:15,20 47:2 50:19 59:12 62:19 68:8 72:5 81:17 85:3 reason 85:12 reasonable 41:20 reasons 60:15 recall 54:21 80:11 receive 14:20 received 7:2 20:21 receiving 90:2 recognize 59:4 recognizes 74:11 recognizing 79:15 recommend 52:9 69:22 71:15 74:22 reconsidering 38:6 record 8:12,14 19:6 53:9 77:6 recorded 8:16 reduce 14:18 18:18 58:3 73:3 reduced 72:22 reduces 15:15 reducing 88:14 refer 83:6 referenced 24:12 references 26:13 reflect 12:6 19:22 28:1 81:19 reflected 82:21 reflects 13:8	Refrigeration 1:14 2:5 5:8 regard 21:16 65:11 regarding 79:7 regardless 62:12 62:13 Register 7:6 20:18 52:6 registered 7:3 regular 48:11 regulated 22:1 regulating 31:20 regulation 66:14 80:5 regulations 37:13 78:8 regulatory 21:1,2 23:16 66:5,13 67:3 related 65:14 relates 23:6 relationship 36:3 relative 24:18 27:21 relatively 54:18 released 66:1 relevant 21:3 27:13 59:1 relieve 15:3 rely 72:6 remainder 41:12 44:14 remaining 65:17 remanded 38:21 remark 83:11 remarks 3:4,6 7:13 8:4,11,22 11:6,11 11:15 19:7 80:21 remember 31:20 34:13 42:10,18 56:10 remind 11:2 89:15 89:20 90:1 remoted 55:15 renewable 17:13,14 report 17:14 65:21 66:8,20	reported 54:21 66:3,17 67:4 69:14 reports 18:9 63:14 represent 17:3 representative 14:2 57:2 68:4 represents 42:8 reprogram 77:3 requested 11:8 requesting 52:3 required 12:14 66:7 requirement 23:4,9 50:16 52:7 requirements 10:9 24:1 28:14 45:13 50:1,4 52:5 67:18 71:12 requires 77:17 requiring 9:13 83:16 research 26:20 reset 78:11,13 79:6 79:16 residences 18:1 residential 1:4 2:7 4:7 9:7 10:10 12:5 22:18 28:2 65:11 81:1 respect 65:22 respective 18:4 respectively 23:1 respond 25:6 response 9:11 21:17 restraint 12:3 result 21:9 74:1 resultant 13:10 review 3:4 6:22 7:9 7:10 reviewing 65:3 revised 69:15 Rheem 2:2 4:21 right 7:1 11:15 32:7,20 35:3 40:7 44:10 47:19 63:15	66:6 69:13 71:5 74:22,22 75:13 Roger 2:2 4:19 11:11,13 19:4,11 27:16,17 78:20 80:17,18 room 1:9 51:13 69:5 round 77:4 rule 20:22 65:19 85:18 rulemaking 1:3 3:5 3:8,8 4:6 7:10,16 7:17 9:6,9,11 10:13 20:12,14,15 21:17 23:16 38:20 66:12 67:17 69:1 83:21 84:3,11 87:1,5 88:11 rulemakings 89:2 rules 73:19 run 16:17 34:7 40:13,17 42:1,2,6 55:5 60:10 68:3 running 14:5 43:12 runs 40:20 47:13	saw 70:20 saying 37:19 39:15 43:19 44:6,22 49:19 66:19 77:1 says 12:11 18:3 26:8,13 47:12 74:10 75:13 76:5 76:17 78:14 SB 28:20 66:20 scenario 57:14 schedule 38:22 Science 88:6 scope 83:15,20 Scott 54:20 screen 62:1 season 13:20 14:6 15:19 29:22 32:16 49:8,8 75:14 82:12,13 seasonal 12:20 16:8 21:6 74:9 77:1,15 78:18 82:8 second 10:11 21:8 23:2 24:7 28:22 67:19 85:20 86:15 seconds 90:19 section 86:8 Security 9:12 24:11 24:20 see 4:9,10 7:7,21 8:6 19:6 26:14 30:13 32:9,11 46:11 58:4,7 64:17,18 67:22 68:4 69:8,14,15 70:7 74:21 78:14 86:22 88:12 seek 65:7 seen 32:10 sees 65:4 segment 84:6 segregated 25:9 select 60:6 selection 55:17 Sempka 5:5 Sempra 1:17 68:16 send 51:4 90:13
S				
S 1:14 Sachs 2:4 5:10,10 19:9,10,10 45:9 45:10 46:8,15 47:15 54:16,17,17 56:12 57:12,12 59:22,22 62:8 65:15,16,16 66:18 66:18 67:5 73:9 73:10,10 76:16,16 77:21 78:19,20 80:10,10 safe 36:11 sales 13:18 satisfied 29:12 satisfies 23:4 satisfy 23:8 28:13 saving 14:17 80:22 81:2				

sense 41:22 61:19 72:9	somebody 70:18,18 78:12	18:12 19:16,20 21:10,11,15 22:5 23:19,21,22 32:4 36:4,6,9 37:2,13 38:7 62:21 69:15 86:6	state 1:20 13:9,11 14:7 15:15 58:1	supplied 34:1 79:19
separate 17:6 18:2 30:7 36:17 37:3 66:10 84:15 87:6	sophisticated 48:22	standby 9:16 11:19 13:21 14:5,18 21:13,19,22 22:7 22:16,20 23:4,21 24:2,9,15 25:14 26:2,8 27:4,9,19 28:19,21 29:2,5,9 30:9,11 31:13 32:14 34:2 36:6 36:13 37:1,7 38:9 40:3 41:8,15 42:13 43:5,11,17 43:19 44:8,9 45:3 45:7 47:10 49:3 49:15,21 54:19 55:1 56:9 59:16 59:16,18 61:20 65:22 66:14 67:3 67:20 68:2 70:2 71:17 72:21 73:3 75:21 82:20 83:3 86:3,12	statement 7:7 11:17 80:14,20	supplies 58:4,9 73:1
separately 41:8 42:22 66:2	sort 39:15 88:17	standing 27:7	statute 26:11 27:13 49:4	supply 55:22 60:19 61:11 76:22
serious 44:18	source 75:6 86:22 87:4,8 88:8	Stanonik 2:5 24:4,5 24:5 25:1,20,20 26:12 32:13,13,22 33:9 38:1,1,16,16 39:8 43:8,9,9,19 44:1,6,16 53:11 53:12,22 54:7 58:19,20,20 67:11 67:12 74:5,6,6 76:10 78:4,5,5 79:1 80:3,3 90:7 90:13	stay 46:1	supplying 12:8
set 64:13 73:19	sources 63:8	start 44:8	steady 13:9,11 14:7 15:15	support 17:1,12 57:17 77:16 89:4
sets 26:1	Southern 1:17	starting 32:15	steps 3:8 7:16 10:16 20:12 50:20	supported 13:12
setup 70:1	space 14:13 17:10 17:22 55:15 81:4	starts 36:2 43:20	stipulate 23:21	Supporting 16:9
seven 57:21	speak 8:14 9:22 11:9	Stas 2:6 5:17,17 26:6,6 27:11,12 86:1,2,2,12	stipulated 14:10	supports 18:20
severe 12:3	speaks 11:21		stops 43:20	sure 33:17 46:2,20 53:14 58:10 70:16 76:12 84:21 90:15
shipped 79:11,13	specific 13:7 19:5 26:19 29:10 65:14 71:3 72:4,5		story 77:5	surface 41:19
shorthandily 78:10	specifically 10:8 26:12 65:6 71:22 81:10		straightforward 34:21 48:20	sweep 58:11
show 29:3 48:6	specification 56:2		stream 28:4	switch 70:10 74:10 74:13 75:12 76:4 76:4,19 77:1,15 78:18 79:9,10 82:16
shut 82:15	specifies 50:6		stuck 77:10	switches 56:16 61:15
side 60:11	specify 21:13 50:13 75:12		studies 18:8 88:5	sympathy 45:14
significant 12:18 13:4 17:3 33:3,4 44:19 57:20	spelled 25:9 50:2		stuff 34:11	synthesizes 58:1
silent 8:21	square 7:1		style 57:18	system 14:3,19 59:5 60:8
similar 16:5 42:4 75:17	stage 67:13		sub 28:20,21 30:10 31:4,15,17,22 35:8 46:10 66:20 66:21 85:16	systems 2:7 12:10 12:19 13:3 17:16 17:18 41:7
simple 41:19 45:13	stages 20:16 38:6		subject 13:21	S.W 1:10
simplification 44:20,22	standard 12:3,14 14:10,16 15:8,10 15:16 16:7 18:20 21:12 24:13 26:14 26:15 28:1,17 35:7 36:11,13,15 36:18 37:3,17 40:1 48:19,21 50:2,5,6,12,17,22 50:22 51:6,14,15 52:13,19 53:1 54:2 62:4 63:15 64:20 65:8,15,15 68:2,12 69:22 70:3,14 71:2,9 73:5 81:11,12,18 83:7 87:22 90:8		submit 11:1 72:1 89:21 90:3	
simplified 44:12	stages 20:16 38:6		submittal 64:9	
simplifying 87:20	stages 20:16 38:6		Subpart 21:8	
simply 34:20 66:1	stages 20:16 38:6		subsequent 37:2	
single 36:14 42:3	stages 20:16 38:6		substantive 64:17	
site 88:16	stages 20:16 38:6		SUF 86:19	
sitting 62:6 73:13	stages 20:16 38:6		suggest 78:6	
six 14:8	stages 20:16 38:6		suggested 73:2	
sketch 57:13	stages 20:16 38:6		suggesting 73:17	
slide 22:12 29:13 29:14 64:12,17 83:6	stages 20:16 38:6		suite 75:16	
slides 7:4	stages 20:16 38:6		sum 30:13 43:5	
slight 43:1 44:9,11	stages 20:16 38:6		summarize 21:2	
slightly 43:17	stages 20:16 38:6		summarizes 22:13	
small 47:3 55:21 58:8 62:13	stages 20:16 38:6		summary 7:13 18:8 19:7 83:11	
smaller 42:15	stages 20:16 38:6		summertime 75:4	
SoCALGAS 1:17	stages 20:16 38:6		sums 29:14	
solid 58:1	stages 20:16 38:6		superficial 57:15	
Solutions 1:12 4:9	standards 1:21			

T

T 2:7
table 3:1 88:12
take 7:18 8:1 13:15
18:10 32:12 50:20
53:14,19 54:4,9
54:12 62:1 70:14
74:16 90:19
taken 84:12
Talbot 9:18,18
Talbott 2:6,6 5:21
5:21 28:7,8 32:7
32:21 33:6,17
34:5,22 35:10,13

35:19 36:1 37:11 39:13 42:4 43:18 43:22 44:5,10,20 46:5,9,14 47:4,19 52:15,18,21 53:5 53:21 54:1 56:4 56:13 58:13 63:7 63:13,18 74:17 77:18,22 82:4,5 87:11,12 talk 36:3 58:21 talked 69:20 talking 34:10 43:11 55:6 70:5 74:19 79:7,9,9 talks 53:16 targeted 8:22 technical 33:7 39:17 40:5 48:17 80:17 technically 21:21 techniques 54:6 technologies 8:19 20:1 Technology 1:21 tell 51:22 71:1 temperature 13:19 13:20 15:15 51:13 52:4,5 78:11,13 78:15 79:6,16 temperatures 14:1 tentatively 11:18 term 29:18 terminology 22:21 terms 30:14 31:3 test 1:3 4:6,12 9:7 9:13,19 10:6 13:6 13:7,8,10,22 14:1 15:20,22 16:13,16 16:20,22 18:12 19:12 20:9 21:5 21:20 22:21 23:3 23:10 25:17 28:9 28:11,16 29:7,18 30:2,4 31:1 34:13 36:22 37:12 40:9 41:2,9 42:8,22	46:7 47:8 48:1 51:14,17 54:8 56:17 58:17 63:6 63:20 70:17,18 72:10 73:17 74:18 75:10,15,16 81:11 81:14,18 85:2,13 86:6 87:13,21 tested 58:15 63:5 testing 4:16 34:16 50:10 51:4 52:16 56:15 61:14,18 63:17 64:4 65:2,5 67:15 tests 16:2 20:3 62:20 68:4 thank 6:13 9:4 11:12 19:2,3,11 20:5 26:21 28:6 36:1 45:7,8 53:5,6 56:4 61:5 62:8,9 62:10,13 63:1 69:9 71:19 73:8 74:3 86:14 88:16 88:20,21 89:3,11 90:4,16 thanks 6:19,20 8:19 20:6 35:20 61:9 76:10 80:18 83:4 90:20 theory 43:12 thermal 13:16 thermostat 33:15 33:16,20,21 34:3 34:7,18 55:16,17 55:21 56:3,14,20 57:6,18 59:2,9 60:4,19 61:13,17 62:14 69:21 70:11 70:12 71:12,14,16 72:10 76:22 77:3 77:17 82:18 thermostats 33:22 59:19 62:5 77:8 thermostat's 60:13 61:22 thing 11:16 27:11	28:14,22 45:11 57:8 69:21 71:16 73:6 75:19 89:13 things 45:21,22 60:17 62:19 71:7 80:20 think 7:2 11:16,20 24:13,19 25:8 26:18 27:9 29:12 34:5 38:18 39:15 40:4 44:21 50:22 51:1,1,18 52:22 53:15 58:22 59:8 60:21 61:10 62:16 63:13 65:20 70:13 72:4,12,19 73:11 73:18 76:8,22 78:7 79:14 80:4 80:20 86:8,19 87:1 88:5,9 89:7 thinking 16:6 thirdly 29:6 thought 19:11 64:14 thoughts 10:14 19:7 39:12 47:18 three 13:1 14:1 20:16 36:5 50:21 tighter 51:12 time 8:11,14 16:10 38:17,22 40:5,17 40:21 41:1 42:2,2 42:6 45:16,19 48:14 67:5,18 83:12 86:21 times 30:15 31:6 48:11 53:8 61:16 titled 28:20 today 10:19 16:16 19:6,13 20:1,18 25:17 37:20 48:2 58:4 60:14 64:7 87:5 89:17 today's 9:5 10:5,22 11:18 30:8 topic 88:3 total 49:21	totally 35:18 88:15 trace 46:18 trade 12:4 tradition 4:14 Trane 2:7 5:13 61:4 69:12,18 transcript 8:17 89:13 transformer 57:19 57:21 58:3 62:4 transformers 49:18 73:2 transparency 18:7 transparent 20:14 trivial 55:9 truly 75:6,19 try 8:10 42:1 84:1 trying 41:7 49:13 60:12 63:20 76:17 85:15 TUESDAY 1:6 turn 8:20 71:10 75:19 77:2 turning 76:21 turns 44:7 76:20 twice 49:9 two 12:11 14:8 16:2 16:9 17:11 30:14 34:6 37:9 53:17 64:18 65:7 two-way 10:11 Type 70:10,11 types 70:4 typical 14:3 32:19 typically 17:18 40:19 41:3 55:15 typo 90:9	45:12 understanding 45:17 53:15 unduly 41:6 unfortunate 87:19 unfortunately 26:7 unit 48:13 58:14 United 1:20 universal 12:13 unknown 80:8 upcoming 89:14 updating 19:15 use 12:14 27:4,9 29:3,9 30:5,10,19 31:22 33:21 36:14 36:17 39:22 41:20 48:15,18 52:18 58:5 61:13,15 68:22 72:14 73:3 75:4 81:10 88:7 useful 74:1 user 75:19 usually 61:11,15 Utilities 1:17 5:6 68:16 utilized 28:17 U.S 1:1,9 4:5 9:5
<hr/> V <hr/>				
valid 68:7 validate 64:5 value 41:9 57:6 59:11 67:2,3 values 67:1,4 varies 33:21 various 42:17 58:4 VerShaw 2:7 5:12 5:12 61:3,3,10 69:11,11,17 71:4 71:9 73:11 versions 22:4 versus 25:9 45:17 52:6 voice 89:4 volt 55:22 57:19 58:2				
<hr/> W <hr/>				

wait 69:14
wall 59:18
want 10:5,11,12,15
 11:4,9 22:9 23:14
 38:5 49:12 51:4
 53:13 56:7,21
 57:5 58:2,11
 60:15 62:20 72:13
 74:7,10 76:1 79:5
 79:14 80:1 89:15
 89:22
wanted 59:9 60:3
 89:9
wanting 25:3
Washington 1:10
wasn't 65:18 69:20
water 12:21 13:3
 15:17,20 16:20
 55:13 78:22 81:4
 86:10
watt 30:20 54:11
wattage 30:14,20
 50:9,11,18,19
 65:1 82:13,19,20
watts 46:4 55:1,4
way 23:17 25:7,21
 26:20 29:15 38:20
 41:4 57:17 59:13
 60:2,7 67:20
 70:17,19 72:11,20
 79:12,13,13,13
ways 38:12
website 8:19
weeks 89:15
welcome 3:3 4:4
 9:4 51:7 71:22
welcomed 37:22
well-run 13:10
weren't 86:20
we'll 4:16,16 7:18
 7:21 8:1 29:16
 30:5 32:12 35:1
 40:4 69:14
we're 7:1,10 20:18
 27:14 31:10,12,22
 33:7 34:16 36:11
 36:18,20 37:19

39:19,19,21 43:11
 43:16,19 44:2,6,7
 44:21 45:20 46:2
 47:4,6,8 49:12,19
 50:11 56:2 59:15
 64:12 66:11 75:1
 75:13 80:22 81:6
 82:9 88:13 89:7
we've 18:15 22:19
 38:7 44:1 63:7
whatnot 61:16
wider 52:12
wife 77:7,11
WILLIAM 1:20
Williamson 2:7
 6:14,15
willing 73:15
winter 78:17
wired 42:20
wish 7:12,14 8:8
 11:10,11 46:12
 83:12
wishes 83:10
wonder 38:21
work 6:5 19:13,19
 28:10 39:1 47:21
 54:20 61:18 73:15
workable 68:20
worked 6:8 77:19
working 66:11
world 27:21 62:18
 78:21
worried 60:18
worry 45:19,21
worth 42:16
wouldn't 49:17
 57:2 60:2 87:7
written 10:20 11:1
 11:15 20:21 26:7
 71:2 72:1 88:19
 89:16,19

X

X 78:15

Y

Y 41:1 42:7 46:9
year 23:8 30:16,18

40:21 41:11,13
 47:11 67:6 77:17
years 13:17 15:5
 54:21 77:8 86:15

1

1 39:2 40:2
1st 24:1 36:12 38:8
 86:13
10 21:7
10:30 7:19
10:35 90:21
10:45ish 7:19
100 42:12 87:17
1000 1:9
103 87:22
11 3:7
12 55:5
12th 21:4
120 14:2
124 15:16
13 90:2
13th 11:3
140 14:2
15 83:6
155 16:6
18 1:6
19th 21:12
1997 21:4

2

2,080 48:10
2.9 76:5
20 3:8 51:19
2007 9:13 21:12,18
 24:11,20
2009 1:6 77:15 90:2
2010 24:1 36:12
 38:8 39:2 40:2
 67:19 86:13
24 55:22 57:19,20
 58:1
24-volt 57:18
27th 20:17

3

30 54:22 77:8 90:19
365 77:17

4

4 3:3
4.1 13:14
4.2 13:20
4.4 14:3
4.5 14:9
4.6 14:15
400 46:3
430 21:8
4600 30:1

5

5.1 15:10
5.2 15:16

6

6 3:4 16:4
6.2 17:1
60 67:15 78:15
62087 22:6,10
62301 22:5 64:20
 64:22 65:9,11
 67:15 83:8
63.01 52:5

7

7 17:5
7,800 44:15
7,880 47:13
7,900 44:14 47:12
7.1 17:12
7.2 18:3
75 63:22
75-day 20:20

8

8E-089 1:9
8,760 30:17 41:13
 47:11 55:6
800 44:13

9

9 3:5
9:00 1:9
9:04 4:2
95 53:17