

Date: April 28, 2015

Case: Commercial AC/Furnace Working Group ASRAC Commercial Package Air Conditioners and Heat Pumps and Commercial Warm Air



Ace-Federal Reporters, Inc.
Phone: 202-347-3700
Fax: 202-737-3638
Email: info@acefederal.com
Internet: www.acefederal.com

U.S. DEPARTMENT OF ENERGY PUBLIC MEETING
COMMERCIAL AC/FURNACE WORKING GROUP
ASRAC COMMERCIAL PACKAGE AIR CONDITIONERS AND
HEAT PUMPS AND COMMERCIAL WARM AIR

U.S. Department of Energy
Forrestal Building, Room 8E-089
1000 Independence Avenue, SW
Washington, DC 20585

9:03 a.m.

April 28, 2015

1 Appearances for Department of Energy Meeting

2

3 John Cymbalsky, DOE

4 Eileen Barkas Hoffman, Facilitator

5 Ted Bantle, Facilitator

6 Mary Anderson, Pacific Gas and Electric Company

7 James Battaglia, Navigant

8 Detlef Westphalen, Navigant

9 Andrew deLaski, Appliance Standards Awareness Project

10 Joanna Mauer, Appliance Standards Awareness Project

11 Paul L. Doppel, Mitsubishi Electric US, Inc.

12 Chandra Gollapudi, Emerson Climate Technologies, Inc.

13 Jill C. Hootman, Trane

14 John J. Hurst, Lennox International

15 Diane M. Jakobs, Rheem Manufacturing Company

16 Nicholas Misiak, Air-Conditioning, Heating, &

17 Refrigeration Institute

18 Karim Amrane, Air-Conditioning, Heating, &

19 Refrigeration Institute

20 Steven J. Rosenstock, Edison Electric Institute

21 Harvey Sachs, American Council for an Energy-

22 Efficient Economy

1 Rusty Tharp, Goodman Manufacturing
2 Meg Waltner, Natural Resources Defense Council
3 Robert J. Whitwell, United Technologies
4 Alison Williams, Lawrence Berkeley National
5 Laboratory
6 Dave Wunningham, Allied Air Enterprises
7 Katie Coughlin, LBNL
8 Greg Rosenquist, LBNL
9 Gary Fernstrom, CA IOU's
10 Travis F. Hardin, UL, LLC
11 Charlie McCrudden, ACCA

12

13

14

15

16

17

18

19

20

21

22

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

2 MR. CYMBALSKY: So, this is John
3 Cymbalsky from DOE. Welcome everyone to the first
4 meeting of the CUACCWAF working group, so CUACCWAF
5 we'll call it.

6 So, this working group was chartered back
7 in March. We have a very aggressive schedule to
8 finish our work in mid-June. So, today we're going
9 to go over -- in the morning we're going to over --
10 after introductions, we're going to go over some
11 process stuff.

12 I'm going to turn it over to our
13 facilitators, who are going to briefly introduce
14 themselves and what they do, and then we'll go around
15 the table for introductions. We have our ethics
16 representatives from General Counsel coming right at
17 9:30, so we'll need to do that right away and then
18 we'll get into the content of the working group after
19 that.

20 MS. HOFFMAN: Okay. Thank you. Hi, I'm
21 Eileen Barkas Hoffman, one of your facilitators. And
22 my colleague, Ted Bantle, will say a few words too,

1 quickly, but we're from the Federal Mediation and
2 Conciliation Service, the independent federal agency
3 that does this, which is kind of fun. We get paid to
4 do this. And we also settle labor disputes if you're
5 a soccer or a baseball fan, thanks us or not,
6 whatever. But we basically deal with these kinds of
7 meetings and look forward to working with you on this
8 important rule.

9 Also, we had the experience of working
10 with John and Joe Hagerman for manufacturing housing
11 successfully resolved last year. So, we look forward
12 to it.

13 MR. BANTLE: Good morning everyone. As
14 Eileen said, my name is Ted Bantle. I'm a mediator
15 with FMCS as well. Happy to be here. As Eileen
16 mentioned, we did have some experience last year
17 during the manufactured housing rulemaking. So,
18 we're really here to lead the process. You are all
19 the process experts. We'll stay out of your way on
20 the details, but if you do have questions at any time
21 about the facilitation process, about our role, let
22 us know.

1 And you probably will at some point see
2 one of our colleagues, Javier Ramirez here as well.
3 So, I'll kind of pseudo introduce him at the moment
4 as well. So, thank you.

5 MS. HOFFMAN: John, do you want to go
6 around the room now?

7 MR. CYMBALSKY: Right. So, we'll go
8 around the room. I'll start. So, I'm John
9 Cymbalsky. I'm the program manager for Appliance and
10 Equipment Standards at DOE, and you're all lucky to
11 have me as the federal representative of this. You
12 don't always have to be the smartest guy in the room
13 to get the job done, but in my mind, though, we're
14 going to stick with that.

15 MR. STAS: Eric Stas with General
16 Counsel's Office.

17 MR. COCHRAN: Pete Cochran, also with DOE
18 General Counsel.

19 MR. GOLLAPUDI: I'm Chandra Gollapudi.
20 I'm with Emerson Climate Technologies and Air
21 Conditioning. I'm filling in for Sammy. He's in
22 Marketing. I'm in Marketing as well.

1 MR. THARP: Rusty Tharp with Goodwin
2 Manufacturing.

3 MS. WALTNER: Meg Waltner with Natural
4 Resources Defense Council.

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

7 MR. SHOWS: Mike Shows with UL.

8 MR. SACHS: Harvey Sachs, American Council
9 for an Energy Efficient Economy.

10 MR. MILSLAK: Nick Milslak, Air
11 Conditioning, Heating, and Refrigeration Institute.

12 MS. JAKOBS: Dianne Jakobs, Rheem
13 Manufacturing. I'm here for Karen Meyers.

14 MR. MCCRUDDEN: Charlie McCrudden, Air
15 Conditioning Contractors of America.

16 MR. HURST: John Hurst of Lennox.

17 MR. FERNSTROM: Gary Fernstrom
18 representing the California Investor Owned Utilities,
19 which are PG&E Southern California Edison, San Diego
20 Gas & Electric, and the Southern California Gas
21 Company. And I'm filling in today for Marshall Hunt,
22 who is having a wonderful time vacationing in Italy.

1 And I'd like to introduce my co-worker, Mary
2 Anderson, who is in the audience representing PG&E.

3 MS. HOOTMAN: Jill Hootman, Trane.

4 MR. WHITWELL: Bob Whitwell, United
5 Technologies, Carrier.

6 MR. DOPPEL: Paul Doppel, Mitsubishi
7 Electric.

8 MR. CYMBALSKY: Thank you.

9 MR. ROSENQUIST: Lawrence Berkeley
10 National Laboratory.

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

13 MR. BATTAGLIA: James Battaglia, Navigant
14 Consulting.

15 MR. WESTPHALEN: Detlef Westphalen,
16 Navigant Consulting.

17 MR. CYMBALSKY: If you could all just
18 stand up in the back in the gallery and please state
19 your name and affiliation.

20 MR. WINNINGHAM: Dave Winningham with
21 Allied Air.

22 MR. HARDIN: I'm Travis Hardin with UL.

1 MS. MONTELLO: I'm Pam Montello, and I'm
2 with the Office of Conflict Prevention and Resolution
3 with the Department of Energy.

4 MR. GORDON: Wade Gordon, DOE's Office of
5 Hearings and Appeals.

6 MR. FEIN: Steve Fein. I'm also with the
7 Office of Hearings and Appeals.

8 MR. ROSENSTOCK: Steve Rosenstock, Edison
9 Electric Institute and member of ASRAC 90.1.

10 MS. COUGHLIN: Katie Coughlin, Lawrence
11 Berkeley National Lab.

12 MS. ANDERSON: Mary Anderson, PG&E.

13 MR. CYMBALSKY: Okay. Great. I know we
14 also have some people on the webinar. How many we
15 got today, Emily?

16 EMILY: We have 18.

17 MR. CYMBALSKY: So, I'm trying to get all
18 our members here. So, I know Andrew hasn't arrived
19 yet, Andrew deLaski. Is Mark Terzignini on the
20 webinar?

21 EMILY: No.

22 MR. CYMBALSKY: Okay. All right. We have

1 a few MIAs, but the show must go on. Okay.

2 I'm going to say a few words about the
3 introduction and what the role of the group is and a
4 few process issues.

5 So, most of you are familiar with the
6 building, but for those of you who are not, we're in
7 a big square right here in this building. At each
8 corner of the square, you'll find restrooms for your
9 convenience. In case there is an emergency, we're
10 going to go out the room, make a left, and then we're
11 going to go down the stairs and we're going to get
12 eight floors of exercise to evacuate.

13 Also, on the ground floor you probably
14 know there's a coffee shop and a Subway, and there's
15 also access to the DOE cafeteria when the time comes
16 for lunch.

17 And so, Andrew, if you want, just
18 introduce yourself for the record.

19 MR. DELASKI: Andrew DeLaski, Appliance
20 Standards Awareness Project.

21 MR. CYMBALSKY: Okay. Thank you.

22 Okay, so the purpose of today's meeting

1 we're going to go over a brief overview of what ASRAC
2 is. We're going to do a brief discussion on the
3 background of the rule. Our mediators will give us
4 an overview of the negotiation process. We're going
5 to go through the ground rules and establish what the
6 ground rules are.

7 We're going to also go through and
8 schedule the rest of our meetings through June, and
9 at the same time we hope to identify what the key
10 issues are in the working group so that we can best
11 schedule these meetings because if we know there's 10
12 issues instead of 5 issues I think we're going to
13 have to be a little more diligent on our scheduling.

14 And then if time permits, and I hope it
15 does, you'll see some very detailed slides about our
16 analysis that was part of the NOPR. We understand
17 there's been some meetings amongst industry and the
18 environmental stakeholders on key issues that they
19 found in the NOPR. So, it is DOE's hope that a lot
20 of these may have been worked out a head of time so
21 that we can hit the ground running, so to speak, but
22 I know there's also a few members who weren't a part

1 of those negotiations. So, we'll have to discuss
2 those as we go through.

3 Okay, so as I said in my opening remarks,
4 this working group was chartered by ASRAC in March.
5 DOE formed the ASRAC back in 2012 to further improve
6 the process in establishing standards. We've been
7 pretty successful to date. We've had I think about
8 four or so rulemakings that have gone through the
9 process. All, in my opinion, have been very
10 successful. I think that you'll find, as we go
11 through this, that this process lends itself to more
12 real time back and forth between DOE and the
13 stakeholders, which is something people have
14 expressed to me that is very important to them. So,
15 I hope we do get that back and forth. We do get a
16 lot of data sharing from everyone in the room. It's
17 very important for the rulemaking.

18 Just to point out that ASRAC is solely
19 advisory in nature, so whatever this working group
20 decides will be floated up to ASRAC, the parent
21 committee. And Andrew deLaski is the ASRAC member on
22 this working group, so he'll be -- so, Andrew will

1 fill in the ASRAC Committee as we go through.

2 Typically, it's worked out that the
3 working group's recommendations have flowed through
4 all the way through ASRAC and to DOE in the form of a
5 Notice of Proposed Rulemaking. This one is a little
6 bit of an odd duck in my mind in that both of these
7 products already have proposals out on the street.
8 So, you all have the benefit or not the benefit of
9 knowing that DOE thinks about these products, but
10 notwithstanding that, we're here to negotiate just
11 like everybody else in the room. So, we have an open
12 mind going into these proceedings.

13 As we go through, we'll be doing -- and
14 this is more process stuff, but we'll be taking votes
15 on the key issues. Once we establish what quorum is
16 for the group and what consensus is for the group,
17 the voting then becomes very important on how we
18 resolve issues that are presented and that's where
19 the real negotiation will start to take place.

20 If things aren't going well, DOE can opt
21 to withdraw the task from the group and ASRAC can as
22 well. We hope that's not the case. We really do

1 want to see this through and get to a good point;
2 however, if we don't get to a point of a
3 recommendation to ASRAC, DOE will go forward with the
4 NOPRs that you've seen, then take them to final
5 rules. However, everything done here is in the
6 public record and in the administrative record for
7 these rulemakings and so, obviously, DOE will enter
8 anything here into the dockets and administrative
9 records for those rules. So, even if we don't get to
10 a yes, I still believe lots of good work will be done
11 inside this working group.

12 Okay, so at this point we have a bunch of
13 slides on the work that our facilitators do. So, I
14 don't know if you want to take this at the podium or
15 take it from there and I can flip the slides.

16 MS. HOFFMAN: We'll just do it quickly.
17 We did our infomercial before. We can flip to the
18 next one. It's just that we've done more than 50 of
19 these and we're kind of pleased that we were the very
20 first negotiated rulemaking in 1983, long time ago.
21 I just said that we've been doing this for quite a
22 while and have more than 50. Okay, we can keep going,

1 and I'd just mention that the last one was
2 manufacturing housing.

3 We're assuming all of you are familiar
4 with negotiated rulemaking, but if you're not it's
5 basically a process where the parties that are going
6 to be regulated by the rule get a chance to actually
7 say what they think and the agency that's involved in
8 making the rule can hopefully have a better rule
9 because it has all the information and all of the
10 insights before promulgating the rule. And we can go
11 to the next one.

12 (Slide.)

13 MS. HOFFMAN: And as you heard just a few
14 moments ago from John Cymbalsky, if it doesn't work
15 of course the agency can go ahead and promulgate the
16 rule as it wishes, but we've been pleased to see that
17 most of the time the rule that actually comes out in
18 the draft enriched by all of the input from the
19 committee.

20 (Slide.)

21 MS. HOFFMAN: This just says why we're
22 doing it. Okay. And now I'm just going to turn

1 quickly to what's a facilitator. Have you all worked
2 with facilitators before? Okay, so we're kind of in
3 between. We don't want to strong arm you. We're not
4 totally laissez-fair because we really want you to
5 work toward a deadline to reach a resolution that
6 you're happy with.

7 (Slide.)

8 MS. HOFFMAN: This just gives us a
9 statutory in the Negotiated Rulemaking Act basically
10 says hopefully you're hire us. We're being hired by
11 the Department of Energy, but we do serve at your
12 pleasure. And we basically work with you, and one of
13 the things we're going to try to do today is define a
14 quorum, work on ground rules and define what
15 consensus is.

16 This looks a pretty well behaved group,
17 but the orderly kind of discussion. We've seen
18 passions that get involves, so if you want to speak
19 this is sometimes a good idea so we can make sure
20 everyone's heard.

21 (Slide.)

22 MS. HOFFMAN: And then this just says all

1 the things we do. You'll let us know if we're doing
2 all of them, hopefully, well. We even talk to people
3 off side to see if there are some issues that need to
4 be addressed, but haven't been. We'll be putting
5 them in what's called "the parking lot," which means
6 we get to them, but maybe not if they're not part of
7 the agreed upon agenda.

8 (Slide.)

9 MS. HOFFMAN: And then you see the color
10 with body language like this (indicating). We watch
11 that's why we try to do this pairs. If somebody's
12 very negative, we try to find out why. It could be
13 something they eat you know downstairs here, but it
14 might be something that's more important, so we do
15 try to do that. And when the process breaks down, we
16 work on the substance. When the substance breaks
17 down, we work on the process. And when in doubt, we
18 take a break.

19 (Slide.)

20 MS. HOFFMAN: And then our obligation as
21 neutrals is by entering the process we're obligated
22 to provide a fair and impartial -- we have a concern

1 and an interest in energy, but we have no stake in
2 this rule and we're here to help you make the best
3 one you can.

4 (Slide.)

5 MS. HOFFMAN: And then just some comments
6 for the participants. By entering the process, in a
7 sense, you're agreeing. And there was a whole
8 convening stage we weren't a part of that John and
9 his staff probably spoke to you about to be members
10 of this committee in good standing, both you and your
11 alternates, and so we'll be sort of harking back you
12 know why did you commit to all this time? Well, for
13 a good reason. Thank you.

14 (Slide.)

15 MS. HOFFMAN: And this just sort of shows,
16 in a sense, a pictorial of what we're doing, the
17 committee over here, the mediator. Technical
18 advisors we have some over here the DOE has worked
19 with. And the stakeholders who aren't present we're
20 very aware that you all have constituents. You're
21 representatives of groups behind you and we know that
22 in between the meetings you may be talking to them

1 and getting some more guidance and advice, and the
2 stakeholders who are present, and our public as well.

3 (Slide.)

4 MS. HOFFMAN: And this just talks about
5 the first meeting. And the hope is that in this
6 meeting we're setting the stage. We're negotiating
7 the protocols, which are the ground rules. We're
8 talk about subsequent meetings and how we'll
9 communicate between meetings. And here it'll be a
10 very compressed schedule. And then if we need
11 smaller working groups, we'll develop those as well.
12 And then this is actually what you heard from John
13 already with his agenda.

14 (Slide.)

15 MS. HOFFMAN: And then just your
16 responsibility. We hope by -- you know, what is it,
17 98 percent as being there? You're here already, so
18 you've, in a sense, said yes. But we hope that you
19 and your alternate will be fully briefed on what's
20 going on so that you can be a participatory member.
21 And then just decision-making and we'll get to that,
22 how we're going to make decisions here. I think

1 that's it.

2 MR. BANTLE: Good morning everyone.

3 MR. CYMBALSKY: We're making record time,
4 so either nobody's had enough caffeine yet or I don't
5 know. Okay, so the negotiation process this is just
6 an overview of what we've all agreed to here. So,
7 you know, first of all, there is the DOE's need for
8 full compliance with the statutory mandate, so
9 everyone needs to keep that in mind as we go.

10 The key here is we're mandated to
11 establish minimum energy efficiency standards that
12 are technologically feasible and economically
13 justified. And we want everyone in the room to walk
14 into it with the idea that they support a consensus
15 rulemaking effort. If you don't, you know I ask you
16 to recuse yourself now. We don't want someone here
17 who doesn't have this goal in mind. It's not why
18 you're in the room. And if you're here for a
19 different reason, the door's over there. Honestly,
20 we really want this to work.

21 DOE will consider the consensus of the
22 working group moving forward, as I mentioned before.

1 Whatever comes out of this group goes to ASRAC for
2 vote and then gets passed to DOE. We have a 100
3 percent acceptance rate thus far and there's no
4 reason to believe that this one's any different.

5 Again, good faith negotiations, so if
6 you're not here in good faith, again, you know we've
7 had other negotiating committees where I'm not sure
8 everyone was there in good faith. And when that was
9 experienced, it wasn't pleasant for anybody in the
10 room and things just don't go well at point.

11 We ask everyone that's here to make a good
12 faith effort to provide whatever data they can. We
13 understand that some data is business sensitive and
14 companies won't want to provide that, but to the
15 extent you can under NDAs or other means we think the
16 data that exists or could exist will go a long way to
17 getting us to a good point and a good place for
18 consensus for the working group.

19 And from DOE's point of view, you could
20 see our technical experts are here. We, in good
21 faith, will provide every means necessary to do any
22 analysis that makes sense for this working group to

1 move it forward. So, DOE has provided that technical
2 expertise and we will, as we go through this, do our
3 best to do the analyses that is asked for by the
4 working group.

5 And I guess the white elephant in the room
6 is the June 15 date, right? So, we know we don't
7 have a lot of time here and it is two products and
8 one negotiating committee, so it's daunting but I
9 don't think it's something we can't achieve as a
10 group. I think, again, the meetings that have been
11 held previously have probably gotten us a lot of the
12 way where we need to get.

13 And I'll pause. I see a question.

14 MR. ROSENSTOCK: It's Steve Rosenstock,
15 Edison Electric Institute.

16 In the publication and federal notice
17 there was the information about the June 15 deadline.
18 Just as an observer, I was wondering with other
19 negotiated rulemakings they were allowed to go over
20 several months and this one you're only allowing six
21 weeks. Could you describe why there's such a quick
22 deadline for this negotiation?

1 MR. CYMBALSKY: Sure. ASRAC required it,
2 simple answer, at the charter meeting.

3

4 MR. ROSENSTOCK: Okay. Thank you.

5 MR. CYMBALSKY: Yes. Okay, so we've kind
6 of covered these already, but the key issues for this
7 working group, again, data, data, data. I won't say
8 it enough. Any and all data that could possibly help
9 inform the rulemaking we definitely are accepting of
10 that and will do whatever extra analysis we need to
11 to work this data into it.

12 We think there are some synergies out
13 there that can be gained by combining these two
14 products into one rule. Compliance dates, obviously,
15 if a manufacturer is making a rooftop unit that has a
16 furnace and air conditioners obviously it makes sense
17 to line those two up. So, DOE agrees with that. I
18 think ASRAC was very clear about that being a viable
19 option.

20 Then, of course, the standards are a key
21 part of this. I should say what's not on the table
22 here is the test methods, and I think that was very

1 clear in the charter to this group. So, please try
2 as best you can not to drag that into this. Any
3 updates to the test method will be down the road, but
4 they won't be part of this proceeding because we'll
5 never finish by June 15. I think we could all agree
6 to that.

7 These are the EPCA Factor. So, I
8 mentioned the statutory requirements. I'm not going
9 to go through this. This is old hat for most of us,
10 but we still need to do this. Even though this is a
11 negotiation, this stuff doesn't just go away. We
12 will be going through all this analysis based on the
13 input and the data we get from this group.

14 Okay, so we are making really good time.
15 We really are way ahead of schedule, which is good.
16 I expect the Ethics briefing in about three or five
17 minutes, but we might as well go through the first
18 slide.

19 (Slide.)

20 MR. BANTLE: Okay. As John and Eileen
21 have referenced a couple of times -- and again, I'm
22 Ted Bantle. One of the major things we have to do

1 today is establish some ground rules for this working
2 group.

3 Just a few considerations, first of all,
4 what's the role of alternates going to be. We have a
5 few alternates there today. Will alternates be
6 voting members? Will they not be voting members?
7 How will they be address you know during the meeting?

8 Second, participating, what is the role,
9 not only of the alternates, but of the public? Can a
10 member of the working group bring in individuals from
11 the public to speak? You know can we hand the floor
12 to them? One of the big questions, quorum and
13 consensus, what are we defining consensus as? As you
14 see on the slide, if the group does not define
15 consensus, the default is unanimous. So, that's
16 something we'll come back to.

17 All right, let's go a little bit through
18 consensus and then we can come back, probably after
19 the Ethics presentation, and actually outline some
20 ground rules.

21 MR. CYMBALSKY: He's here now.

22 MR. BANTLE: Okay, then this is a perfect

1 time before we go into consensus. So, we'll
2 transition over to Ethics.

3 MR. GORDON: Good morning. My name is
4 Wayne Gordon. I work for the designated agency
5 Ethics official for the Department. Her name is
6 Susan Beard. One of the things that our office does
7 is provide advice to designated federal officers
8 regarding their responsibilities in running FACA
9 committees. And today I'm just going to briefly go
10 through what the process is for FACA and how FACA
11 works, and in particular, talk about your roles and
12 responsibilities.

13 And briefly, FACA is a set of rules and
14 laws that came into affect in the mid to late
15 seventies to address concerns about people having
16 unauthorized access to government officials and
17 having undue influence on the process of developing
18 policies, regulations, and rules.

19 The FACA rules are really sunshine rules.
20 They're basically notice giving people the
21 opportunity to be heard and they're oriented towards
22 trying to ensure that fair viewpoints are being

1 brought to the government and that those viewpoints
2 are being represented in the rules and laws that are
3 made up through the federal agencies.

4 In this case, you are all part of a
5 working group for a parent committee, which is called
6 the Appliance Standards Rulemaking Advisory
7 Committee. That parent committee has both special
8 government employees who are actual federal employees
9 and it has representatives on it as well.

10 Now, in your role as a working group
11 member, you're on a working group which is considered
12 a subcommittee to the parent committee. So, all of
13 your recommendations and what you come through with
14 your working group activities today at some point in
15 the future that will come before the full committee
16 for a vote. And at that point if your
17 recommendations are acted on and voted in, then those
18 will be passed back to the Department and those will
19 be part of the Department's process of implementing
20 potential rules.

21 As representatives, unlike special
22 government employees, you're not subject to any

1 federal conflict of interest rules. And in fact, the
2 way that the working groups are supposed to act is
3 that you are supposed to be representing the
4 viewpoints of the organizations that you've been
5 appointed from. So, from that perspective, our
6 office when we're advising John on how to deal with
7 potential conflicts, unless there's a serious issue
8 where somebody is specifically oriented and basically
9 espousing the viewpoint of a particular one institute
10 instead of a group or representative manner, unless
11 that's occurring in the working groups our office is
12 not concerned about the conflict of interest issues
13 because you're presentation and what you'll come up
14 with as a product today will be voted on by that
15 parent committee and they'll have the opportunity to
16 either agree with or discount whatever opinions come
17 out of this working group.

18 So, from the conflict of interest
19 prospective, we're not worried about it, but we did
20 want to make sure that you're aware that there is a
21 conflict of interest rules out there. And the
22 conflict of interest rules for the special government

1 employees who are federal employees are that they're
2 not supposed to act on matters in an official
3 capacity that could affect their personal financial
4 interest.

5 And as representatives, we're not worried
6 about that. We bring you in here to represent those
7 viewpoints that are important in the rulemaking
8 process. This kind of FACA committee has only been
9 in existence for about two years now, so we are still
10 at the initial stages of trying to make sure that the
11 process is working out correctly.

12 I don't know. Is this the fifth or sixth
13 meeting?

14 MR. CYMBALSKY: I think it's the fifth
15 working group.

16 MR. GORDON: Yes, fifth working group.
17 And we've got a couple more coming up over the next
18 couple of weeks, and I do the same kind of briefing
19 for them.

20 If there are particular conflict of
21 interest issues that you're concerned about, you
22 should address those with John. And John will call

1 me and he'll say, Wayne, here's something one of the
2 working group members brought to my attention. Is it
3 something we have to be concerned about? And I will
4 do any research that's necessary and give advice
5 according, but if you think there's something going
6 on that is corrupting the process in any way, bring
7 that to John's attention and he'll be consulting with
8 me about it.

9 Are there any questions about conflict of
10 interest rules or how the FACA process works here?
11 Okay. Thanks very much.

12 MR. BANTLE: So, back to consensus. So,
13 first of all, what is consensus? There are a number
14 of definitions. The one we like to use at FMCS kind
15 of has three parts. First, it's a group
16 decision-making process. We'd like to see that
17 everyone's heard, that there has been discussion,
18 that everyone's concerns are raised, and the decision
19 might not be everyone's first choice, but it's one
20 that everyone can live with.

21 So, we're trying to get a solution that
22 may not be everyone's first choice, but it's

1 something that everyone can live with and it meets
2 the interests of all parties. And interests are
3 really your needs, concerns really in the background,
4 whereas a position is simply a proposed solution to a
5 problem.

6 So, how are we going to reach consensus?
7 First, we're going to ask questions. You're going to
8 raise doubts. You're going to raise your concerns
9 and you're going to offer alternatives. And offering
10 alternatives is probably one of the best ways to work
11 towards consensus. We have a term we often use, and
12 Eileen and I might throw it out at some point during
13 this facilitation, which is that of a blocker. It's
14 the individual who's saying no.

15 So, first of all, you have to explain why
16 you're saying no, and you have to offer an
17 alternative solution. So, those are the kinds of
18 rules and responsibilities of the blocker. The
19 blocker is a strong person to have to help us reach
20 better consensus, but you can't simply say no. You
21 have to provide a reason and an alternative.

22 So, how do we like to test consensus?

1 First of all, you can kind of break it down into five
2 stages, but it's a lot easier to think about it in
3 three: thumbs up, I'm okay with this; thumbs
4 sideways, I'm not quite sure. Maybe I have a
5 question? Maybe there's a clarification. Maybe I
6 just spaced out for a second and need to have the
7 consensus check again; thumbs down, you're a blocker.
8 Remember explain why your thumb's down. Maybe it's a
9 question. Maybe it's a clarification. Or if it's
10 really a strong concern, propose an alternative.

11 So, throughout this process, we may do two
12 different types of consensus checks. First one might
13 be a temperature check. We haven't reach -- you know
14 we're just in the midst of discussion. This might be
15 a check for understanding. Is everyone on the same
16 page here? Does everyone understand the basic
17 concept we're talking about? And then we will have
18 final consensus checks, which will be a bit more of a
19 formal process. We will record the results of those
20 consensus checks.

21 So again, responsibilities of the blocker,
22 consensus -- we can skip through the statutory role

1 of consensus, but in this rulemaking process we are
2 urged to use this consensus process and define what
3 we see as a working group consensus to be. And I do
4 say "we." Eileen and I are just here as
5 facilitators, as she mentioned. You know we're not
6 part of the working group itself. And if consensus
7 is not reached, as John said, you know the Department
8 is willing to go forward with their Notice of
9 Proposed Rule.

10 So, we can go back to the ground rules in
11 the beginning. And Eileen if you could help me out,
12 I see we do have a flip chart, although we don't have
13 any markers it appears. So, thinking about ground
14 rules, I guess the first question if we're going just
15 down the list here is the role of alternates. Any
16 thoughts from the group on the role of alternates --
17 and John, feel free to speak up. I know you have
18 experience with other DOE groups. That might be a
19 good place to start as a baseline.

20 MR. CYMBALSKY: So, this is John from DOE.

21 In the past, we allowed alternates on the
22 working group. We understand that folks can't always

1 make every meeting, but from my point of view if
2 someone's going to be an alternate it's fine. We
3 don't want the alternate to just become the member.
4 I know that's happened in the past as well, so we
5 want the primary person to make every attempt. So,
6 we don't want the majority of meetings attended by
7 the alternate, but personally, I don't personally
8 have an issue with having alternates. I don't know
9 if anyone else feels differently.

10 MR. HURST: I agree, John. I think when
11 we get to the scheduling portion, based on the
12 compressed timeframe that we have it may be a good
13 idea to have alternates, but I agree that the primary
14 should make every effort to be here.

15 MS. HOFFMAN: Just a note, because this is
16 being recorded --

17 MR. HURST: John Hurst from Lennox.

18 MS. HOFFMAN: -- just let everybody know.
19 Thank you.

20 MR. FERNSTROM: Gary Fernstrom. I'm
21 representing the California IOUs. As an alternate,
22 and having participated in previous working groups, I

1 recommend we accept alternates.

2 MR. DELASKI: This is Andrew DeLaski. It
3 seems to me that -- I agree with the notion of having
4 alternates, but it seems to me that people should
5 designate their alternates. So, there should be
6 designated alternates. It shouldn't be whoever I
7 sent this time around. And every organization group
8 who wants to have an alternate should say who that is
9 I would say at this meeting or soon after this
10 meeting so that we don't have someone showing up at
11 the third meeting who missed the first two and they
12 weren't briefed, right, so that could be completely
13 disruptive if we have someone parachute in who wasn't
14 fully briefed.

15 And I think by having a designated
16 alternate that would incent organizations to keep
17 their alternate fully briefed and in the loop.

18 MR. CYMBALSKY: I agree -- this is John
19 from DOE. And I think the way it worked in at least
20 one of the groups the alternates and the main member
21 often came together to meetings, or they were on the
22 webinar. So yes, I fully expect that the designated

1 alternate be fully plugged in to the process as we
2 move through.

3 I don't think we need to carry this out
4 too long, unless anyone has a concern with that I'm
5 getting the feeling from the group that we should
6 allow alternates as long as they're designated ahead
7 of time.

8 MR. DELASKI: I'd just ask the question
9 then just from a process point of view do you want to
10 ask the people to give their alternate by a certain
11 date or today.

12 MR. CYMBALSKY: Yes.

13 MR. DELASKI: I also would ask the
14 question of -- so then the presumption then is
15 alternates can vote? Is that what we're saying?

16 MR. CYMBALSKY: I think that's right.

17 MR. DELASKI: Okay.

18 MR. CYMBALSKY: Whoever wants to designate
19 an alternate why don't we all strive for submitting
20 them by the end of the week to me and the ASRAC
21 mailbox?

22 MS. HOFFMAN: Do you want to make a

1 resolution?

2

3 MR. BANTLE: Should we go through because
4 we haven't defined consensus yet. We'll go through
5 to the end and then we can do a list -- go over the
6 whole list.

7 MS. HOFFMAN: Okay. But to summarize, it
8 sounds like, and we'll go back. And I'm getting a
9 general sense of, yes, alternates by a certain date,
10 by the end of this week. They can vote. They should
11 be designated and fully briefed. Does that capture?

12 MR. CYMBALSKY: Yes.

13 MS. SHOWS: This is Mike Shows with UL. I
14 agree with what everybody said. I think that beyond
15 that the alternate should make every attempt to
16 attend at least via webinar so that they are fully --
17 as you said, fully briefed there, but I think that
18 that attendance portion is important.

19 MR. SACHS: This is Harvey Sachs. There
20 is one remaining ambiguity. The alternate may vote
21 in the absence of the committee working group member,
22 not in addition to.

1 MS. HOFFMAN: Right, vote only once.

2 Right.

3 MR. FERNSTROM: So, this is Gary for the
4 California IOUs again. At least in our case, we work
5 closely enough together that I don't think it's
6 necessary the alternate be on the webinar every time
7 the appointed member is actually in Washington.

8 MS. HOFFMAN: Okay. I'm sorry. Who is
9 it, Gary?

10 MR. FERNSTROM: Yes.

11 MS. HOFFMAN: Your comment was that?

12 MR. FERNSTROM: My comment was I don't
13 think it's necessary the alternate be on the webinar
14 every time the appointed member is at the meeting in
15 Washington. We coordinate closely enough together
16 that we know what's going on.

17 MR. CYMBALSKY: Right. So, this is John
18 from DOE.

19 We're all acting in good faith here,
20 right? So, the good faith here is that if, in fact,
21 you meet after the meeting and you're fully briefed
22 you know that to me serves as a proxy for that. It's

1 not a requirement. All we're saying is make your
2 best effort to be plugged into the proceedings.

3 MR. DOPPEL: Paul Doppel with Mitsubishi.

4 And kind of following in Harvey's thought,
5 which is a dangerous place to go, but wanted to make
6 sure that we understand present to vote and no
7 over-the-phone votes. We haven't defined that, so
8 that might be a --

9 MR. CYMBALSKY: Right. You'd need to be
10 in the room or -- I think on the webinar is fine by
11 me as a vote.

12 MR. BANTLE: Thoughts from the group on
13 being able to vote from the webinar.

14 MR. CYMBALSKY: To me, the webinar is the
15 meeting. You know I don't see that different. If
16 you're like in a foreign country and you're not
17 actually on the webinar and you're just emailing me,
18 I don't think that counts.

19 MR. FERNSTROM: Again, this is Gary. I
20 guess I should be careful speaking because I'm an
21 alternate and not yet officially authorized to work
22 with the group I guess, but on account of weather and

1 other travel-related constraints sometimes the
2 primary member is not going to be able to make it.

3 MR. BANTLE: So, the general idea that to
4 vote you have to be in the room or in the webinar.

5 Okay, moving on, participation -- this is
6 a quick one -- of nonworking group members how to
7 bring them in. Do we have a process? Can any
8 working group member you know pass the mike or give
9 the floor to a member of the public, thoughts on that
10 from the working group? Do we want to set a time
11 limit on that discussion or a process for bringing in
12 outside individuals?

13 MR. FERNSTROM: Gary for the California
14 IOUs.

15 I've found in working in these groups that
16 frequently comments and thoughts from the audience
17 are very valuable to the process, so we should allow
18 that.

19 MS. WALTNER: I was just nodding in
20 agreement with Gary.

21 MR. BANTLE: Not a problem. And do we
22 want to set out any structure for that process, a

1 time limit, a process for nominating individuals, or
2 just see how it goes?

3 MR. SACHS: This is Harvey Sachs, ACEEE.

4 I think a number of us have been in
5 multiples of these things and have found that the
6 commitment to courtesy is meant that this was an easy
7 flow of useful and interspersed comments from
8 outsiders, from non-working group members as they
9 came up and everybody was well behaved about it, so
10 I'm not sure we need any rules.

11 MR. BANTLE: That works?

12 MR. DELASKI: This is Andrew DeLaski.

13 I guess I just would also say that I'm
14 counting on -- that I think we're counting on you, as
15 the facilitator, to ensure that no one monopolizes
16 too much time, right? You know I think we have
17 facilitators here, in part, to manage that process so
18 that we don't get someone who's standing up 15 times
19 to read the phone book or something.

20 MR. BANTLE: And we will do that. We'll
21 make sure to do that.

22 Okay, moving on, quorum. I believe the

1 working group is 15 members. In the past, our past
2 experience we set a quorum at 12, 75/80 percent.

3 Suggestions from the group?

4 MR. MCCRUDDEN: This is Charlie with
5 ACEEE.

6 And I want to go back to the alternate
7 before we get going too far.

8 MR. BANTLE: Okay.

9 MR. MCCRUDDEN: Is there a difference then
10 between an alternate who may vote for you and a proxy
11 vote that you may hand over for a specific meeting or
12 a specific time period to another voting member?

13 MR. CYMBALSKY: Yes, that is very
14 different. Yes. So, we're not going to allow proxy
15 votes. Normally, we don't allow that.

16 MR. MCCRUDDEN: Have you ever allowed
17 proxy votes at least?

18 MR. CYMBALSKY: No, we have not.

19 MS. HOOTMAN: Jill Hootman, Trane.

20 You're defining proxy different than just
21 an alternate that is there engaged in the meeting.
22 Okay.

1 MR. CYMBALSKY: Right. A proxy vote, in
2 my mind, the way Charlie described it was I got to go
3 to the bathroom. Bob, when they vote, vote yes for
4 me.

5 MS. HOOTMAN: Got it.

6 MR. CYMBALSKY: Yes.

7 MS. WALTNER: In the pumps negotiation,
8 there was one time when there was massive flight
9 delays, I believe, and people were calling in --
10 members were calling in on their way and I think we
11 ended up doing some proxy votes during that time for
12 members that had been on the phone and then emailed
13 their votes into us. So, there was one time when we
14 did it briefly. I don't know if you want to allow
15 that here or wait until -- hopefully, there won't be
16 massive flight delays.

17 MR. CYMBALSKY: You know from my point of
18 view ^^^^ this is John again from DOE.

19 So, I know the parent ASRAC committee when
20 we had a couple members who couldn't make it they had
21 sent me an email of their vote and I read the email
22 on the record for the record. You know if we get

1 into that situation to me that's different than me
2 just telling Bob to vote yes because I don't -- you
3 know not that I don't trust Bob. I do. But you know
4 I think it's a little different, in my opinion, but
5 you know I don't have a strong opinion. I think
6 everyone here is on the up and up for getting this
7 done, so you know.

8 MR. DELASKI: Andrew DeLaski.

9 My preference would be to not officially
10 sanction proxy votes. I think that in the event that
11 something like this happens then you manage it in
12 that moment. You know if it's a close -- I suspect
13 it wasn't a close issue, right? If it was a close
14 issue, I wouldn't want to be handling a close issue
15 with people emailing things in from the airport. And
16 I told Bob yes, but he said no by mistake. You know
17 that's what you don't want to have happening and I
18 think that's the risk you take if you sanction it. I
19 would say better not to sanction it. If we run into
20 a situation where people are stuck in an elevator or
21 whatever then you work it out.

22 MR. MCCRUDDEN: This is Charlie with ACCA.

1 I raised it because I think that's with
2 the compressed time schedule that we have -- and I
3 have a sense that when we come to the calendar we're
4 going to find that -- you know like I know
5 specifically one week in May when I can't be here and
6 I have no alternative option because my alternatives
7 won't be here either because we're all somewhere
8 else. And I recognize that this situation -- the
9 elevator situation too is -- so you're saying that
10 you would not exclude the potential for a situation
11 where we could --

12 MR. DELASKI: Let us know where you're at,
13 Charlie. You know that Charlie's got big concerns
14 about this, communicate that to the group, but you're
15 not going to get to vote I guess is the thing, but
16 the group would be doing it with knowledge that you
17 had an issue, right?

18 MR. MCCRUDDEN: Sure.

19 MR. DELASKI: And that would be --

20 MR. MCCRUDDEN: So, you're reserving that
21 possibly that this could occur.

22 MR. DELASKI: Right. Yes, you would

1 communicate with us.

2 MR. BANTLE: Eileen, did you capture that
3 discussion?

4 MS. HOFFMAN: Yes. I just want to make
5 sure.

6 MR. BANTLE: And you might want to come
7 back to it.

8 MS. HOFFMAN: A proxy vote not allowed,
9 but that may be too definitive here, but it sounded
10 like that was what I was hearing; but that doesn't
11 preclude communication, concern and other things.
12 Was that what I heard?

13 MR. BANTLE: Charlie, I think you're
14 coming from a different point there.

15 MR. MCCRUDDEN: This is Charlie with ACCA.
16 I guess the sense I got was that we're not
17 going to official allow proxies, but that if
18 circumstances arose and if it was communicated in a
19 way it would be allowed. So, we're not actually
20 saying on proxies. We're saying we don't essentially
21 have a proxy policy or maybe we're saying we have a
22 proxy policy, but that it could have certain

1 exceptions.

2 MR. BANTLE: And Andrew is what you were
3 saying that the concerns of the individual who wasn't
4 present would be addressed, but the individual still
5 would not have a vote?

6 MR. DELASKI: Right. That's what I was
7 suggesting.

8 MR. BANTLE: Okay.

9 MR. DELASKI: You know I think that it
10 gets to -- we're going to get the consensus here in a
11 few minutes, right, but if we're going to get to a
12 rule proposal that's going to -- I mean our consensus
13 definition and we know Charlie's got big issues, then
14 it would've been good as a vote, even though
15 officially we're not letting you vote, right, since
16 you don't -- slippery slope of proxies.

17 MR. BANTLE: Any other comments from the
18 group?

19 MR. DOPPEL: Paul Doppel, Mitsubishi.

20 So, I think what everyone is saying is
21 that it's not really proxy voting that we're talking
22 about, but special voting during extenuating

1 circumstances is more what we're going to --

2 MR. CYMBALSKY: Right. So, I'm hearing
3 two different scenarios, the one is you know the
4 weather turned bad and everyone was at the airport
5 and they're communicating via email their vote. To
6 me that's not a proxy. I'm reading their votes,
7 right, and they're entered into the record versus you
8 know Charlie's disappears to Hawaii in May and before
9 he left he told Bob to vote no on everything. You
10 know, to me, that's the proxy that we're trying to
11 avoid.

12 MR. MCCRUDDEN: This is Charlie with ACCA.
13 And for the record, it is Asheville, North
14 Carolina.

15 MR. CYMBALSKY: Well, that's a nice place.
16 I want to go there.

17 MS. HOFFMAN: Well, let me just summarize.
18 Special voting during an extenuating circumstances
19 will be decided on a case-by-case basis or just -- I
20 don't know. I'm just trying to figure out how to
21 capture what's been said. Proxy voting will not be
22 allowed, but special voting during extenuating

1 circumstances; is that what I'm hearing?

2 MR. CYMBALSKY: Yes.

3 MS. HOFFMAN: Okay.

4 MR. BANTLE: Thank you, Eileen, for
5 capturing that.

6 Okay, moving back to quorum, I had thrown
7 out the suggestion, based on our previous working
8 group, of a quorum was 12 out 15. Paul informed me
9 that I was incorrect. We have 17. So, just kind of
10 working with that, any suggestions from the group on
11 defining quorum?

12 MR. CYMBALSKY: This is John from DOE.

13 So, quorum is just the number of people we
14 need to have a meeting so it's an official meeting.
15 And so we want to be careful here with what we
16 decide, but generally, 75 to 80 percent for the full
17 ASRAC.

18 MR. FERNSTROM: So, this is Gary.

19 Members on the webinar are considered to
20 be present?

21 MR. CYMBALSKY: Yes.

22 MR. HURST: This is John Hurst with

1 Lennox.

2 I don't see any reason to deviate from
3 what's been successful in the past, so if that's the
4 guideline I think that's what my opening position
5 would be.

6 MR. CYMBALSKY: I mean I would just throw
7 out 75 percent or more. I know we don't have a
8 number of people that'll equal 75 percent.

9 MR. DELASKI: So, let's do the math so we
10 know what we need, right? So, 75 percent -- where's
11 an engineer?

12 (Laughter.)

13 MR. BANTLE: So, that would 13, including
14 members that are on the webinar.

15 MR. CYMBALSKY: So, not less than 13?

16 MR. BANTLE: Yes.

17 MR. CYMBALSKY: I think we should probably
18 just go with 12 just because it's actually some
19 fraction of it, but it could be a problem getting 12
20 people -- well, maybe not with the number of
21 meetings, but if it goes on longer that would be a
22 problem.

1 MR. DELASKI: But the concern I would have
2 is you know if we have a participant or two who
3 decides you know this actually wasn't really worth my
4 time after all and they just start not showing up,
5 then we have a quorum problem. So, that's the one I
6 think that concerns me is if we've got 17 you know if
7 there's the potential that someone just drops out and
8 doesn't actually resign, then we could deal with it
9 then.

10 MS. HOFFMAN: Then do you want to go with
11 12 rather than 13?

12 MR. DELASKI: Seventy and a half percent.
13 I'm fine with 12.

14 MR. CYMBALSKY: Okay. Fine.

15 MS. BANTLE: Twelve, including webinar
16 members.

17 MS. HOFFMAN: Right.

18 MR. BANTLE: Okay, next thing on the list
19 is consensus, thoughts on consensus. Previously,
20 again, going with what we've worked with in the past,
21 we had no more than three no votes on a vote, and
22 that's out of the quorum the amount of people that

1 can vote on that day, not out of the total group,
2 thoughts on that? So, a fourth no vote would be no
3 consensus.

4 MR. CYMBALSKY: So, this is John from DOE.

5 So, the way we've done it in the past with
6 voting, so we just looked for "no's." We didn't
7 actually have to vote yes. So, this is a very
8 important distinction. You know to get that four
9 people they would absolutely have to say no. An
10 abstention in this case does not count towards that
11 number. So, to me, that's important. And remember
12 the rules. If you vote no, you have to say why and
13 you have to offer what your solution path to a yes
14 is.

15 So, from my point of view, you know I
16 think this is a good going in position, but you know,
17 obviously, this is very important, the most important
18 vote you'll have today maybe.

19 MR. FERNSTROM: So, this is Gary.

20 Just an observation, looking around the
21 room it looks to me like we've got individuals that
22 are environmental advocates here, if you include the

1 California Utilities in that, and it would take
2 unanimity among the advocates to block in order to
3 get four votes. I forgot Harvey. I'm sorry. That
4 changes my comment and the perspective. Thank you.

5 MR. BANTLE: Any other comments from the
6 working group on consensus?

7 MR. STARR: I was going to say I think the
8 same kind of rules, at least for pumps in commercial
9 refrigeration, which was three, but I don't know. I
10 guess the math I guess the four could work.

11 MR. BANTLE: Say it again, Louis.

12 MR. STARR: It was three, I believe, was
13 the magic number.

14 MR. FERNSTROM: So, this is Gary again.

15 Not yet able to vote, but being able to
16 comment, I favor four.

17 MR. BANTLE: And just a clarification, in
18 pumps three no votes was still consensus or two was
19 still consensus, three was no consensus, so just one
20 less. Okay. Thoughts from the group? Paul.

21 MR. DOPPEL: Paul Doppel with Mitsubishi
22 Electric.

1 So, the last group I was on there was a
2 differentiation made by DOE between everyone agreeing
3 and consensus as to what was implied by DOE's action
4 because if it was everyone agreed, then DOE would
5 comply with what was said. If it was consensus --

6 MR. CYMBALSKY: No, no, no.

7 MR. DOPPEL: Okay.

8 MR. CYMBALSKY: So, this is what we're
9 defining here. So, the going in position in the FACA
10 kind of rules is unanimous, right, but the group can
11 change that definition. That's what we're doing
12 here. So, once we change that definition that's what
13 DOE abides by.

14 MR. DOPPEL: Okay.

15 MR. CYMBALSKY: I mean from DOE's
16 perspective if it's four or three -- I mean I don't
17 think I personally have a difference with those two,
18 but happy to go either way.

19 MR. FERNSTROM: This is Gary.

20 Four going once, going twice.

21 MR. MCCRUDDEN: I'll say yes. This is
22 Charlie McCrudden. I don't know. It's not auction

1 here.

2 (Laughter.)

3 MR. MCRUDDEN: I mean, Gary, you looked
4 around and you sort of looked at your compatriots. I
5 look at my compatriots. I've got myself and SMAKDA
6 number two as the contractor side of things. Now, we
7 probably play a smaller role than the other voting
8 blocks. I'd put in air quotes. But I think that --
9 you know I don't think I could actually argue
10 successfully that we should go down to two, but I
11 would say I think going to three would be supportive.
12 I can support three. Four I feel like perhaps that
13 there's an issue that comes up and I can't be
14 persuasive and I'm just sort of -- I'm just sort of a
15 ghost here. So, I would support three. I think may
16 be a better -- I think probably the smaller number is
17 -- I still think that would be preferable for us.

18 MR. DELASKI: This is Andrew.

19 I think Charlie's proposal is a good one.
20 I also would think that when we report the vote, any
21 vote back to the parent committee that if the report,
22 the actual votes shows this is consensus, but there

1 were 15 yes and 2 no's. Two no's, right, so the
2 parent committee is -- that actually creates a little
3 more pressure to try to get 100 percent if you can.
4 I mean the idea of not having a hundred percent is
5 that you just don't want an outlier to stop -- an
6 outlier or two to stop the process. That's what
7 we're saying.

8 MR. MCCRUDDEN: And this is Charlie with
9 ACCA.

10 I agree with that. On the Regional
11 Standards Enforcement I think we had two issues where
12 we could not come to consensus, if I'm not mistaken.
13 And I think on the ones that we did there was a
14 report that there was one no vote, and I think that
15 was helpful for the record probably for the ASRAC to
16 understand what happened during the committee --.

17 MR. FERNSTROM: This is Gary. Recalling
18 that, I think I was the one no vote, and I was
19 persuaded at the last minute to change my mind.

20 MR. MCCRUDDEN: No, no, I'm thinking of --

21 MR. CYMBALSKY: That was pumps I think
22 you're thinking of.

1 MR. MCCRUDDEN: This is Charlie with ACCA.

2 The one I'm thinking of was --

3 MR. CYMBALSKY: The PTAX vote on --

4 MR. MCCRUDDEN: No, no, it was PHCC had

5 voted no on one of the votes that we did on

6 enforcement. That wasn't the PTAX.

7 MR. CYMBALSKY: It wasn't?

8 MR. MCCRUDDEN: No.

9 MR. FERNSTROM: So, I was thinking

10 Regional Standards Enforcement, and I was thinking at

11 the end --

12 MR. MCCRUDDEN: Yeah, it was the

13 certification of PTAX.

14 MR. CYMBALSKY: No, I was thinking

15 certification of -- I'm sorry.

16 MR. FERNSTROM: Certification of a split

17 system residential --

18 MR. CYMBALSKY: Got it.

19 MR. FERNSTROM: -- air conditioning.

20 Anyway, we're close I think to agreement.

21 MR. BANTLE: So, it seems to me we have a

22 three. We have a suggestion on four, and the three

1 was the last suggestion. Thoughts from the group.
2 Comment on the three.

3 MR. CYMBALSKY: This is John from DOE.

4 So, using Charlie's example, I think, I
5 think three works perfectly because if his block is
6 two he would need to convince another block to join
7 his side. I think that's the way this thing is
8 supposed to work, so I'm going to say three is my
9 preferred.

10 MR. BANTLE: Okay.

11 MR. SHOWS: This is Mike Shows with UL.

12 So, just to clarify, it's three
13 irrespective of whether it's 12 or 17. It doesn't
14 matter how many people are voting it's just three is
15 the number.

16 MS. HOFFMAN: Right.

17 MR. SHOWS: Correct?

18 MR. CYMBALSKY: Yes, that's the assumption
19 that I've been working under.

20 MS. HOFFMAN: Right.

21 MR. SHOWS: Okay. Cool.

22 MS. HOFFMAN: Should we have a show of --

1 see if we can try a consensus and see.

2 MR. BANTLE: Shall we try a consensus on
3 three?

4 MS. HOFFMAN: If there are three no votes,
5 there's no consensus.

6 MR. MCCRUDDEN: So, this is Charlie with
7 ACCA.

8 I hate to go back. Do we need a quorum to
9 start the meeting?

10 MS. HOFFMAN: Yes.

11 MR. MCCRUDDEN: So, at 9:00 a.m. we need
12 -- so, we need 12 to start. Okay. Thank you.

13 MS. HOFFMAN: Yes, Harvey, is that a show
14 of thumbs.

15 MR. BANTLE: Or hands?

16 MS. HOFFMAN: Or hands. Yes, thumbs up?

17 MR. FERNSTROM: So, this is Gary.
18 Can alternates vote or no?

19 MS. HOFFMAN: Yes.

20 MR. BANTLE: Yes.

21 MS. HOFFMAN: We go back to the -- oh,
22 right.

1 MR. CYMBALSKY: This is just consensus and
2 then we'll go through the whole list of --

3 MR. BANTLE: We're going to go back and
4 officially vote on everything.

5 MS. HOFFMAN: All of the other ones.

6 MR. FERNSTROM: Okay.

7 MR. CYMBALSKY: Does anyone say no? Let's
8 do our normal way of voting.

9 MR. BANTLE: So, consensus is three.
10 Okay, any other suggestions from the group. You all
11 have experience in the negotiated rulemaking process.

12 MS. HOFFMAN: Do you want to do the vote
13 on the quorum?

14 MR. BANTLE: Shouldn't we vote on whether
15 or not alternate can vote first?

16 MS. HOFFMAN: Yes.

17 MR. CYMBALSKY: So we can include them or
18 not?

19 MS. HOFFMAN: Yes.

20 UNIDENTIFIED MALE SPEAKER: Because Gary's
21 vote didn't count.

22 (Laughter.)

1 MR. CYMBALSKY: I informed him.

2 MS. HOFFMAN: All right, so can alternates
3 vote if they're properly designated? We're assuming
4 Gary is, so you didn't just rush in here --

5 MR. CYMBALSKY: Any no's? Raise your hand
6 if you're a no.

7 MS. HOFFMAN: -- wanting to visit
8 Washington, D.C.

9 MR. BANTLE: On alternates. And I see no
10 no's on alternates.

11 MS. HOFFMAN: All right, and we're talking
12 designated alternates, fully briefed.

13 MR. CYMBALSKY: In good faith, though,
14 fully briefed or on the webcast.

15 MS. HOFFMAN: And that you'll let us know
16 the name of the alternate hopefully by the end of the
17 week.

18 MR. CYMBALSKY: Correct.

19 MS. HOFFMAN: All right, so all in favor?

20 MR. BANTLE: 100 percent.

21 MS. HOFFMAN: A hundred percent. Okay.

22 MR. BANTLE: Correct. Harvey, do you have

1 a comment?

2 MS. HOFFMAN: Also, for outside comments
3 they're allowed.

4 MR. BANTLE: A lot of discretion with the
5 working group. And Eileen and I as facilitators will
6 keep track of that.

7 MS. HOFFMAN: And we in other reg negs
8 have said if you wanted someone from the outside
9 you'd introduce them. In other words, so it wasn't
10 just a public -- we will have time for the public to
11 speak, but if you want somebody you would be the
12 member saying I'd like "X" to come up and speak.

13 MR. SACHS: This is Harvey Sachs.

14 I think what we're trying to say is most
15 of us have felt success with the participating coming
16 with the flow instead of having to back up and go
17 forward and back up.

18 MS. HOFFMAN: Okay.

19 MR. SACHS: So, I think we're less turns
20 out to have problems I think.

21 MR. BANTLE: Yes, as it naturally arises,
22 I'd like to recognize so-and-so to just add a little

1 incentive.

2 MS. HOFFMAN: Okay. Proxy vote generally
3 not allowed, but special voting during extenuating
4 circumstances; is that what I heard? Now, we'll
5 interpret that is another issue, but was that --

6 MR. FERNSTROM: This is Gary.

7 My understanding of the term "special" the
8 way John characterized it was the member voting, but
9 through an alternative to the normal means. For
10 example, by email or telephone.

11 MR. CYMBALSKY: Which is different, by
12 definition, than a proxy vote, in my mind.

13 MS. HOFFMAN: Okay. All right, is there
14 an agreement on that?

15 MR. BANTLE: Can we get a show of hands on
16 that one, any no votes?

17 (Vote taken.)

18 MS. HOFFMAN: Okay.

19 MR. BANTLE: Is that the end of the list,
20 though?

21 MS. HOFFMAN: The quorum.

22 MR. BANTLE: Okay, quorum. So, we have

1 quorum set at 12, and that includes remote
2 participants. Show of hands any no votes?

3 (Vote taken.)

4 MS. HOFFMAN: Okay.

5 MR. BANTLE: Okay, I didn't see no no
6 votes.

7 Okay, that covers kind of the major rules.
8 Any other suggested rules just from your previous
9 experience that you'd like to add to the list -- and
10 we will type this up and disseminate it.

11 MS. HOFFMAN: Yes, many of you have served
12 on other committees. Is there some ground rule you
13 want to make sure we have in there?

14 MR. FERNSTROM: This is Gary.

15 My observation has been this is the
16 quickest we've ever come to agreement on these
17 things.

18 (Applause.)

19 MS. HOFFMAN: Well, thank you.

20 MR. BANTLE: So, we will move forward with
21 this list.

22 MS. HOFFMAN: Okay.

1 MR. BANTLE: We will obviously memorialize
2 those. If at some point in the process something is
3 not working for anyone you know that's why Eileen and
4 I are here.

5 MS. HOFFMAN: Right.

6 MR. BANTLE: Bring it to our attention,
7 and us, as facilitators, can address that.

8 MS. HOFFMAN: Right.

9 MR. BANTLE: Okay?

10 MR. DELASKI: Andrew DeLaski.

11 This isn't a ground rule, but I guess I'm
12 back to this notion that if anyone finds themselves
13 not participating I just would ask that they should
14 resign I guess.

15 MS. HOFFMAN: Okay.

16 MR. DELASKI: I would hope that people if
17 they find themselves unable to fulfill what the
18 committee's going to be doing that they should
19 resign.

20 MS. HOFFMAN: Okay.

21 MR. DELASKI: It's not a rule, but I think
22 it's a courtesy.

1 MR. CYMBALSKY: You know and I said that
2 in my opening pretty strongly and I mean it. I mean
3 you know don't bring the New Yorker out in me, but I
4 really feel that you know we're all committing a lot
5 of time. And if you're not going to be one of those
6 people to commit as well just do the right thing.
7 Spend your time the way you want to spend it.

8 MR. BANTLE: Thank you.

9 MR. CYMBALSKY: So, we're at a point now
10 where we could take a quick break and then do
11 scheduling, or we can hammer it out before 10:30 and
12 break at 10:30. Anyone have a strong preference?

13 MS. HOFFMAN: So, we'll see you about
14 10:30.

15 MR. BANTLE: 10:30, about 15, 20 minutes.

16 (Whereupon, a break was taken at 10:11
17 a.m.)

18 MR. CYMBALSKY: Okay, let's get started
19 again. There were a few points on ground rules that
20 we noticed from one of the other working groups that
21 are probably pretty important to cover here, at least
22 from the Department's perspective. And so now that

1 we've defined consensus we can actually take votes on
2 some of these concepts.

3 You know I talked a little bit about at
4 term sheet, and so at the end of this process
5 there'll be a term sheet that will be floated up to
6 ASRAC. We're going to be taking notes as we go.
7 We're going to record every vote, and we're going to
8 create this term sheet. And at the end of the
9 process we'll go through it and make sure everybody's
10 happy with it. That's what will be passed forward to
11 ASRAC to vote on. So, DOE agrees to take this term
12 sheet and incorporate it into a NOPR.

13 And then we get into the interesting part
14 down here that we're going to need to all vote on.
15 So, it's Letter "C" through "F" here on this page.
16 So, I'm just going to read the statement for the
17 record.

18 So, no negative comments, each party,
19 except individuals that have previously voted
20 negatively on the final agreement agrees not to file
21 negative comments or to speak negatively on the
22 proposed standard or its preamble to the extent they

1 have the same substance and effect of the term sheet.

2 So, in layman's terms, what this means is
3 if you didn't vote no you should not also file
4 negative comments to the thing t hat you didn't vote
5 no on. And so, I'm going to throw that out there for
6 a vote. Are there any no votes to accepting this
7 into the ground rules?

8 (Vote taken.)

9 MR. CYMBALSKY: Okay, seeing none,
10 response to public comments. DOE will consider all
11 relevant comments submitted concerning the NOPR and
12 will make such modifications of the proposed standard
13 and its preamble as are necessary when issuing the
14 final standard.

15 So, what that means is we'll take the term
16 sheet, but obviously that go into some sort of a
17 public document where DOE will receive public
18 comments. What we're saying here is that we will
19 incorporate those public comments into that rule.

20 We don't have to vote on that. We're just
21 saying we're going to do that.

22 "E," no adverse action and support each

1 party, except individuals that have previously voted
2 negatively on the final agreement agrees not to take
3 any action to inhibit the adoption of the recommended
4 proposed standard as a final standard to the extent
5 the final standard and its preamble have the same
6 substance and effect of the term sheet.

7 So, here's it a little different because
8 we already have NOPRs out. So, what comes out of
9 this process, depending on what's decided, it could
10 be a final rule. It could be a -- NOPR, but it'll be
11 the term sheet that this group votes towards. So,
12 what this says here -- again, it's very similar to
13 "C," but it also goes a little bit further that
14 you'll agree with what is in the Notice. So, anybody
15 have any thoughts here, concerns, no votes?

16 (Vote taken.)

17 MR. CYMBALSKY: Seeing none on that -- and
18 then finally, no challenge. So, each party, except
19 individuals that have previously voted negatively on
20 the final agreement, agrees not to take a position
21 materially inconsistent with the standard or
22 determination in court or in other forum to the

1 extent that the final standard or determination and
2 its preamble have the same substance and effect as
3 the term sheet for a period of one year from the
4 effective date of the rule or rulemaking
5 determination. So, this is let DOE's big get on this
6 process.

7 MR. DELASKI: John, one question, what do
8 you mean by effective date?

9 MR. CYMBALSKY: So, the effective date is
10 60 days after publication.

11 MS. HOOTMAN: Jill from Trane.

12 Just to understand that a little bit more,
13 when you say 60 days after publication of the term
14 sheet and then one year from that; is that the
15 counter?

16 MR. CYMBALSKY: So, 60 days after
17 publication of whatever the rulemaking document that
18 comes from the incorporation of the term sheet.

19 MS. HOOTMAN: Okay, so the NOPR.

20 MR. CYMBALSKY: For a final rule.

21 MS. HOOTMAN: Right.

22 MR. CYMBALSKY: Usually, I could just say

1 NOPR because we hadn't had one yet, but since we have
2 NOPRs for these rules technically, we could get a
3 final rule out of this.

4 MS. HOOTMAN: Got it. Okay.

5 MR. CYMBALSKY: Frankly speaking, but it
6 all depends.

7 MR. DELASKI: John, can we just pause on
8 that for a second. I think it's worth, sort of
9 emphasizing this point. So, the next step from a
10 federal regulatory perspective it can't be a NOPR
11 because you already have a NOPR out. It would have
12 to be a supplemental NOPR.

13 MR. CYMBALSKY: Right.

14 MR. DELASKI: Or it could be a final rule
15 provided that it meets the legal requirements, that
16 the NOPR gives you a sufficient basis for that final
17 rule.

18 MR. CYMBALSKY: Exactly, that it is a
19 logical outgrowth of the NOPR.

20 MR. DELASKI: Right.

21 MR. CYMBALSKY: And it's comments. That's
22 sort of the litmus test. But we haven't started

1 getting into the nitty gritty, so we honestly don't
2 know that, but whatever that document is that's what
3 this statement pertains to. So, any no votes on
4 this?

5 MR. BANTLE: Any questions?

6 MS. WALTNER: This is Meg Waltner. And I
7 have a question, where did the one-year period on
8 this one come from? It just strikes me as strange.
9 You know in this process maybe this doesn't matter,
10 but if we were to do sort of a NOPR and then a final
11 rule out of this process it could fall out of the
12 one-year timeframe.

13 MR. CYMBALSKY: Right, again, I'm just
14 reading from a previous set of ground rules. We can
15 change that if that doesn't sound -- should it be two
16 years?

17 MS. WALTNER: I don't have a proposal. I
18 just -- yeah, I don't know I just think a bad
19 timeframe.

20 MR. CYMBALSKY: Yes. I mean it seems to
21 me if I was not DOE and I was another member I'd say,
22 well, what I'm really you know voting on here is the

1 product that comes out of this committee, whatever it
2 is and you're not committing to something that might
3 be after that because you don't have that certainty
4 that that was what you voted on, so I would think we
5 would want to restrict it to whatever this group
6 decides.

7 Now, if it's the one-year or two-year you
8 know that's not something I'm particularly wedded to
9 in any way, shape, or form.

10 MR. BANTLE: Any alternative solutions or
11 timeframes from the group?

12 MR. CYMBALSKY: Okay, show of hands.
13 Again, raise your hand if it's a no on the one-year.

14 (Vote taken.)

15 MR. CYMBALSKY: The rest of the stuff we
16 kind of went over already, so I think we're good on
17 ground rules, unless somebody else -- you know this
18 may have spurred some other thoughts in people's
19 minds. Rusty?

20 MR. THARP: This is Rusty with Goodman.

21 Looking back to the commercial
22 certification, one thing we addressed was subgroups

1 just in case. I don't know if we want to develop
2 some subgroups I don't know if we need to address
3 this at this point in time or not, but I think you
4 might want to.

5 MR. CYMBALSKY: So, that's on this
6 document too. I'll post it up here. So, what we
7 just said that subgroups could be formed, no more
8 than 15 people on a subgroup, and as needed, DOE
9 would provide technical support to the subgroups.
10 That's something you know we will do regardless of
11 needing it to be in the ground rules or not, but if
12 you want to memorialize it in the ground rules I'm
13 okay with that.

14 MS. HOFFMAN: And I believe some members
15 of the subgroup don't have to be members of the
16 committee. They can be experts, whatever.

17 MR. CYMBALSKY: I mean it just says here
18 that the subgroups are not authorized to make
19 decisions for the working group as a whole. I think
20 you know the idea here is the subgroup would report
21 back to this group.

22 MR. WHITWELL: Bob Whitwell from Carrier.

1 So John, Eileen mentioned that the
2 subgroup could consist of people from outside the
3 working group; that's correct?

4 MR. CYMBALSKY: So, I think the subgroup
5 could rely on extra technical expertise. I think I
6 might differ with the approach. I think that the
7 subgroup members could be members of the committee.
8 I don't know if anyone else has some thoughts.

9 MR. DELASKI: This is Andrew.

10 It seemed to me that if you get someone
11 who has expertise and you want to bring them on the
12 group whether they are -- since this is a nonvoting
13 group anyway, they're just going to report back to
14 the actual whole authority, which is this committee.
15 It's almost a distinction kind of difference.
16 Whether they're on the group or not in the group,
17 they're in the meeting. They're contributing. Call
18 them one group. I don't think it matters.

19 MR. CYMBALSKY: Okay, my only sense is it
20 seems -- I don't know how we could you know make
21 people do work if they're not kind of part of the
22 group, but I'm okay either way. You know I would

1 think -- you know the way it worked for transformers
2 the subgroups that were formed were all members of
3 the working group. They brought in technical experts
4 to help guide them and that's fine, but I think this
5 group should appoint members of this working group to
6 be the members of the subgroup.

7 MR. WHITWELL: Okay, so it would be
8 members of the working group that are the subgroup,
9 but we could bring in other people --

10 MR. CYMBALSKY: To assist.

11 MR. WHITWELL: -- to work with the
12 subgroup.

13 MR. DELASKI: That makes sense to me.

14 MR. WHITWELL: Yeah.

15 MR. DELASKI: Because I'm thinking about
16 you and Dick, for example. Dick's there with you,
17 but you're there too because you're going to carry it
18 back to the group.

19 MR. WHITWELL: Exactly.

20 MR. DELASKI: That's your job.

21 MR. WHITWELL: That's what I was looking
22 for.

1 MR. CYMBALSKY: I think that's the way it
2 should work.

3 MR. DELASKI: Okay, I'm good with that.

4 MR. CYMBALSKY: Okay. So, if everyone's
5 okay I mean we could adopt this language wholesale.

6 MR. BANTLE: And we do have the 15-person
7 number there. Do we want to leave it so it gives us
8 the freedom, thoughts from the group?

9 MR. CYMBALSKY: Well, we only have 17.

10 MR. BANTLE: Yes, we only have 17 people
11 total that's why it came to my attention.

12 MR. DELAKSI: If it's more than 15, it's
13 not a subgroup.

14 MR. BANTLE: Yes. But probably something
15 that doesn't necessarily need to be changed at the
16 moment.

17 Okay, a vote on accepting this language as
18 is on the board. And just raise your hand if it's a
19 no again. We'll follow our consensus.

20 (Vote taken.)

21 MR. BANTLE: No no's.

22 MR. CYMBALSKY: Okay. Great. Any other

1 issues from members of the group? I mean we've got
2 everything here already; consensus, quorum,
3 subgroups, and we've gone through the agreement.

4 Okay. All right, so we'll go now back to
5 the part trying to schedule some meetings I think is
6 the next topic.

7 MR. BANTLE: Correct.

8 MS. HOFFMAN: Does everyone have the
9 doodle results?

10 MR. BANTLE: Okay, the days were outlined
11 in the doodle May 11, May 12, May 21, May 22, June 1,
12 June 2, June 8, and June 15. Now, we do have the
13 votes.

14 John, I believe the percentage in there
15 was including facilitators. Correct?

16 MR. CYMBALSKY: Right.

17 MR. BANTLE: So, that's not necessarily a
18 quorum even though it does show 12. Any comments on
19 those dates, strong aversion to any of the dates in
20 particular? We can start at the beginning, the May
21 11, May 12?

22 MS. HOFFMAN: You also may want to get the

1 votes from these folks.

2 MR. BANTLE: Correct. I think some of
3 them are alternates.

4 MR. SHOWS: This is Mike Shows with UL. I
5 missed the doodle. Sorry about that.

6 MR. BANTLE: Okay, no problem.

7 MR. SHOWS: I'm transferring from Asia,
8 but all the dates that are there I would be available
9 for.

10 MS. HOFFMAN: Good.

11 MR. BANTLE: Okay.

12 MR. CYMBALSKY: Charlie, I know you're
13 heading to North Carolina. Do you want to be a
14 little more specific on when that --

15 MR. MCCRUDDEN: It's the week of May 11.

16 MR. CYMBALSKY: It is?

17 MR. MCCRUDDEN: Yes. So, I'm just looking
18 at my calendar now. Monday is my travel day.
19 Tuesday I can certainly be available in the afternoon
20 and do what I can in the morning. I'm going to try
21 to work around on Monday.

22 MR. BANTLE: Any of the other dates.

1 MR. MCCRUDDEN: I haven't even gotten that
2 far yet.

3 MR. BANTLE: No problem. One first
4 question, we'll focus on the May 11 and 12th -- and
5 this is also to John. Those are coming up quickly.
6 What will be discussed? Are we going to have enough
7 to discuss on those first two dates, which is I think
8 what I'm trying to get to?

9 MR. CYMBALSKY: Yes. So, we have it here.
10 (Slide.)

11 MR. CYMBALSKY: So, on the screen this was
12 something we put together without really
13 cross-referencing the doodle poll, but sort of
14 outlines what we think -- how things are going to
15 move without the benefit of learning what we might
16 learn this afternoon. So, obviously, this is just a
17 straw man, but this is something the team thinks is
18 something they can do analytically to help move
19 things along.

20 So, personally, I think -- you know
21 Charlie's schedule notwithstanding, the 11th and 12th
22 are two critical next dates in my mind. Obviously, I

1 think next week is probably too soon, but I think in
2 two-weeks time I think is a good spot to get us back
3 in the room. I know there were other conflicts later
4 in the week for at least a couple of us.

5 MS. WALTNER: So, just a question, that
6 5/7 date is definitive as to when we'll have the
7 updated --

8 MR. MILSLAK: I mean the goal is to have it
9 done by the end of this week or possibly early next
10 week, so that should be possible. The members are
11 all getting it together now.

12 MS. WALTNER: Okay.

13 MR. MILSLAK: Nick.

14 Just to follow up, I know there was an
15 earlier discussion there was a question of the
16 members having it done and then you guys at -- having
17 to anonymous it.

18 MR. CYMBALSKY: Right.

19 MR. MILSLAK: But that shouldn't take very
20 long to do. I mean once we have it we can compile it
21 and it should be a pretty quick process once we get
22 the data from the members to do it. Your

1 expectation is that you'll have the data from members
2 at the end of this week; is that what you said?

3 MR. CYMBALSKY: Or early next week.

4 MR. MILSLAK: Okay.

5 MR. BANTLE: So, specifically, we're
6 looking at that 11th and 12th. Louis, I know you
7 were one that we didn't have your info.

8 MR. STARR: Yes. So, the 11th and 12th is
9 fine.

10 MR. BANTLE: Okay. And then we're also
11 missing information from Marshall and Karen, who we
12 have alternates for today. I don't know if you can
13 speak to any availability.

14 MR. FERNSTROM: So, this is Gary for the
15 California IOUs and Marshall.

16 All I know at this point is that Marshall
17 will be back from Italy on May 8, and any time
18 subsequent to that at least he'll be in the country.

19 MR. CYMBALSKY: Thank you. So, Paul will
20 you have an alternate for the 12th do you think?

21 MR. DOPPEL: It depends on the flight. I
22 need to be someplace on the 13th, so I may be able to

1 make a good part of the day.

2 MR. CYMBALSKY: Okay.

3 MR. DOPPEL: And then I'll get a proxy.

4 MR. CYMBALSKY: I'll give you a proxy.

5 And then Andrew, I guess the same question to you.

6 MR. DELASKI: I'm in town the 12th. I'm
7 just speaking at another event.

8 MR. CYMBALSKY: Okay.

9 MR. DELASKI: So, I should be in and out.

10 MR. CYMBALSKY: Okay. Good. All right.

11 So, Charlie -- I don't want to say "Sorry Charlie,"
12 but do you think it's possible that there's anyone
13 that can --

14 MR. MCCRUDDEN: Yes, I'll make something
15 happen.

16 MR. CYMBALSKY: Okay. Great. So, why
17 don't we book the 11th and 12th? Block that.

18 MS. HOFFMAN: And is it exact 9:00 to 5:00
19 both days. I'm looking at travels.

20 MR. CYMBALSKY: It doesn't have to be. We
21 have the room from 9:00 to 5:00.

22 MS. HOFFMAN: Yes, I understand.

1 MR. CYMBALSKY: We might be able to start
2 a little earlier to get people out the second day
3 earlier, but you know why don't we be flexible on
4 time?

5 MS. HOFFMAN: I was going to say I would
6 like it on the second day if we could be like an 8:00
7 to 4:00 because I can get a flight, better choices if
8 I'm out of here by 4:00.

9 MR. CYMBALSKY: Okay, so why don't we just
10 say we'll end at 4:00 on the second day and we'll
11 work on the start time.

12 MR. SHOWS: Hey John, I got a question.
13 Mike Shows with UL.

14 The week of the 25th I'm seeing an
15 in-person meeting there, but I don't see anything on
16 this list that week.

17 MR. CYMBALSKY: Right. Again, these two
18 were created in separate parts of the country. So,
19 what the team was doing was using their kind of work
20 schedule when they can get things done as opposed to
21 when Memorial Day might fall on the calendar.

22 MR. BANTLE: So, we were looking at the

1 21st and 22nd.

2 MR. CYMBALSKY: Right.

3 MR. BANTLE: Okay. And does that still
4 work with the team's deadlines?

5 MR. CYMBALSKY: Yes, I think a couple days
6 isn't going to make or break it. I'm seeing my
7 overtime charges go up. We're still solvent at the
8 current moment. So, looking down at the doodle poll
9 again looks really good there, and then just the same
10 questions to Michael. Michael said he was good on
11 all of them. Louis, the 21st and 22nd?

12 MR. STARR: Yes. I prefer not the 22nd.

13 MR. CYMBALSKY: Again, we can get out
14 early that date. I know it's a Friday.

15 MR. STARR: I have to get to Washington
16 State, but I can make work if we can't do some -- the
17 22nd is really the only problem I have with the whole
18 schedule, but it would be great if we could push that
19 back to Wednesday and Thursday, but if we can't I can
20 make Friday.

21 MR. CYMBALSKY: Well, I do have the room
22 available on the 20th.

1 MR. BANTLE: Yes. So, I think we're
2 looking at maybe the 20th and 21st?

3 MR. THARP: This is Rusty with Goodman.
4 I'll be in Mexico on the 20th, but I
5 could, if it's best for the group, I could have my
6 alternate attend that day.

7 MR. CYMBALSKY: Would the group prefer the
8 Wednesday/Thursday as opposed to the Thursday/Friday.

9 MR. THARP: It is Memorial Day Weekend.
10 Wednesday/Thursday is going to make travel plans
11 easier for those who have to travel.

12 MS. WALTNER: Yes, I think some of us
13 would actually like to stay in the area.

14 (Sidetalk.)

15 MR. BANTLE: Okay, temperature check from
16 the room, 20/21, just show of hands.

17 (Show of hands.)

18 MR. BANTLE: And this would be a yes, not
19 a no.

20 MS. HOFFMAN: A yes?

21 MR. BANTLE: Yes, a yes for 20/21. Okay.

22 MS. HOFFMAN: Either one is fine.

1 MR. CYMBALSKY: Okay, so let me book the
2 room.

3 MR. BANTLE: Okay, so we will make that
4 change.

5 MR. SHOWS: I'm still trying to
6 cross-reference these two documents. So, this week
7 of 5/18 there's an attempt to have a webinar for that
8 week.

9 MR. CYMBALSKY: Right. So, I kind of
10 skipped over those sections now because I want to go
11 back to that once we get into the content this
12 afternoon to see -- personally, I'm still not
13 comfortable where we are right now because I haven't
14 actually gotten a readout from the last two days.
15 That would help.

16 So yes, we can put a placeholder there,
17 but if you don't mind maybe we can just lock in the
18 in-person meetings -- yes.

19 MR. BANTLE: Okay, so then one and two are
20 the next dates on the Google Doodle. And just
21 looking at the numbers, in the Google Doodle these
22 were a little lower, so we want to get this firmed

1 up.

2 Michael was all the way through. Louis,
3 one and two?

4 MR. STARR: That's fine.

5 MR. BANTLE: Okay.

6 MR. CYMBALSKY: Meg, do you think you
7 could have an alternate?

8 MS. WALTNER: I will work on that. I
9 definitely can't --.

10 MR. SHOWS: Hey John, the only change for
11 me is the week of the 11th of May. I'm going to have
12 to do that via webinar. I'm not going to be
13 available in person here.

14 MR. CYMBALSKY: That's fine.

15 MR. BANTLE: Any strong concerns from the
16 group on the first and second?

17 (No response.)

18 MR. BANTLE: Okay.

19 MR. STARR: In general, I guess I don't
20 mind traveling on Sunday, but it always would be
21 better to travel on Monday. I don't know. If
22 everybody else is fine with those days, I am, but I

1 kind of like traveling on Monday and then having to
2 leave on Tuesday and Wednesday.

3 MR. CYMBALSKY: I do not have a room for
4 June 3, unfortunately.

5 MR. STARR: Okay.

6 MS. HOOTMAN: I was going to say I
7 understand what you're saying, but I could not
8 participate third, fourth, and fifth, so I'd have to
9 have an alternate.

10 MR. HURST: We do have the room for the
11 first and second?

12 MR. CYMBALSKY: Correct.

13 MR. HURST: Well, it sounds like we're
14 shot.

15 (Sidetalk.)

16 MR. CYMBALSKY: So, just so everyone
17 knows, the May 12 meeting will be at HRI in
18 Arlington. We'll provide more details on it. It's
19 right at the Courthouse metro stop, but the 11th will
20 be here.

21 MR. HURST: John, will Jeremiah send out
22 an invite calendar?

1 MR. CYMBALSKY: Yes, we'll put all this on
2 everyone's calendar.

3 MR. HURST: Thank you.

4 MR. CYMBALSKY: And we're also going to
5 set up a share point site as well with all of your
6 emails and the alternate's emails for access to all
7 the documents and we'll blast that out as well.

8 MR. BANTLE: So, the next date on the
9 Google Doodle was June 8.

10 MR. CYMBALSKY: Okay, so then that's when
11 we're coming into the home stretch and so I have both
12 June 8 and June 9 held for rooms. The question is do
13 we need to book two days or one day when we get to
14 this point in the schedule?

15 MS. HOOTMAN: That's one of the ones -- I
16 mean kind of like Louis said maybe you know do we
17 make that -- do you start at noon. You couldn't even
18 get here by noon, could you? I don't know from
19 there, so sorry. But we've done it twice now where
20 we're traveling on a Sunday, so that's all I'm just
21 saying is maybe --

22 MR. CYMBALSKY: So, I have the eighth,

1 ninth, tenth. I have the whole week room
2 availability, so I'm agnostic to dates.

3 (Sidetalk.)

4 MR. BANTLE: Just one note, all of our
5 facilitators, including Javier, we are booked I think
6 the eighth, ninth, tenth, so facilitation would have
7 to be the 11th or 12th, I believe, that week.

8 (Sidetalk.)

9 MR. DOPPEL: I can't make it. The first
10 two days of the week I can make, but not the last
11 three. So, you're saying the facilitators can't
12 support that.

13 MR. BANTLE: Not the beginning of the
14 week, no. I think Eileen's out. And I'm actually
15 out at the West Coast well as, so I'll be flying
16 back, and then Javier can be here starting the 10th,
17 10/11.

18 MR. CYMBALSKY: I mean if the group says
19 we need to go the dates they can't make it, we'll
20 make do.

21 MS. HOFFMAN: Yes, we'll figure out
22 something. We have more staff.

1 MR. CYMBALSKY: But the 10th and 11th
2 worked for everybody?

3 MR. DOPPEL: I can't make anything the
4 last three days of the week.

5 MR. BANTLE: Thoughts from the group? I
6 think it's currently scheduled for the eight/ninth
7 and then there was also the suggestion of the
8 10th/11th, those two options.

9 MR. CYMBALSKY: Without the facilitators,
10 can we reach a quorum on the ninth and the tenth?
11 Kind of take what are your days and what are their
12 days.

13 MR. BANTLE: Ninth and tenth?

14 MR. STARR: I can support the ninth and
15 tenth. Sure. That's replacing the first and second?

16 MR. BANTLE: Replacing eighth and ninth.

17 MR. STARR: Eighth and ninth? Okay.

18 MR. BANTLE: Okay, any objections to nine
19 and ten?

20 (No response.)

21 MR. CYMBALSKY: Okay. And then at that
22 point you know we have the 15th here, but I'm going

1 to vote for maybe doing that on a webinar since it's
2 the last day. I'll just leave it at that unless
3 someone has a strong -- I know Monday sounds like a
4 tough travel day. It might be easier to get the
5 group on the phone if we have to.

6 MR. MILSLAK: I won't be available then.
7 I'll have to call in from a foreign country.

8 MR. STARR: Can we go down the list one
9 more time just to make sure everybody's on the same
10 calendar.

11 MR. BANTLE: May 11, May 12 it's at HRI in
12 Arlington. May 20 and May 21, June 1, June 2, June
13 9, June 10, and June 15 potentially via webinar.

14 MR. DELASKI: So, it seems to me -- this
15 is Andrew -- the ninth and the tenth is where the
16 target date we're kind of getting to the final
17 decision.

18 MR. CYMBALSKY: Right. Those are the
19 important dates.

20 MR. DELASKI: If you can't make those
21 dates, then you've got to have an alternate.

22 MR. CYMBALSKY: Yes, absolutely. And then

1 I think we hold the 15th for cleanup, if necessary,
2 on a webinar.

3 MS. DELASKI: Yes. I mean the awkward
4 thing is the facilitators who have guided us to that
5 point will no longer be available.

6 MS. HOFFMAN: We'll see what we can do.

7 MR. BANTLE: We can put the word out and
8 see what we can do.

9 MS. HOFFMAN: Yes, I might be able to make
10 it for the 10th. I'm flying to Atlanta for a
11 program, but I can figure something out. We'll work
12 it out. You won't be alone. And if we are, Harvey
13 will facilitate.

14 MR. CYMBALSKY: And I'll just say the May
15 21 meeting will be held in the building that I
16 actually work in at LaFont Plaza on the eighth floor.
17 We will obviously put that in writing.

18 (Sidetalk.)

19 MR. CYMBALSKY: And you know it's good
20 that this group was first because we have three
21 working groups going on, so we got first dibs of
22 everything.

1 MS. HOOTMAN: Well, I'll be curious
2 because we nominated somebody else for that, so I
3 didn't know how the overlap still happened.

4 MR. CYMBALSKY: We basically booked every
5 space there was for the whole summer, so we got what
6 we got.

7 Okay, so that's good. I think we've got a
8 good schedule planned out for ourselves. We'll
9 circulate all the dates. We'll make calendar entries
10 for everybody. We'll set up the share point site.
11 We'll get the documents out on there. And I think at
12 this point it's actually time to turn to the content
13 portion of the briefing.

14 Okay, so I'm just going to take us through
15 a few slides where things stand sort of in the
16 regulatory history here.

17 (Slide.)

18 MR. CYMBALSKY: You know, basically, this
19 rulemaking kind of kicked off with an RIF back in
20 February of 2013, and we also published a NOPR in
21 September for the air conditioner portion of this
22 rule. Later on, we published the furnace portion.

1 So, the background here for the unitary
2 AC's -- I'm not going to read through this, but
3 there's basically what the current federal standards
4 are, the mapping of the IEER, and then the proposed
5 federal standard that we put out in the fall.

6 (Slide.)

7 MR. CYMBALSKY: For the furnaces, we put
8 out the NOPR back in February. And you could see
9 what the proposal is there vis--vis where things
10 stand today.

11 (Slide.)

12 MR. CYMBALSKY: And so, just to go back,
13 the third bullet here is something that is important
14 because I think a lot of people in the room and
15 people not in the room did a lot of legwork ahead of
16 this meeting in response to the NOPR and tried to
17 think about the analytics to move forward from the
18 NOPR, so I think something we just wanted to point
19 out.

20 What we're really going to focus in on
21 here today with the content, and I'm going to turn it
22 over to the technical team, is what you see here in

1 the red circles. And so, we'll talk about the
2 engineering analysis more and the energy use as well.
3 So, at this point this is where things turn to
4 technical for someone like me, so I'm going to step
5 off the podium.

6 MR. WESTPHALEN: We didn't really rehearse
7 this, but I figure this is where the engineering
8 material and Navigant Consulting comes in.

9 My name is Detlef Westphalen and I'm with
10 Navigant Consulting and we worked on the engineering
11 analysis. Some of our staff also worked on impact
12 analysis and will be involved in some of the later
13 meetings as well.

14 As John mentioned, there was a NOPR
15 published last fall. There were written comments and
16 public meeting comments provided in the wake of the
17 publication of the NOPR. There were also working
18 group meetings held you know which we participated
19 you know with a lot of the people here in this room
20 and probably that are on the webinar as well.

21 And so, with all of those comments and all
22 of that input you know we have considered revisions

1 to the analyses that were presented in the NOPR, and
2 the next few tables indicate some of these revisions.
3 And you know we went over some of this with some of
4 you last week in a couple formal meetings, but we
5 just wanted to go through and indicate which of these
6 issues we feel have been resolved and that we can
7 then take the input and run with it and continue with
8 the analysis.

9 And then for those issues that haven't
10 been resolved certainly those are up for discussion
11 and for the working group here to work on and decide
12 on.

13 MR. SACHS: Harvey Sachs, ACEEE.

14 The question in my mind is the top row of
15 Slide 56. Baseline units with EER lower than the
16 current standards analysis based and the approach
17 removed to units that need the current EER. And I
18 guess at some point are you going to be talking a
19 little bit more about the EER to IEER transition?

20 MR. WESTPHALEN: That is something that we
21 could discuss. We haven't prepared any charts
22 showing the EER versus IEER and the scanner for the

1 different classes. I guess I would ask is there
2 something particular that you'd like to see there?

3 MR. SACHS: Harvey Sachs again.

4 I'm not sure. Obviously, anti-backsliding
5 raises its ugly head, but I'm just not quite sure
6 what was done as we made that transition to establish
7 the equivalence and I'm not sure that equivalence is
8 even the right word. In fact, I'm pretty sure it's
9 not between an EER and IEER in terms of projected
10 energy use.

11 MR. FERNSTROM: So, this is Gary speaking
12 for the California IOUs.

13 I'd like to follow up on Harvey's thought.
14 The EER is particularly important to us, given the
15 hot weather performance and our need to know that in
16 order to characterize the energy utilization and
17 savings in our hot central valley. So, having a good
18 understanding of that relationship is critically
19 important for us.

20 MR. DELASKI: This is Andrew.

21 I think what Detlef is doing now is sort
22 of walking us through changes or potential changes to

1 the analysis, which I think makes this really
2 constructive.

3 I have a handful of kind of legal
4 questions that I would hope would surface at some
5 point. Maybe I can surface them later today -- now
6 is not the moment clearly ^^^^ so that the DOE legal
7 counsel can be thinking about them so then we know
8 some of the parameters or some of the limits of what
9 we can ultimately negotiate.

10 And this kind of relates to the EER
11 question you know, but I have time later on today you
12 know to put those on the agenda for Eric to consider.

13 MR. STAS: Eric Stas, DOE.

14 I think it might be a nice idea to maybe
15 get some of those on the table before the lunch break
16 so that if any questions stump me then I could have
17 good consultation time. Maybe I can get something
18 back to you or just tell you we have to defer it
19 until the next meeting or something, but you know if
20 I hear what they are that would be helpful.

21 MR. DELASKI: Well, should I just run
22 through them quickly? Would that be helpful?

1 MR. STAS: Yes.

2 MR. DELASKI: The one question is can DOE
3 maintain an EER the way it is? So, tell me how an
4 EER is better and have the EER standard, right, if
5 there's consensus. And the DOE has said in the past
6 it can't do two metrics. For residential air
7 conditioners we have SEER and EER now. So, is that a
8 potential outcome of this negotiation in metrics?

9 Another is could we come up with a
10 standard that goes -- come up with two standards, one
11 that goes into effect in Year X and one that goes
12 into effect in Year Y? So, for residential cloth
13 washers there was a negotiated ^^^^ privately
14 negotiated outcome. Twice this has happened now that
15 the standard goes into effect with one level of
16 stringency in year and another level of stringency
17 some years later, so maybe a relatively modest
18 standard initially and a more aggressive one in a
19 second year?

20 Related to that is a separate question,
21 but related is flexibility on compliance date. To
22 what degree is the Department legally limited to a

1 particular compliance date. Are we completely free
2 as a committee to negotiate whatever compliance dates
3 we see fit? And I would say that in terms of what's
4 the nearest term we could negotiate and is there some
5 outer limit that would be sort of outside of legal
6 bounds? And I look to the dishwasher more recently
7 was negotiated, and we did a pretty quick compliance
8 date in that case. I think that might be it.

9 MR. SACHS: This is Harvey Sachs, ACEEE.

10 The corollary to dual metric is whether
11 recognizing the large difference between the 90.1
12 approach, which includes prescriptive features and
13 the DOE approach, which shall we say is strongly
14 discouraging. Consensus were to be reached and
15 included some prescriptive features. Is that within
16 bounds for this process?

17 MR. STAS: I assume you're saying in
18 addition to standard levels, right?

19 MR. SACHS: In addition to standard
20 levels. And again, this might be something that is
21 simple, but it's conceptionally simple is
22 incorporating the economizing rules for metric

1 standard 90.1.

2 MR. SACHS: I guess I would add to that,
3 Eric, you know we're asking the context of this
4 committee's work, right, so as an outgrowth of
5 this committee you know what's in our scope, which
6 may be different -- I recognize may be different than
7 what the agency might decide it could do in a
8 different context and are there things that we have
9 to do differently to do in a particular way?

10 MR. STAS: Well, thanks for these. These
11 are all good questions, and I sort of anticipated
12 them coming and I try to have others thinking about
13 them, and now I put them squarely before them.

14 MR. SACHS: This is Harvey again.

15 And they're not completely off the wall
16 since one of the issues that we've been faced with is
17 the issue of trying to get some correlation, both in
18 timing and in context as we have these multiple paths
19 marching forward with CEC, ASRAC 90.1, and DOE
20 standards. And it's hard for me to keep up. It's
21 probably a whole lot harder for a manufacturer.

22 MR. DELASKI: Hopefully, you can give us

1 some initial take, but I hope you can get back the
2 analysis. I think, ultimately, we need to make
3 progress on analysis to basis for discussions.

4 MR. STAS: Yes. I mean I would say given
5 the weight of these questions I don't know the answer
6 will be forthcoming by after lunch you know, so I
7 think we can go through the substance of all these
8 things and get all the ground rules and everything
9 else going. And hopefully, by the next meeting or in
10 advance of the next meeting should have some answers
11 for you I would hope.

12 MR. THARP: Rusty Tharp with Goodman.

13 Along the lines of what Harvey and Andrew
14 were talking about, if there was an agreement that
15 added in some design criteria or two standards for
16 these next rounds that we would agree to, could the
17 second one go away at some point in time? So, the
18 question to follow up is you know if we agreed to a
19 design standard that has technology and goes down the
20 road would we be stuck with that permanently or is
21 that something that could go away, depending on
22 technology at the next round of rulemaking?

1 MR. STAS: That's a very good question,
2 and I guess my response would be you know you're
3 familiar with the statute's anti-backsliding
4 provisions, so to the extent you're giving energy
5 savings attributable to that design requirement if
6 it's at all possible we would want to look and see
7 whether the new standard that would come after that
8 would make up for whatever you're losing by
9 sunsetting something.

10 MR. DOPPEL: Paul Doppel.

11 Point of clarification on this, the
12 right-hand column it says "additional input
13 required." If it says none, I just want to make sure
14 that we're not precluded from bringing these topics
15 up again.

16 MR. CYMBALSKY: I think these are open for
17 discussion.

18 MR. WESTPHALEN: Yes. The intent was to
19 represent what we thought we heard in the discussions
20 last week, but clearly, if some of these are still
21 open issues you know we should still put them on the
22 table and discuss them.

1 MR. CYMBALSKY: So, I think the whole
2 point of these sets of slides is like what Detlef
3 explained is what in our minds we think we got what
4 we need. If we are mistaken, we need to know that
5 now to move forward with the analysis. And then
6 you'll see ones where we don't think we have what we
7 need. So, this is definitely in the light of where
8 the analytical team thinks they are at the moment.
9 And if you don't think we have it right, we need to
10 know.

11 MR. DELASKI: This is Andrew.

12 Are you looking for just any feedback on
13 this, or are you going to run us through it or what
14 are we going to do now?

15 MR. WESTPHALEN: Well, I think the attempt
16 was to go through one-by-one, hopefully quickly, and
17 you know if anybody says stop, we want to discuss
18 that.

19 MR. BANTLE: Before we move on, Mike, did
20 you have a question?

21 (No response.)

22 MR. BANTLE: So, think you want to back up

1 a slide, right?

2 MR. WESTPHALEN: Yes. So, I'll launch
3 into these tables here. The first issue was there
4 were comments that the tests results that DOE was
5 using on which it based its NOPR analyses were
6 somewhat more optimistic than reality, certainly than
7 rated, and you know the revision here is to base the
8 analysis on the ratings, not the test results.

9 And then component wattage profiles you
10 know would be developed for the units based on
11 specific models with target efficiency levels. And
12 by component wattage profiles, what I mean is
13 understanding, as you do the EBBR calculation what
14 are the wattages assigned to the different components
15 in those equations at the different load levels in
16 order to get that calculation?

17 MR. FERNSTROM: So, this is Gary.

18 I have a question. That sounds fine so
19 long as the test results are better than the ratings,
20 but if it were to work the other way around would you
21 then be looking at the ratings and not the test
22 results?

1 MR. WESTPALEN: Well, I think one of the
2 pointed comments you made in the written comments to
3 the NOPR had to do with the number of tests involved
4 and the number of tests that you know, as DOE's
5 contractors, had available to us to review in order
6 to determine what is the efficiency level of that
7 unit? You know all of these units that we were
8 looking at you know had results that were optimistic
9 or at the rated level.

10 MR. WHITWELL: Bob Whitwell from Carrier.

11 Yes, so that's my recollection is that all
12 of the tests results were higher than the rating.
13 And I guess the other issue is that the EEL levels,
14 particularly like at EEL3 were set based on these
15 tests results that are higher than what the ratings
16 were. So, not only was the analysis done on those
17 higher values, but that it also is what you used to
18 set the EL levels, so I think that's a bit of a
19 concern.

20 MR. FERNSTROM: Okay, this is Gary.

21 Okay. Thank you. I understand.

22 MS. WALTNER: Just to make sure I

1 understand, so the component wattage profiles those
2 are based on your testing of these specific units or
3 are those manufacturer provided values?

4 MR. WESTPHALEN: To the extent that we
5 can, we're taking the information from you know the
6 product literature. In some cases, we do have test
7 data. And you know some aspects of those test data
8 we have more reason to believe -- you know makes
9 sense to use, such as you know the control of the
10 power input, which is a fairly low number. And you
11 know the question of whether you have the cooling
12 load measurement correct does not really play very
13 much into you know how that particular wattage
14 impacts the IER measurement. So you know in some
15 cases we're using some of those wattage numbers in
16 what we're doing in our revised analysis. I mean
17 think we've been pretty open in showing where a lot
18 of the information comes from, and certainly you know
19 we can go into the nitty gritty detail if the group
20 wants to.

21 MS. WALTNER: Thank you.

22 MR. DOPPEL: Paul Doppel.

1 The last one it says "Dual path analysis
2 for lower ELs while staging." It says "Consider
3 costs for upgrade," but then additional input is
4 none, so then you're not considering based on what
5 that says. So, that's kind of what I was bringing up
6 before. You know it says additional input none, but
7 then if there's going to be a consideration for cost
8 input then that should not say none.

9 MR. WESTPHALEN: Well, should we go from
10 the front down and try to check them off.

11 MR. DOPPEL: Well, I just wanted to point
12 out the fact that that could be a problem on some of
13 these others, that same sort of thing.

14 MS. HOOTMAN: This is Jill from Trane.

15 I was going to say if you need us to
16 provide because you will not have that data
17 necessarily. You know so the action is not none you
18 may need us to provide that component wattage. Am I
19 not right because not always it's going to be there
20 to be there for you to use in the literature?

21 MR. WESTPHALEN: That's correct. And I
22 think you know to some extent we're dealing with you

1 know, as John mentioned, the elephant in the room,
2 the June 15th date. And so you know we may decide,
3 as we look into this, that we cannot collect
4 sufficient information to our satisfaction and then
5 we may reach out again.

6 MR. DOPPEL: My concern is that by that
7 column saying none is that that -- I mean maybe that
8 should be disregarded.

9 MS. WILLIAMS: This is Alison.

10 I just wanted to comment, but the "none"
11 doesn't mean no action. It just means that we think
12 that we have the data and what we need, or we know
13 where to get it. And so certainly, if you all have
14 other things you think you can contribute that's
15 fine. I just want to clarify that it's not intended
16 to mean no action. It just means that we think we
17 have a plan to act upon. So, not that you can't
18 provide input, just we didn't think it was necessary.

19 MR. WHITWELL: Bob Whitwell from Carrier.

20 So, Detlef, if you're referring to the
21 previous discussions that were going on between
22 Navigant and some of the AHRI group, right?

1 MR. WESTPHALEN: That's correct. Yes.

2 MR. WHITWELL: Okay.

3 MR. WESTPHALEN: I mean these slides
4 should look very familiar to the people that were
5 involved in those meetings.

6 So, I guess we're going back to the top
7 here. Any more comment on the suggested revision to
8 the analysis here basing the analysis on the units
9 that actually real units with real ratings whose
10 information can be obtained from product literature?

11 MR. THARP: Rusty Tharp from Goodman.

12 One of the things I think you need to keep
13 mind is that there is a very large variance of ER for
14 a given IER and the way a manufacturer may get to a
15 specific rating can vary significantly from one
16 manufacturer to another. And one, as we stated in
17 some of the meetings, I can get to a higher IER by my
18 compression technology, by my E transfer technology,
19 by my air moving technology.

20 So, just because we set a minimum IER
21 doesn't necessarily mean I'm going to get better air
22 flow. I may chose to do it by heat transfer and

1 compression, whereas another manufacturer may chose
2 to do it by heat transfer and air movement. And
3 another may choose to do it a different way.

4 Just looking at what's in the docket
5 ERE2013-BT-SDT-007-01 for a 12 IER unit the ER varies
6 -- and this is DOE's analysis from the HIR directory
7 -- anywhere from just about 11 EER all the way up to
8 12.2 for about 15 IER. It varies from about 12 to 13
9 somewhere range. It's a very broad range and we
10 need to consider how we address that issue in some of
11 this analysis.

12 I guess what I'm looking for would be that
13 we consider having -- looking at different wattage
14 profiles in some manner, shape, or form.

15 MR. WESTPHALEN: So, for each class at
16 each efficiency level instead of selecting a
17 representative unit select how many representative
18 units?

19 MR. THARP: That's something that the
20 working group would want to come up with is determine
21 how we're going to do that because you know if we
22 went to the 1033 buildings maybe we said. You know

1 I'm not suggesting this. I'm just saying that one
2 option would be a third would do one way, a third
3 would do another, and third would do it another way.
4 Whatever the technical experts come up with as the
5 most appropriate manner, but that's something that we
6 should be giving consideration to.

7 MR. ROSENQUIST: Hi. Greg Rosenquist,
8 LBNL.

9 In doing that type of analysis, right,
10 we're doing the downstream from the engineering and
11 doing the energy use. We are completely dependent
12 upon the engineering to characterize the
13 characteristics of that equipment. So, if you want a
14 different type of equipment analyzed for each IER
15 level, it just puts additional burden on Navigant
16 folks to do that. And again, when I'm raising that
17 that to do that that would take time, and we don't
18 have much time.

19 So, the whole idea of using a
20 representative unit to characterize that IER level --
21 I mean I understand your point, Rusty. I think it's
22 very valid, right, there's a huge range -- well, not

1 a huge, but there's a range of EER for a given IER,
2 but given the time we have I think we have to make a
3 decision whether or not we should try to capture that
4 or not.

5 MR. DELASKI: This is Andrew.

6 And I'm not sure I'm completely following
7 what you've done. But another way to address Rusty's
8 concern is instead of doing you know a third, a
9 third, a third is get a weighted average at the front
10 end, right, then you get a weighted average that
11 represents the population -- your best shot at
12 representing the population as opposed to a single
13 representative unit.

14 So, I guess that's the question back to D
15 lift, which is -- so, I mean that's the question,
16 right, do we have a representative unit that's truly
17 representative and how do we know it is?

18 MR. WESTPHALEN: Yes. I mean that's a
19 good question. And you know I can look at the data.
20 You know what's the fan power, how much power goes
21 into the compressor and you know based on all the
22 analysis I've done on these and say, okay, well, that

1 looks about typical. You know certainly with all the
2 experience we have sitting around the table some of
3 the people will say, well no, that's not really
4 representative. It's more like this.

5 You know certainly we can get into that
6 level of detail and later on in the presentation I
7 show some of the representative selections, and we
8 can look at those. You know we haven't provided
9 those component wattage profiles for all of them, not
10 expecting to get this far in the meeting, but that's
11 something that we could do. And say, okay, well what
12 do you think. These are representative, or we could
13 do something like say, all right, let's choose an EER
14 that's in the middle of the range at that IEER level
15 and say, okay, well that's where we want to you know
16 target what the unit would be that would represent
17 that IEER.

18 MR. STARR: So, this is Louis Starr.

19 To some extent, your model is kind of base
20 model of each one of the EL levels; is that right,
21 for your component wattage profile?

22 MR. WESTPHALEN: Yes.

1 MR. STARR: Or is just one right now, I
2 mean, except for EL0 or 1 you assume a certain IER,
3 which was probably the lowest of that then?

4 MR. WESTPHALEN: Well, we're aiming to
5 match the IEER exactly. And so what that does to the
6 EER -- I mean we haven't been systematic and saying,
7 okay, well if we selected one that was off by .1 on
8 IEER does that mean on the higher or lower on EER.

9 MR. STARR: Sorry, I didn't mean ER. So,
10 in this case what you probably gone and saw what's
11 the most typical way people -- or is there multiple
12 models at a given EER level that someone got to the
13 same method by two different ways. In other words,
14 kind of what Rusty was alluding to that different
15 combinations to get to that level that's not a
16 typical -- in other words, the typical layout of the
17 units. Is that kind of right?

18 MR. WESTPHALEN: At the lower IEER levels,
19 particularly for the lower capacity units you know
20 you can look at multiple examples. As you go higher
21 in capacity and higher in IER levels, then you say,
22 okay, well I only have Trane unit here, or I only

1 have a Carrier unit there. And then what'd you do?

2 MR. STARR: Is there -- part of the units
3 a lot different at the lower level where there's
4 multiple units of how they accomplish that or are
5 they pretty much accomplishing the IER the same way
6 or it's all over the board, and so then that changes
7 your profile?

8 MS. HOOTMAN: But he's right, there's very
9 few manufacturers at the upper levels. They don't
10 have a lot to choose from. In fact, I -- this is
11 Jill from Trane. Sorry.

12 I really feel like you know you're going
13 to be surprised when you see the sales data. In
14 fact, there might be some stuff we won't be able to
15 share because there's not enough people reporting in
16 it.

17 MR. WESTPHALEN: What we're trying to get
18 away from is relying on test data of one unit or
19 analysis that we do that -- you know where all right
20 did we test it to make sure it reached that level and
21 go to actual real units and say, okay, we can agree
22 that these units meet these levels, hopefully, and

1 there won't be analysis on that.

2 MR. STARR: So, it sounds like the main
3 concern manufacturers have are that perhaps going to
4 overestimate their energy use of certain models; is
5 that kind of what the concern is? And that it may
6 not be representative of the whole class of equipment
7 and you just particularly choose one?

8 MS. HOOTMAN: Yes.

9 MR. STARR: Do you think it'll change it
10 that much or -- this is a question --

11 MS. HOOTMAN: At the upper levels, yes.

12 MR. STARR: Okay, so at the higher ER
13 levels, but not at the lower ones.

14 MS. HOOTMAN: No question. At minimum, we
15 have lots of models at minimums right now and they're
16 all achieving it all different ways, so you're
17 probably pretty diverse right now. But at those
18 upper levels, threes and fours, there's very few
19 manufacturers, very few models and it's my opinion
20 that we'll show very few sales at that. So, now
21 you're basing something on a model or a design that
22 was designed not for a minimum efficiency, but some

1 glorious level out there to say that I produced the
2 model that did do that. It was never produced,
3 designed for this kind of analysis to be based on.

4 MS. WALTNER: So, Jill, is what you're
5 saying that you think at those higher efficiency
6 levels the wattage profiles would vary as much as
7 they do at lower efficiency levels today -- you know
8 that all models were brought up to meet those levels
9 you think.

10 MS. HOOTMAN: Yes.

11 MS. WALTNER: For the range and how you
12 get there will cause those -- .

13 MS. HOOTMAN: Yes. Because exactly like
14 Rusty said they will all be achieved different ways.

15 MS. WALTNER: Yes.

16 MS. HOOTMAN: And if you do it by
17 compression, it's going to be a completely different
18 wattage profile than if you do it by air flow.

19 MR. STARR: I have a question. Wouldn't
20 you think whoever's making a model they're probably
21 doing it one of the better ways currently? So,
22 wouldn't people follow that?

1 MS. HOOTMAN: No, that was my point is I
2 think there were reasons you did that at the high
3 levels that had nothing to do with making the best
4 design. They had everything to do with, oh, I'm the
5 greatest company out there and I can produce
6 something, and I can do it at this high level. It
7 was not to make the absolute cost optimized, best
8 designed, best energy profile at all. It was for
9 other reasons that those models were made.

10 MR. GALLAPUDI: This is Chandra from
11 Emerson.

12 If you look at the sales data, my guess is
13 -- I don't have the numbers on top of my head, but
14 the EL2 and below has 95 percent or so of the sales
15 currently. I'm just thinking that somehow looking at
16 Rusty's table of IER and EER we need to overlay sales
17 and see where the sales was and how the
18 representative unit falls related to the high sales
19 volume.

20 MR. WESTPHALEN: So, let me try to
21 understand what you're suggesting that at a given EL
22 for a given class we would look at the sales by EER

1 and select an EER that you know that is at the peak
2 sales level?

3 MR. GOLLAPUDI: No, what I mean was, okay,
4 your EL level was it based on IER or EER? I think it
5 was IER based, right?

6 MR. WESTPHALEN: IEER, yes.

7 MR. GOLLAPUDI: SO, if you took at the
8 current sales profile at that IEER level, where would
9 the representative unit land? Is it sold? Is it not
10 sold? I mean I think a representative unit should be
11 something that is sold a lot.

12 MR. WESTPHALEN: But we would then -- you
13 know somebody would say, okay, Rusty sells most of
14 the units in that -- at that EL, so let's use that as
15 the representative unit. I mean I don't know if we
16 could do that. I mean I would be happy to know all
17 of that.

18 MR. GOLLAPUDI: It goes back to how you do
19 you define a representative. It goes back to how do
20 you define a representative unit.

21 MS. JAKOBS: This is Dianne Jakobs from
22 Rheem.

1 Part of the analysis is for EL level there
2 is technologies associated with that EL level. And I
3 think if you just look at products in the marketplace
4 today maybe somebody skipped over a EL level and took
5 something that was easier to do or you know there
6 were different methods to get at your current rating
7 and you didn't actually step through first coil or
8 first staging, whatever it is. So, we might pick an
9 EER level based on the description.

10 I don't know. You've kind of defined this
11 hierarchy that may not probably not -- is probably
12 not true when you look at the the products and
13 production.

14 MR. ROSENQUIST: Hi, this is Greg from
15 LBNL.

16 I wanted to point out that in the revised
17 engineering analysis it's for the 15-ton unit. There
18 are two design paths for EL1 and EL2. One is for a
19 constant air volume system. One is for a staged air
20 volume system, which I believe the question is does
21 that dictate, more or less, the design of that unit
22 if it's going to the constant air volume versus

1 staged? And if it does, then we're capturing some of
2 this effect already on the baseline notes still
3 characterized with one baseline unit.

4 So, I guess maybe there would be a
5 possibility to at least choose one more type of a
6 characterization of the baseline, but again, that's a
7 question to deal with.

8 MR. WESTPHALEN: Yes. I mean you know one
9 thing to potentially suggest is that I mean in all
10 aspects of these analyses there are many different
11 inputs and many different levels that you can chose
12 for all of those inputs. And we've made a lot of
13 those decisions and with the guidance that we've been
14 provided we've tried to steer towards something that
15 you know conforms a little bit more towards all the
16 feedback we've obtained, but ultimately, we think
17 about, okay, if I choose between these two values how
18 will that change my result, and that's ultimately the
19 bottom line. And so you know we can instead of say
20 going to three representative units for each of the
21 class level combinations maybe do some sensitivity
22 analysis to show, okay, what really affects the end

1 result?

2 I mean certainly we're open to feedback on
3 what types of sensitivity analyses we should be
4 conducting. You know one of the themes that Greg
5 alluded to was staging the indoor air volume versus
6 high initial EER level as a trade off, and so we've
7 made an adjustment in our analysis, but there are
8 many other -- you know we don't want to go 100 path
9 here.

10 We just want to go with the two paths in
11 that low EL range, but there may be other things such
12 as large condenser versus -- you know large face area
13 versus deep condenser. You know more surface area,
14 more condenser, less power versus compressed or
15 horsepower. And if there are such tradeoffs that we
16 should look at on a focused bases, I think that might
17 be a way to avoid getting bogged down entirely. And
18 so maybe this is an issue we can come back to.

19 MR. DELASKI: The other thing that I would
20 comment on is that you are going to show these
21 profiles later on I think for the representative
22 units and the manufacturer will have individual

1 reactions to the numbers if they haven't already
2 reacted.

3 MR. WESTPHALEN: Yes. For the 15-ton
4 selections, we -- you know the material we provided
5 last week we provided all those wattage profiles.
6 And any comments on those certainly we'd consider.
7 We haven't provided a whole lot more of that here,
8 again, expecting we wouldn't get to that level of
9 detail.

10 MR. DELASKI: But if anybody's going to
11 have those, you get them from I guess HRI and then we
12 can get them from Nick, right, or maybe you already
13 have them.

14 MR. STARR: The presentation last week was
15 on email to people that were on the hall, so make
16 sure you have your presentation.

17 MR. DELASKI: Yes. Okay.

18 MR. WESTPHALEN: Okay, so do we think we
19 can move on from the first row here? The next item
20 here, low indoor fan power, in the NOPR phase some of
21 the analyses had estimates of the wattage input for
22 the indoor fan that was lower than some people

1 thought was realistic.

2 And again, using the approach mentioned
3 above of using the information for real units where
4 we can obtain product literature and look at the
5 indoor fan horsepower tables to get an estimate of
6 what the fan power should be for that unit and then
7 using assumptions for the motors, i.e., That they're
8 consistent with EPAC requirements and also with some
9 analytical tools that were developed as part of the
10 fathom pump rulemakings to represent what the
11 efficiency level of the motor is when it's operated
12 at lower than nameplate horsepower.

13 We've used the product literature and
14 these other inputs in order to develop the indoor fan
15 power estimates. And for the 15-ton units, I think
16 this was an issue in the NOPR phase more for the 7 .
17 For the 15-ton you know for the most part they're a
18 little bit higher than what we had in the NOPR phase
19 at the highest levels. I think we'll show more
20 change in the 7 where I think there are greater
21 issues, according to the comments.

22 So, from our perspective I think we have

1 what we need for this time. So again, it's open for
2 discussion as to whether anybody disagrees with this
3 thought.

4 (No response.)

5 MR. WESTPHALEN: Well, then moving on to
6 low condenser fan power, again, this was a similar
7 issue. And again, we're addressing it in a very
8 similar fashion, using the fan power input based on
9 product literature, information that we have about
10 the heat exchanger, face area, the air flows on the
11 condenser side typical fan and motor efficiencies in
12 order to estimate the condenser fan power. And we
13 have more information on this later in the
14 presentation just a repeat from the presentation that
15 was provided last week.

16 I don't know if anybody has any more on
17 this side, but from our perspective we had enough to
18 move forward on the analysis.

19 So, moving on to the fourth item on this
20 chart, the single circuit versus dual circuit,
21 meaning one compressor versus two, stages of capacity
22 for the 7 -ton baseline in EL1. Our suggested

1 revision to this is to consider the dual circuit at
2 the baseline and this was one of the issues that was
3 discussed last week that wasn't quite resolved. So,
4 this is something that I don't know if we can resolve
5 it right here and now before I move onto the next
6 item.

7 MR. DELASKI: I think what you heard in
8 the call week, and I think you acknowledge it already
9 was that there is some portion of units that have the
10 single circuit, right, that's what we heard? And the
11 question is does this simplification of a model dual
12 circuit is that acceptable simplification or does
13 that take us off base on that?

14 MR. WHITWELL: Yes, especially when you
15 consider that this capacity class covers product up
16 to 135,000 BTU per hour, so I think the dual circuit
17 is probably more representative of the capacity class
18 than the single circuit.

19 MR. FERNSTROM: So, this is Gary for the
20 California IOUs.

21 I think we need to know the production
22 volume or market share in order to answer this

1 question.

2 MR. DELASKI: Well, then the other
3 question is do you or do you simply not do some sort
4 of -- do them both, right, and then weight them
5 appropriately.

6 MR. FERNSTROM: Exactly. But to simply
7 ignore the single stage I don't think is appropriate
8 unless we have good information that indicates that
9 is appropriate.

10 MR. STARR: So, let's start there. You
11 did the catalog selection. I've forgot how many of
12 them you did. In that it would indicate whether it's
13 single or two-stage compressors, right? You could
14 look based upon all availability, so that would be
15 one way to know it. And then you wouldn't
16 necessarily know the sales data, but you would be a
17 little further along. Do you have an idea of what
18 that mix is?

19 MR. WESTPHALEN: Yes. My expectation is
20 that if you look at 7 -- you know from what we saw
21 the low efficiency units in the 7 -ton range on the
22 model basis maybe half and half. But then when you

1 look at 10-ton, which is an important part of the
2 small class, you know they're all two compressors.

3 MR. STARR: So, another thing you could do
4 is by knowing what the -- AHRs can provide the sales
5 data by the whole product class so you don't know
6 which models sold -- in other words, you could like
7 the IER and the single-stage and two-stage, and then
8 if you knew how much models sold that model class
9 then you could come up with a number. Kind of like
10 what Gary was saying, a sales weighted base volume, a
11 single-stage compressors. But it sounds like they're
12 not collecting that data; is that right?

13 MS. HOOTMAN: Well, we're doing it by
14 product classes, so it's the entire product class,
15 right, Nick?

16 MR. MILSLAK: Yes. So, it's just by
17 product class you know whether it's constant air
18 volume or VAV.

19 MR. STARR: But obviously you could look
20 at the data before you anomolized it and know that
21 mix, couldn't you?

22 MR. MILSLAK: As far as whether it's

1 single?

2 MS. HOOTMAN: I'm not dividing it until
3 then.

4 MR. MILSLAK: I mean it may not be enough
5 that we could report it anyways, depending on what
6 the volume is.

7 MR. STARR: Well, within the absence of
8 data, normally, what I think DOE would do is just do
9 it based upon the number of models. That's how you
10 do your weighing typically. I mean I don't know what
11 else you would do if you didn't have information.

12 MR. FERNSTROM: This is Gary again.

13 The point being I don't think it's
14 reasonable to just make this decision without the
15 information to back up that course of action.

16 MR. WHITWELL: So, based on what Navigant
17 -- Bob Whitwell from Carrier.

18 Based upon what Navigant showed last week,
19 for the 7 -ton in the baseline IEER bucket it shows
20 about 50/50 split between single circuit and dual
21 circuit. Everything above the baseline IER bucket is
22 two circuits. At the 10-ton, everything is

1 two-circuit. So, as you go from 7 to you know up
2 through 10-ton it's migrating from something around a
3 50/50 split to 100 percent two circuit.

4 So, if you're going to have a single model
5 for that capacity class, you could make an argument
6 that the two-circuit would be more representative of
7 the capacity class.

8 MR. DELASKI: So, let me ask the question
9 then, so why do we have to have the single model?

10 MR. WESTPHALEN: We could do multiple
11 models. I mean in going back to how will this affect
12 the analysis, you know thinking on a qualitative
13 bases -- we haven't done the math yet -- if you put a
14 single compressor unit at the baseline, then going to
15 higher levels there will be more of an incremental
16 cost, but there will also be more savings. And how
17 that will balance out in terms of cost effectiveness,
18 well, we haven't done the analysis yet because we
19 haven't done it both ways.

20 MR. DELASKI: But it seems to me that if
21 we -- again, if we have half the units being sold
22 with a single circuit to not characterize them just

1 strikes me as being a problem to sort of leave them
2 out.

3 MR. WESTPHALEN: Half the models at the
4 lower --

5 MR. DELASKI: 7 tons I get that that's
6 not the whole class. I understand that problem.

7 MR. FERNSTROM: And this is Gary.

8 You can speculate that they're going to be
9 more of the smaller models sold than the larger ones
10 because generally as you get smaller you have larger
11 volume relative to smaller volume and larger
12 equipment.

13 MR. STARR: The other thing to think about
14 here is that you know on the lower EL levels that's
15 the cheaper model of equipment and people are already
16 buying that equipment. They'll probably go with the
17 least -- in other words, they'll get the IER level
18 that's lowest, which means most likely the
19 representative class is probably the single stage
20 because you're price sensitive, so you're going to
21 buy the cheapest thing you can that you can put on
22 the roof.

1 And maybe at the higher IER levels there
2 might start to be more selection that the
3 representative class would be in the middle of then
4 of IER levels where as lower levels of efficiency it
5 seems like people are going to buy the cheapest they
6 can, which means that it really should be the single
7 stage of compression, but what do you think about
8 that? Do you think that in your -- since you've
9 looked at these 700 models or whatever, what is your
10 take on that? Do you have one?

11 MR. WESTPHALEN: Whether we should select
12 a single compressor as a baseline versus two? If I
13 had to chose the one or the other?

14 RM. STARR: Yes, kind of based on what I
15 was just saying, do you sort of buy into that or not
16 really? You're not sure.

17 MR. WESTPHALEN: Well, I mean I would want
18 to see the shipment data. You know another thing
19 that plays into this is when we consider economizing
20 and trying to model an integrated economizer with a
21 single compressor that just doesn't work. And so,
22 one might ask, okay, are these single compressor

1 units mostly southern units? Maybe they are. It's
2 more where you use economizers probably.

3 MS. HOOTMAN: Speaking for my company, I
4 would say that they're very diverse actually. I
5 don't think that there's a regionalization to them,
6 and I'm just speaking for my company. Jill Hootman,
7 Trane.

8 MR. DELASKI: And Jill or anyone else, who
9 may want to comment on Louis' point, or argument or
10 hypothesis was that this is a low cost entry.

11 MS. HOOTMAN: And that's really the
12 driver.

13 MR. DELASKI: So, this is a low cost
14 entry, so that will affect the buyer who's buying on
15 cost only. It could be anywhere in the country
16 really.

17 MS. HOOTMAN: That's right. And that
18 really is the driver.

19 MR. DELASKI: Right, so they're dispersed,
20 and they're a significant market share.

21 MS. HOOTMAN: Yes.

22 MR. DELASKI: That 7 tons, but not at

1 10. So, it strikes me that they need to be modeled
2 and you can't just throw this out as a baseline. I
3 mean you could do unless the sensitivity shows it
4 doesn't matter. So, I don't know -- I can't sit here
5 today and say they don't matter based on what I know.

6 MR. WESTPHALEN: As I said before, I
7 expect the savings would be greater going from a
8 single compressor baseline, but the cost would be
9 greater, the cost effectiveness you know DBD.

10 MR. STARR: So, actually, I mean I guess I
11 would certainly be okay with saying a single
12 compressor would be the baseline because that's where
13 they're manufactured. I kind of feel like -- it
14 sounds like they're agreeing with that. I'm not sure
15 if they are or not, but if they are then it makes it
16 easier to just assume the baseline is a single stage
17 compressor.

18 MR. DELASKI: And my supposition would be
19 that the cost effectiveness is probably pretty
20 advantageous, because that's what they do, right?
21 That's the first thing a -- maybe it's not the first
22 thing, but it's -- I'm saying if there's single-stage

1 compressors at 7 , but at 10 you know it seems like
2 that's one of the first things people are doing with
3 those two stages.

4 MS. HOOTMAN: That has a lot to do with
5 the fact that the codes are now -- you know you just
6 have another model at that is certain to be
7 diminishing return, so you know five years ago or
8 seven years ago we did have 10 tons that were single
9 compressor.

10 MR. DELASKI: The fact that the market is
11 trending in that direction it suggest to me cost
12 effectiveness.

13 MS. HOOTMAN: No, I think we were more
14 forced there by codes. We were forced there by the
15 circuit codes, the two-speed fan codes.

16 MR. DELASKI: Okay, well, I guess we don't
17 know until we do the analysis.

18 MR. WESTPHALEN: Well, I was going to
19 suggest perhaps a bit of comfort with a two-stage.

20 MS. HOOTMAN: No question, but you know
21 when you're a first-class sensitive comfort doesn't
22 always come into play.

1 MR. FERNSTROM: This is Gary.

2 It's interesting to me to observe this
3 discussion between whether it was cost effective or
4 if we were forced there by code because in my mind
5 presumably the code is cost effective, so those two
6 ways of thinking about it ought to be synonymous.

7 MR. AMRANE: Karim with HOI.

8 I guess my question to the manufacturers
9 is can we collect this information or not, given the
10 timeframe given to us to collect this information, or
11 would it be too difficult to collect it?

12 MS. HOOTMAN: I'm just speaking for my
13 company. That is not that hard to get. The IER was
14 the hardest stuff to get, but that's not that hard.

15 MR. SACHS: Harvey Sachs, ACEEE.

16 A long time ago, Jim Wolf of Trane said
17 that something about the baseline is the least
18 efficient thing I can sell and stay out of jail and
19 that was for a single-stage, 7 ton and perhaps a
20 two-stage by the time you get to 10 ton.

21 MR. WESTPHALEN: So, I guess moving
22 forward on this and thinking about the options might

1 be, one might be analyze both, but I think that's
2 what I'm hearing in any case, but then how do weight
3 them, whether that be based on shipment data or a
4 number of models.

5 MR. SACHS: This is Harvey.

6 And it seems to me that once you've done
7 that analysis that's arithmetic portioning, based on
8 the quality of information you get from the
9 manufacturers and so they can provide that. If we
10 can get shipment weighing cool. If we can't, we have
11 a little bit of sensitivity question for model
12 numbers. But I think the important thing is to make
13 the decision that we should be looking at a
14 single-stage in the 7 ton and a two stage in the 10
15 ton.

16 MR. WESTPHALEN: I think in any case, at
17 least on Navigant's part that's clear enough marching
18 orders to move forward with additional.

19 MR. STARR: So, the only thing I would say
20 is that if -- I could see a driver would need to
21 collect -- but if they don't collect a mixture of it,
22 it seems like it wouldn't be worth you're just

1 spending time -- it's not necessary to spend time on
2 it. So, before I did that I would make sure if they
3 were to collect data or not and figure out what that
4 mix is; otherwise, it seems like we'll just assume
5 that a single-stage compressor.

6 MR. DELASKI: But I think you heard at
7 least one manufacturer say it wasn't that hard.

8 MR. WESTPHALEN: However, by the time we
9 get the data, we have to have the answer already.

10 MR. CYMBALSKY: John from DOE.

11 I just want to make it clear because maybe
12 it wasn't clear in my mind even that the NOPR
13 analysis had the single-stage unit as the baseline.

14 MR. WESTPHALEN: We're doing a little
15 different or more work now than we did then.

16 Okay, I don't know who's taking notes, but
17 you know from my perspective this means we'll be
18 working through the engineering for both one and two
19 compressor at baseline 7 and then should we
20 consider whether we would carry that through to EL1
21 or I don't know those that have looked at the data
22 for the last week whether that's compelling enough at

1 EL1.

2 MR. CYMBALSKY: And is it possible to go
3 in with the revision of a 50/50 split until we get
4 data that says something different? Is that okay
5 with people? I'm just throwing it out there.

6 MS. HOOTMAN: I'm okay with that.

7 MR. WESTPHALEN: Yes. I mean changing the
8 number downstream is easier than coming up with the
9 two different numbers.

10 MR. CYMBALSKY: Right.

11 MR. WESTPHALEN: EL1, 7 -ton units are
12 available with a single compressor as well, but you
13 know there the split is leaning a little bit more
14 towards the two compressor.

15 MR. SACHS: This is a factual question,
16 and the answer may differ with a manufacturers. When
17 I go to a two-stage in these smaller units, is that
18 typically done with two compressors or a
19 two-stage/modulating compressor, likely the 7 ton
20 to go with a two and a half and a five, so I get
21 three stages, or is likely to be done as a two-stage
22 machine that gives me -- a single compressor that

1 gives me two values?

2 MS. HOOTMAN: Jill from Trane.

3 If we're talking about the low-cost,
4 single compressor it doesn't have any modulation
5 because that is expensive.

6 MR. SACHS: Jill, I'm sorry. Thank you
7 for trying to bail me out, but once I made the
8 decision to go two stage, is that more likely to be
9 with using two constant speed compressors or a single
10 modulating compressor?

11 MS. HOOTMAN: I don't know that we could
12 characterize it because everyone has different design
13 choices for different reasons.

14 MR. SACHS: Thank you.

15 MR. WESTPHALEN: Well, I guess regarding
16 the EL1 I don't know if there's any input. I think
17 if we can find and had the time do to it both ways at
18 EL1 we'll consider that.

19 Okay, so maybe moving on to the next
20 issue, the last one on this page here, that is staged
21 air flow for lower efficiency levels. So, in the
22 NOPR analysis the concept of reducing the indoor air

1 flow part load was not introduced until EL2 or 3. It
2 might've been EL3 and so as a revision here what
3 we're considering is the dual path of the lower ELs,
4 in particular, for EL1 and EL2 introducing staged
5 indoor air flow and considering that cost efficiency
6 path and what it means to the energy use analysis in
7 buildings, and then also considering constant air
8 blowing path.

9 And there are several considerations here
10 as well. Some have to do with the existing buildings
11 for which you are replacing the unit, which might
12 have been constant air volume where the existing
13 ductwork would have been constant air volume
14 ductwork. And so this is where we get into
15 potentially considering costs for upgraded air
16 distributions in lower stage air flow less than 60
17 percent of full air flow where the existing diffusers
18 wouldn't operate properly. You wouldn't get good air
19 mix and it would be very cold underneath the
20 diffuser, but not cool enough far away.

21 So, this is where we said from our
22 perspective we received enough feedback from the

1 group that we think we could go forward with the
2 analysis, but we can revisit this in the discussion
3 here today.

4 MS. WALTNER: What sort of data do you
5 have on existing distribution systems, like the
6 percentage that are considered.

7 MR. ROSENQUIST: In our last phone call, I
8 think that we looked at the CBAKS 2003 and around the
9 70 percent/30 percent split, or a 70 percent constant
10 air volume and 30 percent are variable.

11 MS. HOOTMAN: And Greg, that's at what, up
12 to the 135,000 and that's it?

13 MR. ROSENQUIST: There's no designation on
14 capacity.

15 MS. HOOTMAN: No designation.

16 MR. ROSENQUIST: Right.

17 MS. HOOTMAN: Okay.

18 MR. ROSENQUIST: So, without anything else
19 we would use those fractions.

20 MS. HOOTMAN: There's no designation by
21 like square footage or anything like that?

22 MR. ROSENQUIST: There is that, yeah, a

1 big building.

2 MS. HOOTMAN: So, the bigger the building
3 would it designate then if it was a 70/30 split or
4 not?

5 MR. ROSENQUIST: We could desire down to
6 that level, so I don't know those numbers by the size
7 of the building, but we can certainly do it that way.

8 MS. HOOTMAN: So, I mean if we were to
9 agree that -- and I don't know if we are. I'm just
10 saying if we were to say that everything for the
11 product class up through 135,000 is square footage of
12 -- and I'm just filling in the blank -- you know
13 whatever, 20,000 square foot. And then we said the
14 next one is 20,000 square foot to whatever you know
15 you could characterize it by that?

16 MR. ROSENQUIST: Yes.

17 MS. HOOTMAN: Okay.

18 MR. FERNSTROM: So, this is Gary.

19 The outcome of that would probably that
20 we'd find smaller capacity equipment is much more
21 likely to have constant air volume than larger
22 buildings and larger capacity.

1 MR. ROSENQUIST: Yes, I think that's what
2 the group -- the formal working group has sort of
3 concluded because I think it's on the table right now
4 what to do about 30-ton equipment, right? And there
5 was one point made that perhaps that one should be
6 considered to be variable air volume or staged air
7 volume at the very minimum. So, anyway that
8 discussion is for a later time.

9 MR. FERNSTROM: So, probably in new
10 construction that's true, but for existing buildings
11 it may not be so much.

12 MS. HOOTMAN: So true. And at 30 tons I
13 would ^^^^ but during this 35 years I was product
14 manager for many of those years and I will tell you
15 that a good portion of them are variable air volume.
16 They have been since the 1980s, so they're there.
17 They're all variable air volume. They used different
18 control methods, but they're variable air volume.

19 MS. WALTNER: Jill, am I correct in
20 remembering that that's one of the things you were
21 collecting data onto what percentage?

22 MS. HOOTMAN: Yes.

1 MS. WALTNER: Okay.

2 MR. ROSENQUIST: The answer to that would
3 be borne out in that data, at least on current
4 shipments.

5 MR. CYMBALSKY: Can't a big building just
6 use a lot of smaller units? Is that common practice
7 from my not a lot of knowledge, but just looking on a
8 rooftop it seems to me that you can employ lots of
9 small, constant volume units to a larger building.
10 The only reason I bring it up is because I want to
11 caution that mapping that you're describing could be
12 that.

13 MS. HOOTMAN: I agree, John, that would
14 have some works to it. And you're right, at larger
15 buildings, depending on its use, could be all
16 constant volume or it could be BAB. If you
17 classified it as an office, it's BAB. If it's a large
18 box retailer at that same large then they're constant
19 volume, and it's the nature of what's happening in
20 the building. I agree. It has works. I didn't know
21 what his data had. That's what I just asking him.

22 MR. CYMBALSKY: I'd feel more comfortable

1 with the building type defining the volume.

2 MR. SACHS: This is Harvey.

3 And a follow-up question for Jill. My
4 memory is that the CBAKS data also breaks down by
5 number of floors. And by the time you get into the
6 30 ton are you penetrating more than two floors or so
7 for your BAB systems.

8 MS. HOOTMAN: It still could be two floors
9 and still could be a single floor. I mean I could
10 think about around Nashville where I'm from you know
11 there's a lot of single-story, big square footers
12 because land's cheap.

13 MR. SACHS: I understand that. I'm really
14 asking the converse. Am I seeing 40-ton units on
15 six-story buildings carrying the air all the way down
16 from the roof? That's important to me. Thank you.

17 MR. STARR: Well, I would say something
18 about that. Normally, the cheapest thing to do is
19 what you would do, which is you get the biggest
20 amount of equipment to cover the most you can in the
21 building. So, you have the option of two 60 tons for
22 an office building -- three-story office building you

1 would try to go with one large unit and drop one --
2 the more drops you have in the building the more
3 floor space you take up and so you generally try to
4 keep everything in one spot and run as much -- the
5 biggest equipment you can with the centralized
6 ductworks.

7 MS. HOOTMAN: If it's all single owner.

8 MR. STARR: Yes.

9 MS. HOOTMAN: Yes, building ownership is
10 not always single ownership, metering and all that
11 has to do with it.

12 MR. STARR: So, I had another question
13 about the 60 percent if we were moving onto that,
14 that 60 percent of full load I have a question in
15 general about. Are you saying when you have a system
16 that can deliver below 60 percent air flow then you
17 are considering the cost of upgrading the system? Is
18 that essentially what you're doing in that for your
19 analysis?

20 MR. WESTPHALEN: Yes, there would be cost
21 of upgrading the particular diffusers if it's a small
22 capacity.

1 MR. STARR: So, right now the way the
2 two-stage equipment works is that it's at -- well, I
3 should say I think this is how it works is that 100
4 percent where it turns down to 66 percent of air
5 flow. So, in that case on the two-stage equipment
6 you would not be considering the upgrading of your
7 distribution system; is that right?

8 MR. WESTPHALEN: Well, I was a little bit
9 surprised when I heard the comment last week that at
10 two-thirds you're fine with any existing traditional
11 CAV diffusers, but that's potentially something up
12 for discussion.

13 MR. STARR: I actually had that. Where
14 that comes from is the 9.1. It requires that you
15 have for staged equipment you have two stages. My
16 understanding was that it's more for ventilation.
17 So, when you're heating or cooling, you're basically
18 a hundred percent. And then when you're ventilating,
19 you switch to your 66 percent load. But what I don't
20 know is do they have staging, such that if you switch
21 down to your 66 percent because then that would seem
22 like more of a problem.

1 In other words, if you were ventilating a
2 space maybe the air distribution isn't so critical,
3 but if you're running a light load and running your
4 AC all day at 66 percent on a moderate day then
5 that's where kind of what Detlef was saying would be
6 surprising. And so I don't know enough about the
7 equipment to know if you're going to run at a lower
8 stage at a lower CFM or would you run your cooling
9 always at the higher CFM no matter what.

10 MR. WHITWELL: We run the lower stage at
11 the lower air flow.

12 MR. STARR: Okay. Is the 66/100 percent
13 the right split on that, or does it depend upon the
14 characteristics?

15 MR. WHITWELL: Well, the 66 percent comes
16 from ASRAC 90.1 where it says you must have two
17 stages of air flow and the lower stage must be at 66
18 percent.

19 MR. STARR: Is that essentially just
20 really constant air volume application and so now
21 they've put some more requirements in there, say fan
22 energy? So, it's really just a constant air volume

1 distribution system essentially; is that what it's
2 being hooked up to? I mean you're not hooking up the
3 VAV boxes, right?

4 MR. WHITWELL: That's correct.

5 MS. HOOTMAN: That's why it's called
6 single-zone VAV. It's varying the air volume, but
7 still a zone is all ductwork and all that is
8 considered single zone.

9 MR. WESTPHALEN: So, I think one of things
10 we potentially have here for input is guidelines that
11 the LBNL team can use if the recommendation is that
12 they do this to apportion the different capacities to
13 the different building sizes and the CVAC survey in
14 order to allow proper estimate of accommodating these
15 buildings at different capacity levels are VAV or
16 CAV.

17 MR. STARR: Are you talking about the
18 three levels? What percentage of constant volume of
19 VAV or are you trying to get the split on that?

20 MR. WESTPHALEN: Well, Greg mentioned that
21 CVAC has the percentages of the floor space that is
22 CAV versus VAV. And so, Jill had the question of,

1 okay, well that would vary by the size of the
2 building or it would vary by the type of the
3 building.

4 And so, there's the question of instead of
5 straight up using a commercial building percent of
6 CVA to do a little bit more of the disaggregated
7 query into CVAC you know to do a
8 two-dimensional/three-dimensional assessment to
9 figure out what percentages really are CVA.

10 MR. ROSENQUIST: You know Katie just
11 looked at the CVAC data and the 2003 CVAC data and at
12 least by building count smaller buildings have a much
13 lower percentage of VAV than larger buildings, and it
14 sort of graduates up. It's more like a bit of a
15 hockey stick.

16 MS. HOOTMAN: Yes, we would agree by
17 equipment shipments.

18 MR. ROSENQUIST: So, with that then, I
19 mean --

20 MS. HOOTMAN: That's what I'm saying.
21 With that then do we say that the small class is
22 constant volume, the 15 ton we probably have a

1 discussion about, and the 30 is probably all VAV.
2 You know I don't know. I mean that's why I'm saying
3 I don't know that we can flatly say 70/30 across all
4 of it.

5 MR. ROSENQUIST: Right. Like say for 15
6 ton we have two design paths, right, for 15 ton at
7 EL1 and EL2, and the 7 ton will be the same thing.
8 So, I mean we could allocate a market share of zero
9 percent for 7 ton or 10 percent or some small
10 fraction, whatever. Again, what this working group
11 decided.

12 MR. WESTPHALEN: Yes. And AHRI is
13 collecting data on this, so that'll help us to decide
14 what percentage we should allocate of the different
15 capacity classes because even at 7 in that capacity
16 it won't be zero. It's not a zero.

17 MR. CYMBALSKY: This is John from DOE.
18 So, what I'm hearing is we're going to
19 vary these percentages once we get the data from
20 AHRI; is that what the group is -- okay. That sounds
21 good to me too.

22 MR. WESTPHALEN: Yes, it almost sounds to

1 me like LBNL would do a first cut and then it might
2 be adjusted based upon their result.

3 MR. ROSENQUIST: Right. Because we're
4 planning to do these different design paths, right,
5 based upon the type of air volume system it was. And
6 we're going use 30/70, right, but now we'll use some
7 refinements to that. And we won't zero out the VAV 7
8 tons, but we could, based upon what we're seeing
9 here and again just report back when show our
10 results.

11 MR. CYMBALSKY: Okay, I'm going to jump in
12 and declare it's lunchtime. We'll come back in one
13 hour and 19 minutes.

14 (Whereupon, a lunch break was taken at
15 12:26 p.m.)

16 MR. BANTLE: Okay, good afternoon
17 everyone. We will bring it back together. I hope
18 everyone had a good lunch.

19 Just a brief comment from the Legal
20 Department, and then we'll head back to Navigant.

21 MR. STAS: Eric Stas, DOE.

22 So, especially for Andrew, I took your

1 questions back and started the process to get some
2 answer percolating. I'm not going to have those
3 answers today, but we'll try to get them to the group
4 as soon as possible. I've urged by the next meeting,
5 but it's kind of a little bit out of my hands; but as
6 soon as we can get it to you we will get it to you.

7 MR. WESTPHALEN: All right, so I think we
8 finished with slide here, so I'm moving on to the
9 next set of issues.

10 (Slide.)

11 MR. WESTPHALEN: So, the one at the top
12 here pointing out that the baseline unit -- some of
13 the baseline units selected for the analysis at had
14 EER lower than the current standards. In the
15 revision, essentially, we're basing the analysis on
16 existing models which meet the standards; otherwise,
17 they wouldn't be for sale.

18 I don't know if we want to go back to that
19 question of the EER. I mean I think there are many
20 issues associated with EER, but if there's no comment
21 I'll move on.

22 (No response.)

1 MR. WESTPHALEN: One thing brought up was
2 the potential need for conversion curves. If the
3 standard mandates efficiency levels that push package
4 sizes larger than the existing package size for
5 replacement units and so the team is considering
6 incorporating this into the analysis.

7 There was some discussion last week about
8 potentially some of the manufacturers, maybe through
9 surveys or measurements, providing some input on
10 potential pressure drops and cost parameters
11 associated with conversion codes, and so that's why
12 we have the additional input required here. I don't
13 know if anybody has any comments or information at
14 this point on that.

15 MR. STARR: This is Louis Starr with NEEA.

16 I think one of the things from -- I guess
17 in my mind the phone call the concern I have is on
18 the conversion. So, it's basically additional
19 pressure drop due to the conversion curve. And the
20 thought is the bigger the unit the case sizing gets
21 larger and now all of a sudden you have to have in
22 order to fit on the same curve you need a curve

1 adapter to fit on there, which is possible for the
2 higher -- basically higher EL3 and 4s is ones that
3 it's going to apply to. Is that, more or less, the
4 issue that we're talking about?

5 MR. WESTPHALEN: Yes, that's the issue.

6 MR. STARR: Okay. So, the thing I had
7 about that in addition was really there -- you know I
8 would probably be okay with that. It's just the
9 magnitude of the pressure drop relative to the amount
10 of pressure drop that's being used in the air
11 handler. And you know I have a proposal is that you
12 know the typical -- I looked through the PNL models,
13 the 90.1 models, and I also looked through the
14 commercial DOE prototypes. And basically, they used
15 in small office, which is generally the small air
16 handlers that would probably be appropriate for our
17 size is they're using about 2 static inches of
18 pressure for the fan. And a conversion curve --

19 MS. HOOTMAN: Total?

20 MS. STARR: Yes, total. It's a lot as
21 opposed to the HR test procedures .3 something. And
22 so, what I would think might be a good idea was that

1 it makes sense to add a pressure drop of something,
2 but I think percentage-wise -- in other words, let's
3 say there's 2 inches of pressure and you figure the
4 conversion curve is .2. So, that's basically an
5 additional 10 percent pressure drop that you have to
6 overcome for having a conversion curve.

7 So, what I was thinking is like let's take
8 whatever the -- the thing that you're writing, the
9 equipment at .3 pressures and just add 10 percent
10 more on for a curve adapter and run that using the
11 number of your static pressure for those higher EL
12 levels. Do you get more or less what I'm talking
13 about or the concept?

14 MR. WESTPHALEN: I understand what you're
15 talking about.

16 MR. STARR: But do you see a problem with
17 that? I mean -- well, first of all, I guess I should
18 say do you see an issue if we attribute like .5
19 inches for the higher EL levels as opposed to .3
20 inches it's just that it's going to really show a lot
21 of fan energy in the higher static or in the higher
22 efficiency levels, and that doesn't seem quite fair.

1 That's what I'm trying to get at with this
2 suggestion.

3 MR. WESTPHALEN: Well, maybe the
4 conversion curve would loss more for a larger
5 capacity. Until somebody has some data, we don't
6 know.

7 MS. WALTNER: And I think the underlying
8 issue is that we're not using realistic static
9 pressures for the system in the rest of the analysis,
10 so then when you look at the static pressure we're
11 using there compared to the side pressure added by
12 the conversion curve the relationship is off because
13 we're not using the right or real-world static in the
14 system. So, that's going to sort of bias the results
15 against higher efficiency levels.

16 MR. WESTPHALEN: No, I understand that.
17 But in order to get the right impact of the
18 additional pressure drop, you really want the actual
19 pressure drop, not a percentage of the other external
20 static pressure. And I see these two issues as --
21 you know they're related, but they're separate
22 decisions to make on these two issues.

1 MR. DOPPEL: Paul Doppel.

2 I think it should be noted that the
3 external static pressures that are used in the
4 testing are set up for a certain building parameters
5 and that's so that there could be equitable,
6 comparable testing from one system to another. And
7 so there's going to be whole variances of what a
8 system could see once installed, but they are
9 realistic for the testing parameters that have been
10 set up.

11 MR. FERNSTROM: So, this is Gary for the
12 California IOUs.

13 I understand the value of having an even
14 playing field such that the test allows different
15 units to be compared to each other, but it's really
16 important for us, the California Utilities, to try
17 and have these tests results be as realistic and
18 representative of field conditions as possible. And
19 oftentimes, tests are simplified in such a way to
20 allow comparison between equipment all right, but not
21 necessarily be very representative of field
22 performance.

1 So, it would be great if we could move in
2 the direction of utilizing numbers in our analysis
3 that are as representative of field conditions as
4 possible.

5 MR. STARR: So, you know I was just
6 thinking -- so I actually asked some engineers
7 because the conversion curves are kind of unusual to
8 apply because it's usually only a retrofit that
9 you're going to do this on. And the numbers they
10 gave was a 1/10 of an inch to 2/10 of an inch.
11 Actually, they threw in some other things like
12 systems affect, which you're not talking about, but
13 if you think about whether it's a 1/10 or 1/10 of an
14 inch when you only apply it to a fan static pressure
15 point or two -- if you do it on a percentage basis,
16 it doesn't really matter whether it's a 1/10 or 2/10
17 the additional amount is going to have little affect
18 on it.

19 So, I mean I personally would be okay
20 whether it's -- you know you use 1.5 or .2 it's
21 probably okay. It's more the treatment of that next
22 step. So, to my mind the pressure drop of the

1 conversion curve is not so much the issue, but it's
2 how you apply it to the next step that you're going
3 to do that I really have an issue with.

4 I mean, in other words, what if it's .17
5 -- I don't think it's going to make a difference if
6 it's .2, .17 or .15. if you're just adding on that a
7 small percentage on the .3 static of that as opposed
8 to .2 onto that. That's where the big difference is.

9 MR. WESTPHALEN: So, when you're referring
10 to the next step, you mean you know the general ESP?

11 MR. STARR: Exactly.

12 MR. WESTPHALEN: And that's one of the
13 parking lot issue that we have you know like a
14 separate topic for discussion.

15 MR. STARR: Okay.

16 MS. WALTNER: You know another question on
17 conversion curves maybe going back to the cost side
18 of things. So, my understanding from the
19 conversation last week was that some units use them.
20 Some units don't. You know what's the potential for
21 units to be redesigned so they don't need conversion
22 curves because that might be more cost competitive?

1 Have we thought about that? And do manufacturers
2 have thoughts on how necessary conversion curves are
3 at higher levels and whether that will remain the
4 case you know if we move the standard to those higher
5 levels?

6 MR. WESTPHALEN: I don't doubt that the
7 manufacturers in this room have engineering at their
8 disposal that's very creative and might be able to
9 you know come up with higher efficiency levels at
10 some point that fit the existing curves, but at this
11 point we're kind of heading down the path of basing
12 the analysis on existing units where we can point to
13 the sizes. And so that would be the basis of at what
14 point would a replacement unit have to either have a
15 larger curve built into the roof, which is probably
16 less cost effective, or put a conversion curve on
17 there in order to install it.

18 MR. DOPPEL: This is Paul Doppel.

19 So, what's your intent for how to handle
20 this in the current analysis then? So, how are you
21 going to determine whether your conversion curve is
22 needed or not?

1 MR. WESTPHALEN: Well, we were thinking
2 that EL3 would be an appropriate place to say that,
3 okay, at that level or higher we'd need a conversion
4 curve.

5 MR. DOPPEL: And did you find that the
6 units that you looked at today all required a
7 conversion curve at EL3, or have you looked?

8 MR. WESTPHALEN: We looked at the size
9 progression for the key capacities we were looking at
10 for different manufacturers. And some bump up in
11 size --

12 MR. DOPPEL: I'm sorry. You're talking
13 pretty quietly.

14 MR. WESTPHALEN: Some bump up in size at
15 lower levels in EL3, some at EL3. I mean I don't
16 have all the data in my head.

17 MS. WALTNER: And I don't know that that's
18 necessarily fair to characterize it on what it is
19 today. Those designs at EL3 and EL4 today are not
20 designed to be the minimum efficiency. We will look
21 at it differently.

22 MR. DOPPEL: Right.

1 MS. WALTNER: They are high premium. You
2 know not optimized necessarily in cabinets like we
3 would look like in the future.

4 MR. DOPPEL: Right.

5 MS. WALTNER: So, I don't know that that's
6 a fair characterization to say that you know here's
7 the break today and that break will happen tomorrow.
8 But all of us no matter what we do, no matter how
9 fantastic engineering we have, we will have break
10 points. It will require conversion curves, and the
11 market is over 60 percent replacement.

12 MR. STARR: So, one last thing, so on that
13 you're assuming on EL3 it's only on the percentage of
14 the market that needs -- on new construction you
15 don't need conversion curve, right, to put it on?

16 So, when you look at the EL3, it's only
17 the percentage of EL3 that's going into existing.
18 So, where that's 60 percent or 80 percent or whatever
19 that is, the number, so it doesn't get applied across
20 the whole category, is that right, or are you
21 splitting it up into two segments. One that EL3 it's
22 conversion curve and EL3 it doesn't get a conversion

1 curve in your analysis?

2 MR. WESTPHALEN: The intent would be when
3 considering an EL3 as a standard level. If the
4 consensus is that's the right level to require a
5 conversion curve, then you would look at the
6 replacements that aren't already at that level and
7 say those would require a conversion curve.

8 MR. ROSENQUIST: The other thing I wanted
9 to add regarding the static pressure -- I mean so
10 this is a section that I'll be addressing, but
11 jumping ahead we're planning on having Detlef and the
12 Navigant engineering team provide us with fan powers
13 at higher static pressures for the same rated powers.
14 And the input we would need from the working group is
15 at what static pressure should we use to do that.

16 MR. STARR: That's easy. Just use the
17 90.1 models and that'll get you the 2.5 static inches
18 that I was talking about. I looked a couple
19 different types of warehouses and small office and
20 came up with those numbers. And it has a static
21 pressure as to the inputs into the model.

22 MR. ROSENQUIST: Yes, we were just looking

1 at the blast data, and apparently they model .75 and
2 1.25 external static pressures in that analysis so I
3 don't know what the basis of that is.

4 MR. WESTPHALEN: What were those values
5 again?

6 MR. ROSENQUIST: .75 and 1.25.

7 MR. SACHS: This is Harvey.

8 I really need to ask for an explanation to
9 overcome of my naivety. When I think about the
10 general issue of the conversion curves or any curve,
11 I see at least three parameters. One of them is the
12 cross-sectional area of the supply and return ducts.
13 The second is the positioning of the supply and
14 return ducts. And the third is the total area batch
15 of the curve. Now, which of these are the critical
16 parameters as we move up in EL?

17 I understand the heat exchangers are
18 getting bigger. Does this mean that my duct sections
19 are also getting bigger? Does this mean I'm moving
20 things around within the cabinet to re-optimize that
21 spacing, and therefore I've got to have an adjustment
22 to move the supply and return ducts? What exactly is

1 the engineering issue that the conversion curve is
2 addressing?

3 MR. WESTPHALEN: Well, it's addressing --
4 you know supporting the weight of the unit. And as
5 you point out, having the openings for the return and
6 supply ducts in the right in places. You know in
7 some cases you could envision the unit hanging over
8 the existing curve.

9 I mean we're open to input on -- you know
10 is EL3 not the right level at which to consider this?
11 Should there be a more sophisticated assessment for
12 each given situation, given the existing models that
13 we're talking about? I mean we're open to discussion
14 on this.

15 MR. SACHS: Please let me try once more.
16 And maybe I should be addressing this to Bob and Jill
17 and the other OEMs, that as I move up -- you too
18 Rusty. In EL4, am I likely to be moving my condenser
19 and evaporator -- well, my supply and return ducts
20 further away from each other so I now have to have
21 some curve in my adapters? And that means I've got
22 to have some vertical spaces.

1 MS. HOOTMAN: Yes.

2 MR. SACHS: That's where I'm trying to get
3 a figure on.

4 MS. HOOTMAN: The openings might get
5 bigger. They might change in space.

6 MR. WHITWELL: That's what the conversion
7 curves would refer to what numbers.

8 MR. SACHS: So, is this something that is
9 changing what I'll call footprint as well as size?
10 Footprint being the relative position of the two
11 ducts and their size, is that something that starts
12 happening at EL1? Does that start happening at 3?
13 Does that vary enormously, depending on capacity and
14 manufacturer choices or where are we on that?

15 MS. HOOTMAN: It definitely happens at
16 three. It's my opinion it definitely happens at
17 three. Jill Hootman from Trane. Sorry.

18 MR. WHITWELL: Yes, I agree. Bob Whitwell
19 from Carrier.

20 MR. SACHS: Thank you. This is Harvey.
21 And that helps me a great deal. Would I be thinking
22 in terms of the vertical riser to accommodate that

1 offset that looks like it's 12 inches, 24 inches, 6
2 inches on a 15-ton unit? Is this thing going to be
3 up on stilts?

4 MR. HOOTMAN: On a 15 ton, it could
5 elevate it three to four feet, yes.

6 MR. SACHS: Thank you. That's very
7 helpful.

8 MS. HOOTMAN: So, accommodations also have
9 to happen on the roof for stairways, for access for
10 servicemen in order to get to these units now because
11 they are that high up. It definitely happens on 30
12 tons.

13 MR. DELASKI: This is Andrew.

14 I just want to follow up on Jill's earlier
15 point, which is that a manufacturer when a new
16 standard goes into effect are going to redesign to
17 meet that new standard in their volume product,
18 right? So, what we see today -- you're doing a model
19 based on what you see today, recognizing that what
20 you see today is not what you're going to see in the
21 market comply with the new standard. And so that's
22 sort of a basic, underlying tension in this analysis,

1 the way it's structured and we can't make that go
2 away. You know these are some decisions being made
3 already earlier today.

4 What I would submit to the group is that
5 there's a built-in conservatism in the analysis
6 because of this, right? So, you're building in a
7 cost that, as someone said earlier smart engineers
8 may very well find a way to develop because you're
9 going to have a cost advantage. If you can make that
10 product without a conversion curve and your volume
11 unit for that portion of the market during the sales
12 you're going to have a big advantage in the
13 marketplace, right, come three years from the final
14 rule date.

15 And your competitors are going to have to
16 do the same thing or else they're going to lose
17 market share, right? So, it's going to be tremendous
18 pressure to find those solutions. Unfortunately, I
19 can't sit here today and say you know at what level
20 that's going to be, right, at what level do you not
21 need a conversion curve?

22 But what I would submit to the group is

1 that it is a conservatism in the analysis that's
2 going to increase costs and reduce savings at those
3 higher levels. And that quite possibly will not
4 obtain -- you know I don't know a way -- I can't say
5 it's EL3, EL3.1, EL3.5. I don't know. There's no
6 way for me to say.

7 MS. HOOTMAN: Jill from Trane.

8 And I agree, Andrew, but you also have to
9 remember that we also opportunistically have to look
10 at who was in the marketplace, who were we replacing?
11 And we might be replacing someone else, so it's not
12 just like manufacture to like manufacture. It's you
13 know if I'm trying to grow a marketplace I'm going to
14 try to replace over Carrier. So, I might choose
15 different ways to attack that.

16 MR. DELASKI: But would that apply, the
17 conversion curve?

18 MS. HOOTMAN: I'd have to do a conversion
19 curve, likely.

20 MR. DELASKI: At any efficiency level?

21 MS. HOOTMAN: Possibly, any efficiency
22 level, yes.

1 MR. DELASKI: So, that suggest in the base
2 case we have conversion curved at a certain rate that
3 we have to capture it.

4 MS. HOOTMAN: That's possible, yes.

5 MR. DELASKI: Right. You know if you're
6 switching from one manufacturer to another then
7 that's a part of the base. I mean this suggests to
8 me -- you know I don't know how big an issue this is.
9 I mean is this a 2 percent issue or is it a 20
10 percent issue? I mean if it's a 2 percent issue then
11 --

12 MS. HOOTMAN: Two percent to the energy
13 analysis or -- I don't know.

14 MR. DELASKI: Or do the cost analysis,
15 right? So, is this a sensitivity and we just can
16 dispose of this, or do we need need a sensitivity to
17 know I guess is the question I would pose to the
18 group? How far do we have to go down this issue or
19 can we set it aside because it doesn't matter that
20 much?

21 MR. WHITWELL: Bob Whitwell from Carrier.

22 From a cost perspective, it's significant,

1 right? So, I think this other question about from an
2 energy perspective or how often it's applied that's
3 something I think we need to think about, but from a
4 cost perspective it can be a significant cost at
5 thousand bucks possibly.

6 MR. ROSENQUIST: Hi, this is Greg.

7 From a cost perspective, this lends itself
8 very nicely to a sensitivity analysis. So, you could
9 see this in the life cycle costs results by just
10 either having a conversion curve or not having or
11 just having it on certain efficiency levels or
12 certain parts of that market.

13 So, on the energy side, again, that's a
14 little bit more involved just because we have to be
15 more careful about our calculations to get capture
16 the energy consumption.

17 MS. HOOTMAN: What about cost sensitivity
18 just from the equipment concerning sensitivity?

19 MR. WESTPHALEN: Well, I mean on the costs
20 there would be -- I mean I guess here's the question.
21 If you're going to put a unit on a conversion curve,
22 does the unit itself have to change?

1 MS. HOOTMAN: Yes, possibly could need
2 high static motors in order to overcome the static,
3 so -- not always. Not always, but depending on what
4 you're talking about here in this arduous path that
5 happens in air flow if that design was already at --
6 you know kind of maxed for that unit or maxed for the
7 standard motor we almost all offer high static
8 motors. In these applications, we might have to move
9 to a high static motor to do it.

10 So, I'm just thinking through like a 7
11 ton might be at one inch of total static and now
12 you're using up another .2 to .25 or something in
13 this path. That might very well move you into the
14 high static motor, and there's a cost for that.

15 MR. WESTPHALEN: Right. And that's
16 something we could to the product literature to
17 evaluate once we decide what the ESP for the ductwork
18 was.

19 MS. HOOTMAN: And for John's benefit, but
20 that high static motor is more efficient than our
21 standard motor.

22 MR. WESTPHALEN: But beyond that, then you

1 know I mean the cost within the unit is potential
2 upgrade of the motor and the pulley system.

3 MS. HOOTMAN: That's right.

4 MR. WESTPHALEN: You have the cost of the
5 curve. You have the people installing have more to
6 do, so those are the different aspects of the costs.

7 MR. STARR: This is Louis with NEEA.

8 You know, realistically, when you're --
9 you know if you're hooking up to an existing system,
10 you have to guess at what the ductwork is, and a lot
11 of times it's overestimated. Most of the static
12 pressures when you order a new unit what the static
13 pressure you order is probably going to be a lot more
14 than what is actually need for the job because when
15 you're sitting off in a design office designing these
16 things you don't what's going to be in the field
17 conditions a lot of times.

18 So, there's a tendency to oversize the
19 equipment because you don't know if they're going to
20 route the ductwork in a circle, in a square, and
21 everything else before it gets to the diffuser, so
22 you have to put a lot of safety factor in the design.

1 So, an extra 2/10 of an inch I wouldn't think, in
2 general, is going to push that over the edge. And
3 chances are it's probably going to be -- you know the
4 other thing to think about is when you come in with
5 newer equipment motor efficiencies and fan
6 efficiencies have probably gone up rather than going
7 down, so you're getting more work for the same amount
8 of energy based upon higher efficiency products.

9 To me, I think sizing to a higher static
10 motor is probably not too likely unless you're
11 already there to start there.

12 MR. DOPPLE: So, Paul Dopple.

13 So, if you're designing for a building,
14 you're going to have to take that into consideration.
15 That's not like a surprise that would occur. You
16 would know that ahead of time and that would be part
17 of the calculation.

18 MR. STARR: Yes, you might if someone went
19 through with a tab report, right? That's how you'd
20 have to know that. If a balancer went through and
21 told you what the static pressures are in the
22 existing system; otherwise, you might just take the

1 same piece of equipment and make sure that you end up
2 with the new stuff is the same as the old stuff.

3 MR. DOPPEL: Not if you're talking larger
4 capacity systems because people don't want to make a
5 mistake, especially with all the cost of having to
6 put the equipment on the rooftop. That's a huge
7 adder too.

8 MR. STARR: Well, I mean think about it.
9 If it's the exact same unit that's replacing your
10 older unit, as long as you get the same -- I mean,
11 first of all, not everything is engineered, right?
12 The contractors as well do the work and they don't
13 necessarily -- or maybe not going through a thorough
14 process.

15 The right thing to do would be is go out
16 and get the actual numbers of the pressure drop and
17 the duct work or what the existing systems are
18 operating at and then size your equipment based upon
19 that.

20 MR. DOPPEL: But the conversion curve
21 would be part of the ordering process even it was
22 just a contractor. So, in order to get the

1 conversion curve, they're going to have to do an
2 analysis of what was there before, what the
3 capability of that system was, and then they're going
4 to have to re-look. So, it's going to have to be
5 included; otherwise, they're going to get in serious
6 trouble on that job, and they don't want to do that.

7 MR. STARR: But I mean think about. When
8 they order the air handler, most likely, it's not
9 running at full tilt. In other words, there's room
10 for more capacity in that system. And if they
11 designed the equipment at inch static pressure,
12 likely there's going to be less in that or they
13 wouldn't have been able to balance the job in the
14 first place. So, in other words, it's only 1-inch
15 static of pressure.

16 So, you throw in the static curve and
17 you've got another .2, so you're at 1.2. The
18 original system was sized to 1.5. You might even be
19 able to downsize your system a little bit.

20 MS. HOOTMAN: I don't agree.

21 MR. STARR: Which part?

22 MS. HOOTMAN: I don't agree with that. I

1 can probably show you, and I just don't have time to
2 pull it up here, a 7 ton that will be nominally at
3 1-inch static. And the minute you go to 1.2 you're
4 going to be in an oversized motor. And we design it
5 around the 1-inch total static and the edges are
6 there. And I know we ship a lot of them and I've seen
7 our customers use them on the conversion curves.

8 MR. STARR: So, you mean, though, their
9 existing systems that they're hooking up to you're
10 saying is one inch?

11 MS. HOOTMAN: Yes.

12 MR. STARR: They may be already be under
13 performing, right? That's possible. In other words,
14 the equipment that's already there may not be
15 performing to what it needs to and you're trying to
16 save money you cut the cost out of everywhere. So,
17 most engineers' designs are the opposite, right?
18 They're trying to cover themselves, so they're going
19 to oversize everything.

20 The contractor is the other way around,
21 right? He's trying to save money and he's figured
22 they always oversize stuff, so I'll just undersize my

1 stuff. So, I mean I guess it is a mixture of the
2 market.

3 MS. HOOTMAN: I can tell you what I ship,
4 and I can tell you that isn't what I ship.

5 MR. WESTPHALEN: Well, we could proceed on
6 this on the engineer side by providing to LBNL the
7 performance correlations that include a .2-inch
8 static addition for full load air flow. And then if
9 we can get input on costs, then we can use a cost
10 number and then do some sensitivity analyses
11 afterwards to see how that would affect the result.

12 MR. STARR: The other thing too is you
13 should, in your model, when you drop the CFM so that
14 you have a VFD you should also be dropping that
15 pressure drop with it, right?

16 MR. WESTPHALEN: Right.

17 MR. STARR: Right.

18 MR. WESTPHALEN: That's important.

19 MR. DELASKI: I was just looking back to
20 the costs. So, on the cost side of the equation you
21 know it just strikes me as an important question
22 where do you apply this cost adder for a conversion

1 curve? And I don't know how you're going to
2 determine that. I mean it's been floated here at
3 EL3, but I think I heard you say that some
4 manufacturers think that some today are doing that
5 without a conversion curve already. Some are using
6 conversion curves. Some are not. Some would
7 require, based on your analysis, a conversion curve.
8 Some would not.

9 You know it just strikes me as a bit of a
10 leap to say that that's the point. So, I think, at
11 most, you want to a sensitivity with and without on
12 the cost side and account for some proportion that
13 needed in the base case, but that would be more for
14 the overall analysis.

15 MR. WESTPHALEN: Right.

16 MR. ROSENQUIST: On the conversion curve,
17 all that is on the installation cost side, right, for
18 replacement of an existing unit. And what Detlef and
19 Navigant need to provide are performance at the
20 higher standard pressure, whatever that is, .2 inches
21 above the field accepted value.

22 MR. WESTPHALEN: Yes. And if you do have

1 to go to an oversized motor that can be treated as
2 part of the installation that, okay, well in this
3 installation you know there's more costs required
4 coming from the factory.

5 MR. ROSENQUIST: Just one last thing about
6 that, to assume an oversize motor you basically have
7 to assume everything is right at the edge. So, what
8 you could do is assume a certain percentage of the
9 population is at the edge. In other words, they've
10 got it designed right up to they need exactly one
11 inch of static pressure and that's what the fan can
12 deliver.

13 And so there will be I'm sure, as always,
14 there'll be a certain population that has designed it
15 right up to that amount. But it'll be a lot that you
16 know it's a one inch thing, but it only needs
17 three-quarter or whatever. And so if nothing else
18 maybe getting some kind distribute, maybe not always
19 going to an oversized motor, but maybe sometimes
20 doing it. That could be another way to do it.

21 MR. WESTPHALEN: Well, do we think we have
22 enough discussion on this topic? Again, if anybody

1 does have input on -- and I guess here I'm looking to
2 Greg. You know I assume that there's been some
3 research potentially that you'd conduct on what are
4 conversion curve costs?

5 MR. ROSENQUIST: Right, there'd be the
6 conversion curve. You know we can get an estimation
7 on the conversion curve. I mean certainly welcome
8 input in the group for that, but barring that we'll
9 estimate it. If you're talking about potentially
10 shipping out a larger motor, I mean along with the
11 power at the higher pressure drops that would also
12 come from Detlef and the Navigant team along with the
13 power at the higher pressure drops. That would also
14 have to come from Detlef and the Navigant team.

15 MR. STARR: And one just last thing. You
16 mentioned the glass model has I think one and a
17 quarter and three-quarters for the different sizes.
18 So, keep in mind with the -- test procedures actually
19 covering not only just the external side, but it also
20 has the fan that they use has to overcome the coil
21 losses inside the unit and things.

22 So, that's why in the model they look at

1 the external static pressure consistencies, but the
2 fan actually sees -- most of time because there's
3 only one fan it sees the return ductwork. It sees
4 the filters. It sees the coil and whatever else, so
5 when I looked in the PNL model and also in the
6 commercial one, it's kind of figuring those pieces in
7 there too. So, I think it's 622 pascals, which comes
8 out like 2.5 or something.

9 Anyway, I just looked up those models and
10 it's right in the input file for the different
11 prototypes they have. I mean I didn't do a thorough
12 analysis, but it's in there. I would say you know
13 that I think, in general, it seems like everybody's
14 been happy with the PNL models on that front, but if
15 not, that'd be okay too.

16 MR. WESTPHALEN: Okay, maybe we ought to
17 move onto some of the other topics here. One issue
18 raised out the NOPR comments was the fact that the
19 coil designer and ^^^^ well, just the coil designer
20 software that we're using for much of our analyses
21 only did smooth tube coil analysis back in 2013. We
22 were not using the updated coil designer, which has a

1 rightful tube and so that should be resolving that
2 issue.

3 MR. THARP: Rusty Tharp from Goodman.

4 One thing we do need to be careful of is
5 the simulations need to be calibrated to the test
6 data to make sure that inputs are correct because
7 very minor differences in the inputs on the internal
8 enhancement can make a very significant difference in
9 the estimated simulation results.

10 MR. WESTPHALEN: Good point. And
11 basically, what we're doing is we're matching to a
12 known parameter, such as capacity of EER. And so, to
13 the extent that we have that information in the
14 published literature, we're matching those key
15 parameters.

16 MR. THARP: So, to me as an engineer, the
17 key parameters are refrigerate state points, not
18 results. So, if I've got a 300,000 BTU unit, I can
19 get the 300,000 BTU's multiple ways in the simulation
20 results, but the refrigerant state points can vary
21 wildly. So, what we should be doing is matching the
22 refrigerant state points.

1 MR. WESTPHALEN: Which we can do if
2 everybody gives up all their test data.

3 MR. WINNINGHAM: This is Dave with Allied.
4 I would agree with Rusty. And we've kind
5 of talked. I mean one of the methods you've used to
6 match the capacity and efficiency was just change air
7 flow, and I think that's brought us into some problem
8 areas. And I think the refrigerant state points is
9 more of what you're looking for.

10 MR. WESTPHALEN: Well, at this point we
11 use the air flow that's listed in the product
12 literature.

13 Any other comments or questions about
14 that? I mean I guess the question is --

15 MR. CYMBALSKY: This is John from DOE.

16 So, since we don't have the test data -- I
17 mean the analysis that we did was built off of the
18 product literature using air flow and not the
19 refrigerant set points. And the reason we can't do
20 that is because we don't have them.

21 MR. THARP: The TSD says there were five
22 systems that were tested, right? So, there's five

1 sets of test data. Greg?

2 MR. WESTPHALEN: The test data do not
3 include the pressure measurements.

4 MR. THARP: Okay.

5 MR. WESTPHALEN: Anyway, I think I'll move
6 on. Bring me back to that later if it's still an
7 issue.

8 Head pressure control one of the comments
9 made was that the correlations developed based on the
10 NOPR-phase data did not consider any change in
11 operation at cool ambient temperatures, and so now
12 what we will be doing is assuming that head pressure
13 control starts to take affect at an ambient
14 temperature of 65, and so that say the compressor
15 input at temperatures below 65 would not be any
16 different than it would be at 65.

17 We consider a reduction of condenser fan
18 power below 65 in order to take into account either a
19 reduction in speed or cycling of the condenser fans
20 in order to achieve head pressure control. Any
21 questions or comments on that?

22 MS. HOOTMAN: Just I think you missed the

1 constant sub-cooling at the bottom.

2 MR. WESTPHALEN: Yes, good point.

3 Constant sub-cooling in our NOPR-phase analyses we
4 assumed that the sub-cooling didn't change as the
5 difference in temperature between ambient and
6 condensing temperature changed. And we are now
7 scaling that sub-cooling difference with that ambient
8 to condensing difference.

9 Okay, so moving to this last issue here,
10 the capacity in EER trends versus ambient this
11 relates very much to the same theme that the head
12 pressure control issue did. That basically, in
13 developing these correlations for the NOPR-phase some
14 of those equations when taken to the full range of
15 ambient conditions that were randomized gave results
16 that didn't make sense. And so what we're doing is
17 as part of the engineering phase evaluating those
18 correlations and then plugging them back into the IER
19 calculations to make sure we get back the same
20 performance of the unit and all of the points down to
21 the 65 Fahrenheit. And that might become a little
22 bit more clear as go later on if we have time.

1 So, if there are no comments on that, I'll
2 move on to the next page.

3 (No response.)

4 MR. WESTPHALEN: The next issue here as to
5 do with micro-channel heat exchanges versus round
6 tube heat exchangers. And this applies only to air
7 the conditioning units and only the outdoor heat
8 exchangers of air conditioning units. We're assuming
9 that evaporators will not use micro-channel tubes and
10 micro-channel heat exchangers and that heat pumps
11 will not use outdoor coils that are micro-channels.

12 And so, we talked a little bit earlier
13 that for some of the classes and efficiency levels
14 that there are not that many units at those levels
15 that we can consider in our analysis. And so, when
16 we look at reasonable selections, we can not put
17 together a curve that is all a round tube or all
18 micro-channel all the way up and down the efficiency
19 level scale.

20 So, what we're doing in this analysis is
21 considering the performance of both round tube and
22 micro-channel. And assuming that -- you know we've

1 built our cost models so that there's essentially
2 equivalent costs for either path, which may or may
3 not be exactly true. You know we think that it's an
4 industry in transition. You know some people may
5 have lower costs. Some manufacturers may have higher
6 costs with micro-channels.

7 MR. STARR: So, just a quick question.
8 Isn't the other thing on micro-channels is you can
9 get it in a smaller area? So, it sounds like isn't
10 one of the upsides that -- you know just talking
11 about the conversion curves if you don't have to
12 increase the size of your casing if you use to
13 micro-channel are you getting it in a smaller
14 footprint such that you don't need things like your
15 conversion curves, or does that not follow?

16 MR. WESTPHALEN: Well, yes, potentially,
17 but you know with the approach we're talking, basing
18 the analysis on the existing models we can point to
19 the dimensions of the particular models whether or
20 not they have micro-channels.

21 MR. STARR: But you also have limitations
22 and the micro-channels can be designed and it has to

1 be able to fit in the furnace, so you have the
2 dimensional constraints.

3 MS. HOOTMAN: Yes. And the manufacturing
4 of the micro-channel has constraints and so therefore
5 it causes us to have constraints, so, no, not in
6 every single case. We've actually had to grow our
7 cabinet where we've used it.

8 MR. STARR: Is that why you use
9 micro-channels to keep the case from growing a lot of
10 time? I mean is it sort of like your first step
11 things?

12 MS. HOOTMAN: No.

13 MR. STARR: No, okay. What is it, just
14 like the technology?

15 MS. HOOTMAN: Lower leak.

16 MR. DOPPEL: It also eliminates a lot of
17 problems that can be associated with dissimilar
18 metals, especially certain applications.

19 (Sidetalk.)

20 MR. THARP: And one thing you have to
21 remember too is most manufacturers will have Box A,
22 Box B, Box C, Box D. You try to get your 10 ton or

1 less in Box A. And you know the certain capacities
2 in Box B. And you only tool up for certain sizes and
3 if you can't get it in Box A, then you go to Box B.

4 MS. HOOTMAN: But Louis, literally,
5 because of that aspect ratio and because of the way
6 that they're made and their oven and how that
7 production is it literally caused us to grow a
8 cabinet because we couldn't get it in the size we
9 needed it. So, don't take it for granted that it's
10 going to do it.

11 MR. GOLLPUDI: This is Chandra from
12 Emerson.

13 But even in round tube, you have different
14 technology, different diameters, and all that, so
15 that needs to be taken into account. I mean there
16 are many ways you can -- manufacturers can reach the
17 micro-channel cabinet advantages with different tube
18 sizes and newer technologies.

19 MR. STARR: And a little bit where I was
20 just going with that is the sense that this is a --
21 you know if you think about the conversion curve's
22 part is whether you're putting on a replacement unit

1 or not. But then I would say another element to that
2 is, to the extent that you could use technology in
3 order to keep you from going to the conversion curve.
4 So, it doesn't seem like it's a panacea of
5 everything. It's not going to solve every single
6 problem, but it will solve a some certain portion of
7 them.

8 And I don't know. I don't make or handle
9 enough to know how many that is, but just another
10 thought. I mean the same line of thought with that
11 as well.

12 MR. DELASKI: I guess I'm not quite sure
13 how to pose this question or who it's to, but so Jill
14 when you were saying that it doesn't necessarily
15 solve the problem of size because of the furnace
16 interaction. Is that taking today's unit or is that
17 back to my earlier formulation that, okay, a new
18 standard goes into effect. That's going to go into
19 effect three or four years from now.

20 You know now I'm going to redesign my
21 basic compliance product. I mean do those issues
22 start to get addressed as you redesign your basic

1 compliance? Because you're not going to -- sort of
2 we're trying to solve the multi-regulated problem all
3 at once at this point. And I'm going to optimize.
4 And Detlef characterized it as an industry in
5 transition with respect to micro-channels.

6 So, this is the trend and so let's fast
7 forward now to 2020 or 2021, whatever the year is, is
8 that what we're going to be using in the outdoor
9 unit?

10 MS. HOOTMAN: So, good question. And it's
11 what we weigh against, what did we just talk about a
12 half hour ago, we weigh that against the potential to
13 replace ourselves and replace others.

14 So, yes, we might say that the aspect
15 ratio is two to three or something for this
16 particular heat exchanger and EVAP coils and we would
17 optimize around it, but all of a sudden does that
18 cabinet change so significantly that it now we can't
19 meet up to the same curve and have those issues.

20 I'm going to tell you that the replacement
21 usually weighs out over optimized design. It's a
22 bigger deal for us because it's so much costs in the

1 end run for our contractors to do those conversions
2 will eat up cost in production probably.

3 MR. WINNINGHAM: This is Dave with Allied.
4 Andrew, the other thing we're kind of
5 focusing on the air conditioning side, but part of
6 this discussion is also around furnaces.

7 MS. HOOTMAN: Just to be clear, when I
8 talk about furnaces of EVAP, of micro-channel you
9 have to realize they get put into a furnace to make.

10 MR. WINNINGHAM: Yes.

11 MS. HOOTMAN: Okay, not be confused with
12 the heating and air coil, the heating coil in a unit.
13 Okay.

14 MR. WINNINGHAM: And in order to meet the
15 proposed level, I'm not saying that that where we're
16 landing. I mean the general approach would be more
17 heat exchanger. And while there may be some areas
18 where smart engineers can get around physics will win
19 every time, and unless there's breakthroughs that
20 require a certain amount of heat exchange circuits to
21 do a certain amount of work.

22 MS. HOOTMAN: Gas heat exchangers we don't

1 like to redesign very often, so they are one of our
2 sticking points because they take a lot to redesign.

3 MR. WESTPHALEN: So, anything else on
4 micro-channels versus round tube?

5 MR. THARP: It strikes me that there's an
6 opportunity there that we're capturing in the
7 analysis and I don't know how to capture that. So,
8 to me, it's another conservatism in how we're
9 modeling this, but I don't have a way to get around
10 it.

11 MR. WESTPHALEN: I imagine if John gave us
12 a year we could.

13 MR. CYMBALSKY: No.

14 MR. DOPPEL: Paul Doppel.

15 Jill, this is not like a three-year
16 transition. This is probably more like a ten-year
17 transition to that technology, the micro-channels.
18 And just think about all the manufacturers.

19 MR. WHITWELL: Many manufacturers produce
20 products with both, equipment with both, right? It's
21 an option.

22 MS. HOOTMAN: It's an option. I don't

1 know. I mean I can only speak for myself. And our
2 company it took us a couple, three years to change,
3 so it wasn't forever.

4 MR. DOPPEL: But it won't be the main
5 offering forever.

6 MS. HOOTMAN: Maybe not.

7 MR. DELASKI: But the reason why I thought
8 the main offer is for the reason you were describing
9 before. And the reason you're describing is this
10 sort of different reasons why you might now make your
11 main offering.

12 MS. HOOTMAN: Yes. And I agree. I mean
13 you know a lot of us do produce our own coils. And
14 in that case that's another whole investment to
15 invested in those furnaces, et cetera, to make those
16 micro-channel coils. So, it's a philosophy change of
17 whether you want to build within or you want to go
18 out.

19 MR. STARR: I'm sort of getting lost. So,
20 the furnace size is set and so then the coil -- I'm
21 trying to figure out what the relationship to the
22 coil.

1 MS. HOOTMAN: The ovens that actually --

2 MR. STARR: So, if you change your coil it
3 doesn't matter because that size is already set.

4 MS. HOOTMAN: Because now you start to get
5 that aspect ratio is -- they only have so much give
6 in those.

7 MR. WESTPHALEN: Unless they wanted to buy
8 a new furnace, which, of course, is another
9 proposition all together.

10 MS. HOOTMAN: Oh my, yes.

11 MR. WESTPHALEN: Okay, moving on here to
12 this second issue on this slide. And basically, the
13 bottom line here is that we have decoupled the energy
14 part of the engineering analysis from the cost part.
15 We are looking at development of cost curves. Costs
16 as a function of IEER separately from development of
17 the correlations that will go into building energy
18 use models.

19 And this is because when looking at the
20 cost versus IEER relationship we really want to look
21 at as many models as we can, but in order to do that
22 careful development of the correlations we just don't

1 have time to do the full assessment of all of those
2 models. And so for that reason, we've done this the
3 decoupling here. I hope it's understandable what I'm
4 saying here, and if you have a question certainly
5 ask.

6 (No response.)

7 MR. WESTPHALEN: Then we have this third
8 issue here is looking at additional efficiency
9 levels. And for the analysis that we started showing
10 last week, we added something that the team called
11 the EL3.1, which was during the NOPA phase EL4. And
12 then added at the higher level a max tech, which now
13 is called EL4, which it uses variable speed,
14 compressor technology typically at that level. And
15 so I suspect there might be some discussion of this
16 issue if anybody has any comments.

17 MR. DELASKI: So, Detlef, I'm glad that we
18 addressed in our written comments to the docket both
19 the need for max tech that really represents the max
20 tech, which I think is DOE's obligation or one of
21 their legal obligations under the rulemaking. I
22 don't think we're going to negotiate a level of max

1 tech. So, it's interesting, but I don't think it's
2 really -- you know I'm not going to settle on the
3 level, a new EL4.

4 To me, what we also asked for in our
5 written comments was something to fill the space,
6 which is quite considerable between old EL3 and EL4
7 from NOPR. This was a point that we gave some
8 emphasis to in our written comments.

9 Last week on the phone you said that you
10 looked for something there, but you couldn't find
11 units to enable you to use the method that you were
12 looking for. So, we took that under consideration
13 and we went back -- well, it looked like to us what
14 you were doing, the reason why you couldn't find
15 units our hypothesis is that you were limiting
16 yourself to those particular -- to the capacities --
17 to those precise capacities.

18 And it looked to us that if you let
19 capacity vary by only 10 percent that you could,
20 indeed, find units that would enable you to model
21 something between old EL3 and EL4 to better fill that
22 space. And to us that would give us a more complete

1 consideration of the space between baseline and max
2 tech, which was the argument in our written comments.

3 And we came up with -- I think the numbers
4 if we let vary by 10 percent we came up with values
5 of -- let me find it here -- for the 7 -ton unit --
6 their models is weighted at 15.5, multiple models at
7 15 tons, at 15 multiple models, and at 30, 13.7,
8 which you just tick above the EL3, but the other ones
9 it seemed to us they filled that space a little
10 better, and I think are more interesting.

11 I'm glad you're doing max tech, but I
12 think is more interesting in terms of filling that
13 space to give some variation there to not use that
14 tonnage as a rigid determinate of being able to find
15 a unit. So, I hope you can model those as well. And
16 again, so just linking back to the comments we've
17 been making all along.

18 MS. WALTNER: So, to further on to kind of
19 what you're saying is that absolute tonnage then
20 because of the energy analysis to try to keep it
21 exactly what it is?

22 MR. WESTPHALEN: Yes. I mean if I say I'm

1 modeling a 25-ton unit you know I need more units. I
2 don't get quite as much capacity out of a 25-ton
3 unit. The cost differential -- like if my cost
4 differential is a thousand dollars with a 25-ton unit
5 how does that compare with the same cost differential
6 on a 30-ton unit? So, there are some questions. You
7 know if we do this we have to sort of resolve those
8 questions. I think that could be resolved, but we
9 just have to be careful making sure that ultimately
10 apples to apples.

11 (Sidetalk.)

12 MR. DELASKI: Excuse me. For the 10
13 percent that scaling you should be able to a scale --
14 you know find factors to scale. If we're getting
15 further off that then maybe those scales might not be
16 as reliable, but within a pretty close range is the
17 concept that we had.

18 MR. WESTPHALEN: Yes. On the first cut,
19 assuming that you would scale your cost by the
20 capacity you know would sound reasonable you know
21 within plus or minus 10 percent.

22 MS. HOOTMAN: And I was just thinking,

1 just doing the math a little bit. So, you took a 30
2 ton and it became a 27 ton and while that sounds like
3 it's still within the same, it's a completely
4 different product for me.

5 MR. DELASKI: How about at the 15 ton
6 level with the 7 ton level?

7 MR. CYMBALSKY: Can everyone just use
8 their mikes, please?

9 MR. WESTPHALEN: Yes, there are some
10 places where there are platform step ups like you
11 know Rusty was saying Box A, Box B. And so, in our
12 analysis -- you know certainly in the cost analysis
13 we're aware of that and we're trying to make sure we
14 properly account for that.

15 MS. HOOTMAN: Yes, it does appear like
16 it's going into a whole cabinet size in every single
17 case because a 15 ton goes down to 13 , which is
18 really that probably falls into a 12 ton more
19 nominal. Wouldn't you guys agree? And then that's a
20 different cabinet for all of us or a different unit.
21 That was the case in the 30 ton. And I haven't done
22 the math on the -- let's see what I have -- yes, six

1 and a quarter, and that's a different unit. I do see
2 the issue. It's become hard.

3 MR. WESTPHALEN: On a cost curve, you
4 could imagine that you know it might be acceptable to
5 interpolate at an intermediate level.

6 MR. WHITWELL: The cost is going to go
7 somewhat in steps. The cost is not going to be a
8 straight, linear relationship as you go up through
9 the different chassis sizes, though, right? If we're
10 talking about jumping from one chassis to another
11 chassis size, it's not a linear cost different.

12 MR. WESTPHALEN: If you are jumping
13 chassis sizes of course.

14 MR. WHITWELL: Yes. Right. And that's
15 what we're talking about is probably this is what's
16 happening here is you know you go up or you go down
17 10 to 15 percent in capacity you could be in the next
18 smallest chassis size or go the other way. You're in
19 a small capacity in a bigger box, so your efficiency
20 is going to be higher there and so that could give
21 you a substantial jump in efficiency, so it makes it
22 look like -- I mean you can't see what's happening

1 unless you're actually looking at the size of the box
2 at each capacity size going on up through the line.

3 MR. WESTPHALEN: Well, I guess it's for
4 the group to recommend whether we should consider
5 another intermediate efficiency level. And you're
6 right there is a big jump from EL3 to EL4. I'm not
7 quite sure how do deal with that at this point,
8 though.

9 MR. WHITWELL: You're right. There is a
10 big jump from EL3 to EL4. I'm not quite sure how to
11 deal with that at this point.

12 MR. DELASKI: Is it possible to capture
13 that cost of chassis change, so the question is how
14 do you capture that.

15 MR. THARP: Rusty with Goodman.

16 I guess one of the concerns I have about
17 having additional efficiencies levels for
18 consideration is the timeframe again because we have
19 such limited timeframe, but if we are going to add in
20 addition ELs, I think we may want to consider like a
21 two and a half also. Because I mean once you get to
22 a justifiable number to me -- or I guess we're sort

1 of thinking that the best justifiable number may be
2 something less than EL3, but maybe more than two.

3 So, if we're going to throw an additional
4 analyses, let's look at those. But again, I'm not
5 sure we have the adequate time for additional levels,
6 but I do agree that between three and four it would be
7 good to have some other levels in between.

8 MR. DELASKI: So, I mean the challenge is
9 that you just can scale it. So, I mean it's easy to
10 add these levels if you just could scale, right? And
11 you guys are arguing that you just can't do it. You
12 got to have a unit there.

13 MS. HOOTMAN: Well, I don't know that I'm
14 arguing that you can't. I just want to go back and
15 look at what that means in cost and will it be a fair
16 way of looking at doing a curve and just picking up a
17 curve. I can't visualize that yet without some data
18 to look at that.

19 MR. DELASKI: Okay, so I just would put it
20 back again to you guys, to the manufacturers, and to
21 the consultants to consider because I'm all for two
22 and a half too, right? If we can populate -- for the

1 negotiations, right, the more options we can put on
2 the table the more dimension we create for positive
3 outcomes, right?

4 MR. STARR: This is Louis with NEEA.

5 On the second one, the decoupling analysis
6 with the cost start, can you briefly explain what you
7 did originally? And think, if I remember, my
8 understanding of why those were decoupled was because
9 the power profile for the air handle was laid off and
10 that's why you decoupled it, but maybe you can just
11 briefly explain what the reasoning was for the change
12 in your analysis. Maybe what the original was and
13 why you changed it.

14 MR. WESTPHALEN: Well, in the NOPR-phase
15 we developed models you know using the coil designer.
16 You know the University of Maryland tools. Some of
17 those were extrapolated off of the test units or
18 perhaps a catalog unit. And then we calculated costs
19 for the design associated with that unit. You know
20 sort of piggybacking off of information we had about
21 a reversed engineered unit, so you know say we know
22 how large the heat exchanger is.

1 Basically, the extrapolation on the cost
2 from say the tested and reversed engineered unit as
3 well as the energy side. And so when we got into
4 this approach of basing the analysis on the energy
5 side of it on existing units, you know when you
6 select your existing units you have different
7 manufacturers taking different approaches and then
8 you construct the cost curve and it's all wavy and it
9 doesn't make any sense because of the particular
10 strategies that one manufacturer took versus another.

11 And one manufacturer may be at the large
12 end of the small box and the other one might be at
13 the small end of the large box, so then the cost
14 curve doesn't look right. And so we decided in the
15 cost curve analysis we need to look at many more
16 units to get a better industry average, so that's why
17 we took this approach.

18 MS. MAUER: This is Joanna Mauer.

19 I just wanted to provide a little bit more
20 information about the specific unit set Andrew was
21 mentioning. I think they may be a little bit closer
22 to the actual capacities than the full 10 percent.

1 So, for the 7 ton units it looks like they're units
2 at 15.5 that are at 96,000 BTUs, 7 tons is 90,000,
3 and then for the 15-ton units it looks like they're
4 units at 174,000 at 15.0 IER. So, I don't know if
5 those capacities are close enough to the
6 representative ones to make it a reasonable --

7 MR. WESTPHALEN: I mean this is something
8 we can look at. And given the pressures of the time
9 versus more data, certainly whatever the consensus
10 winds up being we'll do what we can to get the
11 numbers as quickly as possible.

12 MR. CYMBALSKY: And so, as we go through
13 these points, I've been making checkmarks when I
14 don't hear anybody say anything. So, just so that
15 you know from -- you know I'm being honest about it,
16 so when I looked around everyone's shaking their
17 head, nobody commented. I'm assuming what that meant
18 what Detlef explained in his approach the team was
19 taking that there weren't any -- or at least at the
20 time there aren't any -- there's no prevailing wisdom
21 to do something differently. So, I hope I'm reading
22 the group the right way.

1 MR. STARR: I think I would be up for them
2 doing an additional level, as we suggested.

3 MR. CYMBALSKY: For this point, I did not
4 make a checkmark. There are a couple other ones
5 where I did. Until Louis just spoke up about the
6 decoupling, I had a checkmark, but I think I still
7 have a checkmark. But I just want to make sure that
8 we're not just -- you know Detlef just asked a great
9 question that is based on the consensus of the group
10 we will do X, Y, and Z.

11 Well, we don't have a lot of time to do X,
12 Y, and Z, so I want to push us along to say, okay, we
13 all think 3.05 is good and we think, I don't know,
14 2.75 is good too, but you know we don't have three
15 weeks to come back here. So, kind of think about
16 that, and as we go along, let's try to make decisions
17 when we can.

18 MS. WALTNER: So, starting on the
19 intermediate efficiency levels, I just want to add my
20 support that I think that adding levels is I think a
21 very important step for us in this process. So, I'm
22 just adding my support there.

1 MR. CYMBALSKY: And that's great. I mean
2 we can do it. So, the real question is do we hit the
3 step function, and I think that's a valid concern in
4 both directions. And we may not know the answer on
5 the fly. I understand we need to look back. So, if
6 we go to the levels that Joanna just brought to our
7 attention, do we hit the step function in a chassis
8 swap out, for example?

9 I don't think we know that. We don't have
10 -- I don't think we do at the moment to know that
11 answer.

12 MR. WESTPHALEN: I don't think it'll be a
13 hard and fast answer. It depends on the
14 manufacturer.

15 MR. CYMBALSKY: And my sense is that if
16 the manufacturers can do -- you know forget about
17 the standards for a second, but if there was a way to
18 get that extra incremental efficiency level without
19 that big investment in chassis or whatever box side
20 that you would do it. We just don't know if you can
21 at the moment. We haven't examine it, at least
22 that's my theory.

1 MR. WESTPHALEN: Yes, we would attempt to
2 analyze this based on the existing models and whether
3 or not if there are steps -- you know increase in
4 sizes that then make that curve non-linear in that
5 particular regions, then that should come out of the
6 cost analysis, given the information that we have.

7 I mean what I think what I would be
8 interested in know is getting a consensus. You know
9 I hear potentially two additional levels. Is there
10 consensus that we're going to do two? And if there
11 is consensus on two, roughly what would those levels
12 be for each of the classes.

13 I mean that's a lot to ask and maybe
14 that's not going to come out of this meeting right
15 now. Certainly, from our perspective if we're going
16 to have those results for engineering and LCC in say
17 two weeks time, we really need to know what we're
18 doing right now as I leave the room.

19 MR. CYMBALSKY: And so that was my point I
20 think. So, Andrew and Joanna, from their
21 perspective, what they're trying to do is squeeze a
22 little bit more efficiency without hitting that step

1 function. Is that a fair characterization? And so I
2 guess the question to the group is do we think is it
3 3.05 or 3.0 -- I mean we know 3.1 might make that
4 chassis change, or whatever it is that was described,
5 but do we think there's another sweet spot in there
6 by I guess altering the capacity a little bit.

7 MR. DELASKI: I'm fully supportive of 2.5
8 if that helps to -- I mean we're trying to
9 characterize that curve. I mean we know what the
10 particular point is. We don't know what the sweet
11 spot is in terms of -- .

12 I like the idea of plug in both of those
13 spaces more completely. You know put on the table a
14 way to get to something in that -- I'm not used to
15 the terminology, in levels.

16 MR. WESTPHALEN: Yes, I think for the 2.5
17 the question of what the level is is much more
18 straightforward. We just take the average and that's
19 our target.

20 For the level that's just above three, I
21 don't know, do we want to go halfway in between? Do
22 we want to go you know a portion of the way from the

1 three to what's now the 3.1?

2 MR. DELASKI: (Off mike.)

3 MR. WESTPHALEN: And then roughly how much
4 IEER.

5 MR. DELASKI: (Off mike.)

6 MR. CYMBALSKY: Can you hit your mike?

7 MR. DELASKI: Sorry. They were the values
8 that I read off earlier, which again I found before.
9 Here they are. So, that was -- at 7 tons it was
10 15.5. ELR is 14.8. So, we found models at 15.5.

11 MR. WHITWELL: And that was 96,000 BTU per
12 hour?

13 MR. DELASKI: We found models in the 15
14 ton range. We found models at 15, and that was 174
15 and we give, Detlef, the models. We'll show you the
16 models. We just pulled them off the HRI directory.

17 MR. WESTPHALEN: Yes.

18 MR. DELASKI: And EL3 -- I'm sorry. At 30
19 tons it was 13.7. EL3 is 13.5. So, it wasn't much
20 of a change for the 30 ton. At 30 tons, EL3 is 13.5.
21 We saw models at 13.7. It may have just been one.
22 Maybe it's Jill's model. I don't know. She seems to

1 know that number. Anybody can check the HRI
2 directory, but those are the levels that we ^^^^ you
3 know those levels are well below the midpoint between
4 three and four.

5 MR. CYMBALSKY: Does it make sense to
6 focus on the 7 and the 15?

7 MR. DELASKI: Yes, I mean just from a pure
8 impact point of view, right? We're not talking --
9 that would be where the --

10 MR. CYMBALSKY: Yes, I mean the more we
11 can narrow the focus the better off I think we are.

12 MR. WESTPHALEN: Okay, so does it sound
13 like we're talking about the two and a half level for
14 all three classes, but then above three for just the
15 7 and 15?

16 MR. DELASKI: It makes sense to me.

17 MR. CYMBALSKY: It sounds like where the
18 action is. I mean I would vote for that.

19 MS. HOFFMAN: Do we have a consensus to
20 give some direction and then be able to move on?

21 MR. CYMBALSKY: I mean the one question we
22 haven't settled on is -- so for the 7 and the 15

1 ton, do we think what the found in the directory we
2 can do some cost analysis to get there or we haven't
3 hit that yet?

4 MS. HOFFMAN: We haven't hit there yet.

5 MR. CYMBALSKY: Okay, that's the last
6 piece is do we hit the big step or do we hit some
7 scale.

8 MR. WESTPHALEN: Well, I mean I think we
9 would ^^^^

10 MR. CYMBALSKY: You would try to figure
11 that out?

12 MR. WESTPHALEN: We would try to figure
13 that from the data we have available to us.

14 MR. CYMBALSKY: Okay.

15 MR. BATTAGLIA: (Off mike.)

16 MR. WESTPHALEN: Well, James, I don't
17 know. Is the plus or minus 10 percent already in
18 there of the cost analysis currently?

19 MR. BATTAGLIA: It may be. I think we
20 ought to back and look, but I think that plus or
21 minus -- we looked at the nominal capacity, so that
22 might have captured that. We definitely didn't have

1 that 15 IER unit in our sample when we did it.

2 MR. WESTPHALEN: So, we'll have to look
3 back at our data and figure out what we can do there,
4 but it would be useful to have the models. And we'll
5 have to do some thinking about like if those are
6 gas-heat models and we're mostly looking at -- I mean
7 just some discussion about whether it should all be
8 gas heat, but I know we've kind of gone down this
9 path and we'll probably stick with it. But yes, I
10 mean it would be useful to have the model numbers.

11 MS. MAUER: This is Joanna.

12 The SPA models in the HRI directory are
13 all non-gas heat; is that right?

14 MR. WESTPALEN: Yes.

15 MS. MAUER: Okay, so that what we were
16 looking at for these.

17 MR. WESTPALEN: SPY is gas heat.

18 MS. MAUER: Right. Yes, so we were
19 looking at the SPA models.

20 MR. DELASKI: We'll give you the units.
21 We'll just give you the little spreadsheet.

22 MR. WESTPHALEN: Okay. Good.

1 MS. MAUER: So, I'd like to move back to
2 the cost point if we're done discussing intermediate
3 ELs.

4 MS. HOOTMAN: Getting more cost data is
5 going to be hard out of us. At least I'm going to
6 speak for myself. It takes a lot. I have to
7 dedicate an engineer and a finance person to sit down
8 and pull this stuff, and it doesn't happen overnight.
9 It takes me weeks.

10 MR. CYMBALSKY: All right, so I think
11 we're going to take a crack at it, that's what I'm
12 hearing.

13 MR. WESTPHALEN: Yes.

14 MR. CYMBALSKY: And then we'll bring the
15 results out and see what they say. I really wanted
16 to finish this slide.

17 MS. HOFFMAN: He's hard. I've already
18 tried for a break one.

19 MR. CYMBALSKY: Only because the topic
20 switches to buildings after that.

21 MS. HOFFMAN: By the way, do you have your
22 marching orders on the earlier run with the 2.5, what

1 you're going to do?

2 MR. CYMBALSKY: Yes.

3 MS. HOFFMAN: You're all set? Okay.

4 MR. CYMBALSKY: So, I think there's just
5 one more topic left on engineering.

6 MR. WESTPHALEN: Well, Meg wants to go
7 back.

8 MS. WALTNER: Yes.

9 MS. HOFFMAN: Not so fast.

10 MR. WALTNER: That was the second half of
11 the comment I was trying to make earlier when I let
12 you respond to me. So, my understanding of the way
13 that you changed the cost analysis before you were
14 building up the cost based on your modeled equipment
15 and now you're using the cost for actual equipment,
16 actual cost data that you have equipment available
17 today. Is that an averaging cost over you know the
18 models that you have that data for; is that right?

19 MR. WESTPHALEN: Yes, basically, we go to
20 the product literature and look at all the models
21 that we can. And the key designed details like heat
22 exchanger size. And fortunately, for a lot of the

1 manufacturers there's a lot of information there that
2 really helps in understanding how big are the heat
3 exchangers, what compressor are there, what kind of
4 finds, and all of that information feeds into the
5 cost models. And so then we estimate costs for all
6 of these models and we've tried to get feedback
7 directly from the manufacturers under nondisclosure
8 agreement as to how close we are on those estimates.
9 But you know then we have these estimates and then
10 you can put that on a scatter plot of costs versus
11 IEER and then try to figure out, okay, what's the
12 trend.

13 MS. WALTNER: Right. Okay, that makes
14 sense. And I guess I would just raise the flag as
15 we're doing that. The point, though, has been
16 brought up a couple times that the high efficiency
17 models today are not the same models that would be
18 the high efficiency models if the standard was
19 brought to that level and sort of how that would
20 affect the cost.

21 MR. WESTPHALEN: Well, yes, and we then
22 estimate our costs at those different levels based on

1 full production quantities at those levels.

2 MS. WALTNER: So, it sounds like that's
3 already something you're doing.

4 MR. WESTPHALEN: Yes. And what we're not
5 doing is looking at future designs that we can't
6 conceive of yet.

7 MS. WALTNER: Right.

8 MR. BATTAGLIA: I just want to follow up
9 on the issue with that 3.05 level or whatever. One
10 of the issues I think, and I'll verify the model, but
11 some of these spreadsheets don't provide all the
12 information that Detlef was talking to like the heat
13 exchanger sizes, compressors, and such, so that
14 becomes another issue. We can't model that for the
15 cost or the energy modeling if we don't have the data
16 for those units.

17 MR. WESTPHALEN: Yes. We don't have
18 complete data of the full industry necessarily.

19 Shall we try to move onto the last item
20 here, the coil circuiting?

21 MR. CYMBALSKY: Yes. Because my math is
22 we have three hours and 15 minutes after lunch and at

1 3:15 it'll be exactly half and half with 15 minutes
2 in the middle.

3 MS. HOFFMAN: It's great when you work
4 with engineers, right?

5 MR. WESTPHALEN: I can make it.

6 MR. CYMBALSKY: Come on, we're almost
7 there. Come on, we really have a good reason to move
8 forward.

9 MR. WESTPHALEN: I believe this is a
10 fairly small issue here. In cases where we're
11 considering staged air, we are using intertwined
12 circuits or front/back circuits for the split if
13 there's two circuits, each serving a separate
14 compressor in order to limit the impacts of reducing
15 the air flow. You know if you have a staged or a VAV
16 so that all the air flow has interchange with all of
17 the evaporator for the given circuit, even when the
18 second compressor is not operating.

19 I don't think anybody is going to have any
20 argument with the concept, maybe some argument with
21 whether we're getting the results 100 percent
22 correct.

1 (No response.)

2 MR. WESTPHALEN: John doesn't hear
3 anything.

4 MR. CYMBALSKY: And I don't even know what
5 you're talking about.

6 (Laughter.)

7 MR. CYMBALSKY: An economist. I don't see
8 any dollar signs in there.

9 (Laughter.)

10 MR. THARP: Rusty Tharp with Goodman.

11 I'll say that from a perspective of the
12 staged air flow that's the correct thing to do.
13 Agreed. But another thing that needs to be taken
14 into consideration is the number of circuits per
15 refrigerant circuit and it's potential impact in the
16 measure versus actual performance as you change
17 efficiency levels. Because as you increase your coil
18 volume surface area if you keep the same number of
19 circuits you've got a different pressure drop per
20 circuit. That needs to be taken into account. And
21 if you change the number of circuits, then that also
22 the impact needs to be taken into account.

1 So, that would be interesting. I was
2 unable to participate in the last two equipment
3 modeling sessions, but I would like to make sure that
4 those issues are addressed in the modeling because it
5 can make a major impact on what is estimated to be
6 required to hit a certain efficiency level, one way
7 or the other. It could cause an overestimation. It
8 could cause an underestimation. So, it's needed.
9 I'm interested in seeing the details of the input for
10 all the various models just to make sure that there's
11 nothing that sticks out like a sore thumb.

12 MR. WESTPHALEN: Yes. I imagine that
13 might be guidelines in terms of rules of thumb of how
14 much pressure drop do you want to see in an
15 evaporator, how much do you want to see in a
16 condenser in order to get the right number of
17 circuits. The product literature doesn't show that,
18 so we're kind of going by those kinds of rules of
19 thumb. And if you want to have like a sidebar
20 meeting to go over some of that or provide some
21 guidelines, certainly, I mean we're open to that.

22 MR. THARP: I think it wouldn't be a bad

1 idea to either create a subgroup or continue the
2 equipment modeling subgroup from previously to review
3 some of those details, probably as quickly as
4 possible, obviously.

5 MR. WESTPHALEN: Okay. Well, let me think
6 about --

7 MR. THARP: We can have some sidebar
8 conversations also in addition.

9 MR. WESTPHALEN: Yes. Let me think about
10 what the best way to try to have that conversation
11 without having the team just stop what they're doing
12 and then try to get back to you on that.

13 MS. HOFFMAN: Now, would it be fair to say
14 that it's break time. Come back in how long, 15
15 minutes? What is it, 3:30? We'll see you back here
16 at 3:30. Thank you.

17 (Whereupon, a break was taken at 3:16
18 p.m.)

19 MR. CYMBALSKY: I'll turn it over to Greg
20 Rosenquist from LBNL to go through the work that's
21 been done in the buildings modeling part of the
22 analysis.

1 MR. ROSENQUIST: Hi everyone. So,
2 hopefully you can start thinking about buildings
3 rather than equipment modeling. You'll refresh your
4 mind.

5 A lot of these issues were identified out
6 of a meeting that was in Berkeley on March 19 and
7 20th. So, I think a lot of them have been resolved,
8 at least on this slide, but of course, if not,
9 certainly let me know if you think differently.

10 The first one has to do with the design
11 temperature for the system sizing. Blast is a
12 simulation model that was used to determine the
13 energy use of this equipment, and from that building
14 loads were backed out of. And in
15 that calculation, they also determined the system
16 size for the building. And for that calculation it
17 was assumed that it was based upon a 95 degree design
18 temperature, but that was incorrect. It should be
19 actually one percent cooling dry belt design
20 temperature, and that change has been made. What
21 that has the affect of doing is reducing the number
22 of units that serve the building. So again, that's

1 been done and the most recent files have been sent to
2 the working group. Again, I believe that one's
3 resolved.

4 We talked about it briefly in our last
5 call, but from my understanding I think that was
6 taken care of.

7 MR. FERNSTROM: So, this is Gary.

8 I have a question about that. You're
9 saying that revising the design from 95 degrees to 1
10 percent cooling dry belt design results in a
11 reduction in load and a reduction of the number of
12 units needed to serve buildings?

13 MR. ROSENQUIST: Well, the system size is
14 based upon the design temp, so for a lot of these
15 buildings it's around 90 degrees Fahrenheit rather
16 than 95. And so if you go ahead and use that as
17 opposed to 95 that ends up resulting in just less
18 units having to serve that building.

19 MR. FERNSTROM: Okay, I understand. I
20 just wanted to clarify that because you know where I
21 live the design temperature might be higher than 95,
22 but for the nation as a whole. Thank you.

1 MR. ROSENQUIST: Yes. I mean the examples
2 I had done were not in California or Central Valley,
3 I should say. So, there I think the design temp
4 would be about 95.

5 The next issue was the load factor. And
6 it's important for determining the cyclic degradation
7 of the unit, basically, how often the unit turns on
8 and off to meet load. And in the analysis performed
9 for the NOPR, it was determined that we had an
10 incorrect calculation there. The load factor was
11 determined across all the stages of equipment as
12 opposed to just the upper stage that the equipment
13 was in. So, this would really affect things or this
14 does really affect things when the unit is beyond its
15 first stage if it's a two-stage unit or a three-stage
16 or four-stage unit.

17 This correction can have a significant
18 affect and it does for 7 -ton units, especially
19 going from single stage to two stage. Also, there
20 was another correction that had to be made where
21 there was an assignment of a degradation coefficient
22 of one whenever the unit was in its highest stage of

1 operation, so that's also being corrected.

2 So, the top two items have already been
3 dealt with and the file sent back to the working
4 group. It's reflected in those files. What we're
5 further going to do based upon input we've heard from
6 the working group is the units -- many of the loads
7 that we're seeing are times when the unit operating
8 in both heating and cooling. And so the cooling load
9 is relatively low during this time and we have the
10 assumption that all the units in the building are
11 running during this time. And as a result, often the
12 units are running at below 25 percent part load.

13 So, a better way to handle this we feel is
14 to have only a certain number of units serve that
15 load. And we haven't exactly thought through the
16 numbers of units, but we're thinking that perhaps
17 have units bunched in sets of 10 perhaps, maybe 8 or
18 9 or 7. Whatever that number is we're looking for
19 input, but basically saying that if 10 units -- if
20 the unit's being served let's say by 20 units and
21 that load can be met with 10 of them or 12 of them,
22 then we would reflect that on the analysis and that

1 way the equipment then wouldn't be in such a low part
2 load condition as we're currently assuming and so
3 this revision and this method then will result in
4 calculating the cooling load for a smaller number o f
5 units and thus, they would be at a higher part load
6 condition.

7 MR. STARR: This is Louis with NEEA.

8 So, I guess maybe an example -- so what
9 you're thinking about is maybe say a large retail
10 space of some sort. You're saying that you maybe
11 have 20 units serving a retail floor or something.
12 You assume those loads, so you assume that 10 of them
13 would be running to meet the load and the other 10
14 would be off; but in reality each one -- I mean it
15 seems like each on of those might have a thermostat
16 and sort of be zoned for first flow.

17 For instance, in a retail space you would
18 have maybe an electronic section that would have a
19 little more load than the clothing section, right, or
20 actually maybe the reverse because you have more
21 lighting on the clothing. I don't know. But anyway,
22 there could be actually different things in there so

1 that it seems like those units could really not cycle
2 10 at a time. I mean that would be great if they
3 did, but I don't think that's how they would work.

4 Help me to understand what the --

5 MR. ROSENQUIST: I guess I was thinking
6 more about an office building where you have core and
7 parameter zones. And maybe that's the thing to do
8 here is just apply this method to only office
9 buildings rather than retail.

10 MS. HOOTMAN: But retails going to have
11 what he's talking about, where other areas are not
12 running, but there is light load are. So, you're in
13 a Macy's and over the cosmetics counter has got the
14 light load and it's going to happen, but in other
15 areas it won't, so you'll have that switching on and
16 off.

17 MR. ROSENQUIST: A lot of blast output
18 we're seeing you know instances where there's both
19 heating and cooling and so we would be applying this
20 method -- potentially applying this method when we
21 would see that type of condition occurring in the
22 data.

1 MR. STARR: So basically, it where you
2 have a different kind of system which is probably
3 more VAV with reheat like a large office building
4 where its parameters you might be heating because
5 it's a cold morning. And meanwhile in the center of
6 the building it's pretty hot because everybody's in
7 there making lots of heat and so you're trying to
8 compensate your output to make up for that by making
9 this assumption that you're doing.

10 So, I guess that maybe okay; but yes, you
11 certainly would be based on certain kinds of spaces
12 like the certain models of the 10,033 that have that,
13 but I wouldn't say you'd want to do that across the
14 board.

15 MR. DOPPEL: Paul Doppel with Mitsubishi.

16 So, it seems to me that you're going to
17 have different levels of energy usage when you do
18 that and different efficiency levels. And it would
19 just seem if you consolidated to 10 instead of 20
20 that you're going to have a different performance
21 characteristic than the other.

22 So, does that increase energy savings?

1 So, that's kind of the whole issue here. So, if the
2 systems are not capable of doing that themselves,
3 then you're trying to replicate what reality is and
4 not what's easy to do.

5 MR. ROSENQUIST: If you're going from a
6 single stage to a two stage, right, you'd see a
7 dramatic -- probably a significant change in the way
8 energy is being consumed in that building, right,
9 because for the two-stage unit you can better meet
10 that load than in a single-stage unit. So, in going
11 from two stage to two stage, it could be a different
12 situation.

13 MS. COUGHLIN: This is Katie from Lawrence
14 Berkeley Lab.

15 I was just going to say I mean the initial
16 idea here is to construct a sensitivity, so you know
17 obviously we're not going to be able to capture all
18 these nuances, but right now we have one very extreme
19 case that's being modeled where all units are
20 operated as a single unit, which in a building with
21 50 units is not a realistic assumption.

22 So, we're going to change that assumption

1 and we can look at what the impact will be. And I
2 think you know these details will be more -- it'll be
3 more productive to discuss those once we have the new
4 calculations.

5 MR. ROSENQUIST: Okay, so onto the next
6 one, which I hope isn't controversial any longer.
7 It's about the fan speed when the unit isn't heating,
8 space heating.

9 We went around on this a bit, and I think
10 we've all decided that it should be in high speed.
11 And for the inter-fan space cooling, what was done
12 for the NOPR is that there were all these
13 correlations where power was a function of dry belt
14 temperature. And actually, there were some cases for
15 some efficiency levels there was no low limit on
16 that, so you could actually get down to a pretty low
17 fan wattage in some cases.

18 So, moving forward, we're just going to
19 have the fan power be a function simply of the stage
20 that you're in. I think again there's consensus on
21 doing it that way. Also, on something that will have
22 less of an effect is that we'll use the load factor

1 to determine the energy used when it's in a high
2 stage rather than just this percent in value that we
3 were getting from the blast output.

4 MR. STARR: So, just a question on that.
5 So, when you're in economizer mode, that fan energy's
6 counted somewhere else or how do you take care of
7 that fan energy because you're still cooling, right?
8 When it's 60 or 75 in here and you've got nice, cold
9 outside air you know you turn on the economizer. You
10 won't be turning on your compressors, but you'll be
11 pulling in air and your fan will probably be running
12 on its high speed, so it's being captured somewhere
13 else, right?

14 MR. ROSENQUIST: Well, you know at least
15 for the buildings we've been looking at there's very
16 little time that the fan's actually in ventilation
17 mode. It's either in cooling/heating or heating and
18 cooling. And again, you know it's hard to tell how
19 much economizing is going on for a building that has
20 an economizer and blast.

21 So again, we're just keying off you know
22 what stage the equipment -- I mean we're keying the

1 fan power consumption off what stage the cooling is
2 in or if it's heating we put in high speed for
3 heating. So, that's what we're currently doing.

4 MR. STARR: So, that basically means the
5 fan energy you're picking up and probably outside air
6 temperature of 75 up you're assuming some kind of
7 staged compression, and below that? But you know
8 there is cooling happening there. It's just not
9 staged compressor.

10 MR. ROSENQUIST: Right.

11 MR. STARR: It seems like you should be
12 trying to capture that somewhere. I mean it's not
13 ventilation, right? It's really cooling. I don't
14 know. It's hard to capture; is that the problem?

15 MR. ROSENQUIST: Yes, it is hard to
16 capture, at least again with the data that we're
17 dealing with.

18 MS. WALTNER: This is just a request. You
19 said that the revised analysis on the first two
20 points had been sent to the subgroup. I'm not sure I
21 got that, so if that could be posted on the share
22 point, once it's up --

1 MR. ROSENQUIST: Okay.

2 MS. WALTNER: -- or make sure it's sent
3 around to the whole group. Thank you.

4 MR. DOPPEL: Can that request apply to
5 all?

6 MR. ROSENQUIST: Yes.

7 (Sidetalk.)

8 MR. ROSENQUIST: I think Louis is a little
9 uneasy with the indoor fan for space cooling.

10 MR. STARR: I would say if we were to look
11 at the number of economizing hours like in Portland
12 there's a lot of them. I want to say two to three
13 thousand that were not actually -- every morning we
14 don't actually turn on the cooling until about 11:00
15 or 12:00, and we're definitely cooling and we're --

16 MR. ROSENQUIST: Let me just revise my
17 statement here on the fly that, again, for the
18 buildings that we've been -- this handful of
19 buildings we've been looking at more closely for the
20 spreadsheet calculations, again, like I said, there's
21 very, very few hours, if any, that it's in
22 ventilation.

1 Now, I'm not looking at a building in
2 Seattle or Portland or a place where there could be a
3 lot more economizing going on. And in that building
4 perhaps it is in a mode where it's economizing a lot
5 when there's no mechanical cooling or heat, but the
6 fan's on. And in those cases, and I hear what you're
7 saying. What you're suggesting is have it be in a
8 high speed mode during that time.

9 MR. STARR: Yes. Or at least be counting
10 the fan energy in some way, yes. But most likely, it
11 would be pretty much going full out. And you know
12 Climate Zone 4 is quite a bit -- you know it's not
13 just Oregon. It's through the center of the country
14 and on up. And you know also when you get into the
15 higher -- five, six, seven those also could be using
16 economizer too a lot rather than using compression.
17 The same thing in the mornings until lunchtime or
18 whatever when the air heats up you could still be
19 using all of that free cooling. It seems like
20 there's a lot of hours there. I'm thinking in the
21 order of two to three thousand, but I'm not sure.

22 MR. ROSENQUIST: What I'm hearing then is

1 that when the blast output that says that the fan is
2 on, right, and it's not heating or cooling then what
3 we would do in that circumstance is bring the fan
4 speed up to high.

5 MR. STARR: I think a portion of it is
6 ventilation, right? In the wintertime, you wouldn't
7 want to be pulling in cool air, so it'd be
8 ventilating. The summertime, you could be cooling or
9 you could not be. It depends on the set point in the
10 room.

11 MR. ROSENQUIST: I mean what I have for
12 that hour, right, whether it's heating, cooling or
13 heating and cooling, or if the fan's just on, right,
14 without any of those three things going on.

15 MR. CYMBALSKY: So, how does it impact the
16 analysis, though, as we step through IEER levels?

17 MR. ROSENQUIST: Well, this is just for
18 calculating energy savings from a particular piece of
19 equipment, right? And in this case, when it's in
20 economizing mode, right?

21 And I guess what I'm saying here is at
22 least during cooling, heating and cooling and heating

1 I meant the fan speed is being specified by the
2 methods I've just described.

3 MS. COUGLIN: So, it's possible that we're
4 currently underestimating the base case energy use
5 during ventilation only. And depending on the
6 efficient improvement associated with the fan going
7 to higher yields we might get a slightly higher
8 energy savings, but I think the fraction varies. I
9 mean even in -- in some areas it may be significant,
10 but when we do the national building sample I don't
11 think it's going to be a very large -- I mean it'll
12 be in the order of a couple percent probably. That's
13 my guess.

14 MR. DOPPEL: It's Paul.

15 I don't know whether it's connecting or
16 not. I mean the only other thing is this maybe while
17 your post-processing the economizer you could capture
18 it somewhere in that area too, and post process that.
19 But if it only gets to make a big difference in the
20 analysis, then I guess don't worry about it.

21 MR. CYMBALSKY: I mean that's kind where
22 I'm focused right on this issue because it seems to

1 me if it's really on the order of 1 to 2 percent is
2 it going to change the policy outcome, which is I
3 think the important part here.

4 MS. COUGHLIN: We can do a sensitivity
5 order. We can go ventilation hours and just go from
6 there to high speed and look at the impact on total
7 energy use and that will give us an upper bound on
8 the change.

9 MR. ROSENQUIST: Well, talking about
10 economizing, again, the formal working group has been
11 discussing this for a while now. And you know
12 there's two proposed approaches I've put up here.
13 One is somehow validate that the blasting relation
14 output for economized building is fine, and I
15 presented a slide in last Friday's call to try
16 demonstrate that. And the other option is
17 post-process blast output for buildings that are not
18 economized into an economized building.

19 And so the input we're looking for here
20 from the group is does one of these methods seem fine
21 or is there another method that could potentially
22 resolve this issue? I feel like right now it's

1 definitely unresolved. And again, we're just
2 proposing a couple of methods here to try to take
3 care of it.

4 MR. DOPPEL: Can we call a friend?

5 (Laughter.)

6 (Sidetalk.)

7 MR. DELASKI: So, when I heard things on
8 the phone call -- this Andrew -- Greg you were
9 describing on the phone that in the blast simulation
10 -- or as you understand it I think you said it was 35
11 percent of buildings, but that the square footage was
12 more like -- a much larger number, like 70 or 80
13 percent. So, I guess I needed to understand what do
14 you think is happening in the blast model?

15 MR. ROSENQUIST: Yes, so this is the slide
16 I had presented last Friday on the phone call. And
17 on the left are the non-economized buildings. On the
18 right are the economized buildings on the blast, and
19 comparing both cooling load on a regional basis for
20 all the buildings in that region. And then the
21 bottom table is an average cooling load per square
22 foot. And just trying to get a sense maybe of if

1 blast is doing something with regards to economized
2 building to reduce cooling load.

3 And the take aways I had from this I think
4 you really should ignore that building count because
5 I think you really want to look at the cooled square
6 footage is that two-thirds of the cooled square
7 footage being analyzed, at least in those blast
8 simulations was with economizers. And the other big
9 take away is that is that at least on a national basis
10 the cooling per square in economized buildings is
11 lower than that in non-economized buildings.

12 Now, it does definitely vary by region.
13 And in some regions during the summer, for example,
14 it's actually higher. Region 7 is Texas, Oklahoma,
15 and Louisiana, so it's a question there if
16 economizing are even all that effective down there
17 for them.

18 So anyway, that was the purpose of this
19 slide is to try to at least get a very, very high
20 level sense of whether or not blast modeling is at
21 all decent. The other slides I had presented in the
22 previous day's call were talking a non-economized

1 building and using this method here to turn it into
2 an economized building. And that involved
3 calculating the absolute humidity on an hourly basis
4 for each one of these, these 8760, the 8760 being
5 8,760 hours a year, and comparing that to the indoor
6 conditions of the air.

7 And this is a big assumption here. You're
8 assuming that the indoor air is maintained at 75
9 degree dry belt, 50 percent relative humidity, but if
10 you satisfy these two conditions -- if the absolute
11 humidity of the outdoor air is less than the absolute
12 humidity of indoor air and your outdoor dry belt temp
13 is less than your indoor dry belt temp, then you're
14 going to economize. And that last equation shows you
15 how much you're going to reduce your cooling load by
16 when you're economizing. And what that ends up doing
17 is -- West Palm Beach is not a good example here, but
18 let's take Baltimore.

19 This Baltimore building, which on the left
20 it shows you the building load as a function of dry
21 belt temp, and what would happen to that load if you
22 applied this method. And in total, you're going from

1 1.4 billion BTU's of cooling load in that year to
2 just over 1 billion BTU's cooling load in that year.

3 Again, there's a lot of simple assumptions
4 behind this, but that's the affect of using this
5 method. So, it was roughly a 35 percent reduction in
6 cooling load for that particular building.

7 MR. STARR: So, I guess I have a couple of
8 thoughts. So, really the calculation that you're
9 doing is probably what the energy model in blast is
10 doing, right, I suspect if not -- you know those
11 equations are not new. Those are old equations and
12 so I suspect the other one is doing it. What the
13 difference is is coming up is that in your calculated
14 model it assumes that all of the economizers worked
15 perfectly.

16 And in the blast model, I think in the A
17 NOPR in the appendix it talks about two things, a
18 failure of the economizer at a certain rate and I
19 think it talks about ventilation here, and I don't
20 know if that affects it or not. But essentially, one
21 would assume that the economizers work perfectly in
22 the math, unless you were going to do something

1 different with your math now, and I'll assume that
2 they don't. And I think that's what the difference
3 maybe between the blast models and the non-blast
4 models or just the straight calculation are.

5 And so that's I think what -- when you
6 presented the options of "A" and "B" there, that's
7 really what you're getting to. If the post
8 processing assumes a perfect economizer and the blast
9 models do not, to my mind that's always what the
10 difference was. When Dick was looking at the two
11 building profiles my thought when I looked it at was,
12 yes, they just didn't check the box for economizers
13 working and that's what you're seeing, but I don't
14 know if that's everybody's take on it or not.

15 And I mean to me that's what the
16 difference is, and so when you talk about which one
17 we should use I mean the blast one is conveniently
18 already there and we don't have to do anything with
19 it, so I like that. But if we did "B" with some kind
20 of failure rate, I'd probably be okay with that too.

21 MR. DELASKI: Just a follow-up question,
22 Greg. This is Andrew.

1 So, when you show two-thirds of the square
2 footage have economizers, those are functioning
3 economizers?

4 MR. ROSENQUIST: Yes. So, of that
5 two-thirds, 30 percent of them are assumed to be
6 inoperable.

7 MR. DELASKI: Thirty percent of the
8 two-thirds are inoperable?

9 MR. ROSENQUIST: Yes.

10 MR. DELASKI: I'm just trying to sort sync
11 up the numbers from our call last week. There were
12 some numbers tossed out. I couldn't identify all the
13 voices on the phone, but some people say 80 percent
14 of the units are shipped with economizers today.
15 That was one number tossed out. So, 80 percent being
16 shipped today isn't that far off from 67 percent in
17 the stock having economizers. So that would suggest
18 that the stock is pretty stable.

19 I had initially heard that the one-third
20 of the ^^-

21 MR. ROSENQUIST: That was on the building
22 count.

1 MR. DELASKI: -- the building count, but
2 now when you ship to square footage it starts to sync
3 up more clearly with the numbers that were being
4 shared by manufacturers last week.

5 And then on the -- the question is of the
6 failure rate. And you know I had shared a paper last
7 week -- you know I don't know. I mean I guess I
8 would look to the community as to whether this
9 reasonable failure rate.

10 MR. DOPPEL: You know last week Dick Lloyd
11 shared the story of economizers being shipped with
12 the unit and related it to a store just down from his
13 house where you have the rooftop unit and the
14 economizer was still on top where it was shipped with
15 the unit, but packing, the shipping is still on it.

16 MR. DELASKI: Hopefully it'll lower the
17 install costs too, but maybe not.

18 MR. STARR: So, I mean I think the reality
19 is it's not necessarily that all times people are
20 putting ^^^^ well, a couple of things happen. The
21 common one is maybe they don't get installed. The
22 other thing is they set them so that they won't work,

1 whether it's disconnecting or adjusting the settings,
2 but a lot of things can happen on these air
3 economizers. And actually, Steve Taylor, who is also
4 90.1, has a whole article on the interpolate
5 economizers and how they're the worst ones out there
6 and they're sensitive to a lot of failures.

7 So, I am thinking that there's a certain
8 amount of failure. It's basically just not taking
9 credit for economizers. So, you've got this fancy
10 piece of equipment and you're only taking advantage
11 70 percent of the time, which to me is a reasonable
12 thing because there's enough things that can go wrong
13 with it. So, rather than taking credit for it
14 working 100 percent of the time you only take credit
15 for it working 70 percent of the time and you leave
16 out analysis. So, to me, I'm wondering -- one thing
17 you could do as a sensitivity analysis is you could
18 look at "A" and "B," take "B" with a 30 percent
19 failure rate at economizers.

20 In other words, figure it out with the
21 buildings and then leave 30 percent of them out, but
22 see what the numbers come up and see whether "A" and

1 "B" are the same number and then it won't make a
2 difference in the analysis.

3 MS. WALTNER: This is Meg.

4 Just to add onto that, you know I'd be
5 comfortable with that approach. I think I would
6 argue for a higher percentage failure rate. The
7 study from last year, a summer study showed failure
8 -- it surveyed different studies on economizer
9 failures and found failure rates from ^^^^ 43 percent
10 was the lowest study they found up to 100 percent
11 failure, which was just looking at four economizers
12 with I think the medium at around 65 percent failure.

13 So, maybe 50 percent is the right number
14 in there? Jill's shaking her head at me.

15 MR. WESTPALEN: She says more. She wants
16 to go with 70 percent failure rate.

17 MR. DELASKI: Do you guys have data? I
18 mean I know you sell the stuff, but do you know how
19 it's installed? I mean they all worked when you sold
20 it, right?

21 MS. HOOTMAN: By contract too. Yes, I
22 do.

1 MR. FERNSTROM: So, this is Gary.

2 Out there in California, the seagulls
3 build their nests in the economizers.

4 MR. HURST: So, this is John Hurst with
5 Lennox.

6 Are you saying we should get an
7 environmental benefit for providing safe dwelling and
8 mating locations for seagulls?

9 (Laughter.)

10 MR. FERNSTROM: An environmental award for
11 protecting seagulls.

12 MR. DELASKI: Who models that?

13 MR. DOPPEL: Kristen Hanameyer did a
14 study, and she's with the Western Cooling whatever --
15 I forgot what that title is, but I mean maybe her
16 study should be used. That was presented at ACEEE
17 summer study.

18 MS. COUGHLIN: That's what I was citing.

19 MR. DOPPEL: Okay. Yes.

20 MR. CYMBALSKY: This is John from DOE.

21 Is there another way to look at this from
22 maybe the macro level where you look at time series,

1 commercial electricity from EIA on a monthly basis?
2 If the phenomenon we're trying to describe is that
3 over time economizers are being employed in large
4 numbers, you'd actually be able to see that in the
5 data because I don't think we've seen -- at least
6 there hasn't been a lot of standards set for
7 commercial AC. So, if we don't see that reduction in
8 the load I don't think you can attribute a lot going
9 on with economizers over time.

10 MR. ROSENQUIST: I don't know if that's
11 what we were after here.

12 MR. CYMBALSKY: I think now the
13 conversation was focused to whether they're used or
14 they don't work or whatever. So, what I'm trying to
15 get at is there should be some macro level data you
16 may be able to parse out monthly or whatever and look
17 at. I don't know.

18 MS. COUGHLIN: This is Katie from LBNL.

19 I just want to mention and remind people
20 that we did take -- within the AEO there are
21 adjustment factors to internal heating and cooling
22 loads on new building stock that incorporate things

1 like code changes as well as things like internal
2 loads that may go up due to more equipment.

3 And we used those when we take the
4 building loads that are developed from the 1033
5 building with the 95 building stock and apply those
6 to new buildings. We include this factor.

7 So, it is possible -- it's very likely
8 that we are already incorporating some affect of --
9 if economizers have become more prevalent or are
10 operated more effectively that that's already
11 accounted for in the analysis.

12 There's not a whole lot of discrete data
13 that we could separate out different factors, but I
14 think to the extent that the AEO staff who look at
15 commercial buildings are probably as expert on this
16 as anyone that they would have already incorporated
17 that information.

18 MR. STARR: You know my thought is it
19 possible to do this analysis first and then we could
20 start discussing it more? If they come out with the
21 same answer -- well, I guess actually we're saying
22 that maybe there should be more economize failure

1 than there is necessary, but if it matches up with
2 the blast simulations from 2003 or '04 that would be
3 one place to get to, and then it would help us have
4 the next discussion.

5 I mean part of the deal is that -- you
6 know Dick was talking about this last week. I was
7 like why are economizers better. And so he said,
8 well, for instance, they no longer use linkages.
9 They're using gears. I hope that they probably fixed
10 some of the electronics and the sensor malfunctions
11 they typically have.

12 So, I think there's implications that some
13 of the things that have typically been problems with
14 economizers are starting to get better. So, in the
15 future, maybe those will be better, but the existing
16 one still probably don't work so well.

17 MR. WHITWELL: We're talking about new
18 installations, right, so with the better economizer
19 design?

20 MS. COUGHLIN: The blast data don't allow
21 us to do much. We have buildings with economizers in
22 that simulation output and buildings without

1 economizers in that simulation output. There's no
2 way to say what the load would've looked like in a
3 building with an economizer if it didn't have one.

4 MR. STARR: So, I was thinking doing
5 nothing with the blast stuff. I was just addressing
6 in the post processing of -- well, you put in the
7 economizer afterwards and then assume a certain
8 failure rate and see what that number comes out and
9 see if that matches up with the blast simulations,
10 that's what I was getting at.

11 MR. ROSENQUIST: On that approach, I mean
12 we were going down that road, right? You know at
13 least the thought I had was that we could take a
14 non-economized building from blast and replace that
15 with this post processing for a functioning
16 economizer, take that and replace an economized
17 building in blast, but when you start looking at the
18 differences in the cooled square footage that
19 indicates to me that, again, economizers are being
20 used in much larger buildings than in non-economized
21 buildings.

22 So, it presents a problem then trying to

1 do this substitution, right? Again, maybe if we
2 thought about it hard enough and long enough we could
3 figure out a way to get something that would you know
4 start approximating that, but it's not necessarily
5 trivial.

6 MR. SHOWS: This is Mike Shows with UL.

7 I assume here, based on this discussion,
8 that if an economizer is shipped with a unit and it
9 fails it's never repaired, right? Because we're
10 talking about failure rates, but we're not talking
11 about repairing, but I'm sure that if the system
12 itself broke it would be repaired. So, I'm just
13 wondering what is the assumption here with the
14 economizers themselves.

15 MR. ROSENQUIST: Yes. I mean if it's 30
16 percent failure, right? I mean that 30 percent of
17 them are not operating, so there's no assumptions in
18 the analysis about them getting repaired down the
19 line.

20 MR. CYMBALSKY: The 30 percent that don't
21 operate could be different each year, so that's
22 another way of looking at it. You could fix some,

1 but then others break. I think that's the
2 assumption.

3 MS. HOOTMAN: Because that would say that
4 we don't sell any parts for them, and we do, in fact,
5 sell parts for them.

6 MR. ROSENQUIST: The Kristin Hanameyer
7 paper was that -- you know a lot of mechanics who go
8 to repair it don't even want to repair it.

9 MR. DOPPEL: Well, there's an association
10 with ventilation here and economizer. And I think
11 that -- I don't know what blast does as far as
12 ventilation, but ventilation for a non-economized
13 building what's that assumption there? And then if
14 there's economized is the same as --

15 MR. ROSENQUIST: I think it was meeting
16 minimum mass rate 62, ventilation requirements that
17 were in effect at that time.

18 MS. WALTNER: So, one thing to note about
19 the study is that the failure rates found you know
20 ranged from failing completely shut or open to just
21 an engineer programming the economizer set points you
22 know not optimally. So, there's range of failure

1 rates. So, it might not be fully that the economizer
2 isn't functioning.

3 But I wanted to understand the Option B a
4 little better based on what you were describing. So,
5 would the post processing -- so is the idea that you
6 would keep the 369 economized buildings and then post
7 process on economizers to some of the no-economizer
8 buildings and add those together, or is the idea that
9 you would -- I thought I'd just heard you say because
10 of the square footage difference in the economizer
11 buildings versus non-economizer buildings you
12 couldn't just sort of scrap.

13 MR. ROSENQUIST: Again, my thought
14 processing, and again it was under the assumption
15 that there was general discontent about the
16 economized buildings is that you would take the
17 non-economized buildings, convert them into
18 economized buildings, and replace the economized
19 buildings in blast. Now, what you're proposing do --

20 MS. WALTNER: That wasn't a proposal. I
21 was trying to clarify what you were proposing.

22 MR. ROSENQUIST: No, no, no, what you're

1 proposing to do is add those buildings instead to the
2 existing stock of economized buildings as modeled by
3 blast and that certainly can be another option.

4 And again, I was going down the path that
5 I thought that there was general discontent with how
6 blast was modeling economized buildings and that they
7 weren't worth much so that they would not be you know
8 continued to be analyzed in the analysis.

9 MS. WALTNER: Okay, but are there -- in
10 the 664 are there large buildings that could be used
11 to replace --

12 MR. ROSENQUIST: I don't know.

13 MS. WALTNER: Okay.

14 MR. ROSENQUIST: I don't know, but I
15 suspect that you know there's far more small
16 buildings in the 664 than ^^^^ you know and far more
17 large buildings in the 369 that are economized.

18 MR. DOPPEL: Paul Doppel.

19 I was in a meeting with Dick Lloyd last
20 Thursday and Friday, so I know he wasn't
21 participating in this, but I'd really like to hear
22 what he is --

1 MR. ROSENQUIST: He was on the Friday call
2 at least the part where we were talking about
3 economizing, and he had things to say about that.

4 MR. DOPPEL: Yes. Because we did stop at
5 2:00.

6 MR. STARR: I have a generalized question
7 about the economizer. So, in the overall energy
8 analysis is this going to make -- my sense is that it
9 would make a difference, but is it going to make a
10 difference, depending on how you model this one way
11 or another or is there going to be a huge effect of
12 the analysis or do you have a sense for that?

13 MS. COUGHLIN: Again, it's the situation
14 that will affect the base case as well as the
15 standard levels. So, you're going to change the base
16 case estimate of energy consumption. So, if you
17 think of energy savings a percent of what's available
18 at the base case, it could have an effect, but it
19 will not have an effect on the relative position of
20 different yields.

21 MR. STARR: You have more energy to save.
22 Right.

1 MR. ROSENQUIST: Right. Because what I'm
2 looking -- well, all we have to look at are these
3 examples that I had done previously, right? And so,
4 in this specific one for Houston there's not much --
5 I mean .13 out of .163 that's what, 7 percent, 6 or 7
6 percent reduction in cooling load? The Baltimore
7 example is much larger, 30, 35 percent. Chicago's is
8 very large, right, because this particularly large
9 office building has a lot of cooling load, even down
10 to temperatures beyond zero degrees. So, I guess it
11 just depends and I don't -- you know I think if the
12 building's larger and it's in a northern climate,
13 then perhaps it can have a more significant impact
14 than other buildings.

15 MR. STARR: So, I just thinking if you
16 were able -- perhaps it's not an easy thing to do.
17 "A" is already done, right?

18 MR. ROSENQUIST: Right.

19 MR. STARR: The choice is done, so you
20 don't have to do any work there. "B" requires some
21 work. And so if you were to come and they were to
22 show 3 percent more savings as "A" as opposed to "B"

1 you can just divide it by two and call it one and a
2 half.

3 I don't know, but you really don't know
4 until you run the numbers necessarily what the
5 difference is, and I assume that's a lot of work.

6 MR. ROSENQUIST: Yes, it is a lot of work.

7 MS. COUGHLIN: It may be impossible to
8 create a statistically equivalent sample with Greg's
9 proposal. So, this opens up a lot more problems than
10 it solves. And I think we already have an estimate
11 in the difference in cooling load in economized
12 versus not economized buildings from just what was
13 done with blast.

14 So, unless someone can look at that and
15 say it's really not credible you know for various
16 reasons, it's not ^^- so this is the magnitude of the
17 cooling impact. Now, the sales numbers we can look
18 at the capacity that's currently in the 1033
19 associated with economizers and then again this is
20 not the building stock that we're actually working
21 with in the LCC. We've sort of scaled that up to
22 reflect the current building stock.

1 So, we can go through that exercise and
2 compare to your sales numbers and see if we should
3 maybe adjust the penetration of economizers, and that
4 can be done by reweighting the buildings. But again,
5 we also have that adjustment I mentioned to the
6 cooling loads, which is bringing down the cooling
7 loads over time with new construction. So, we
8 already have some adjustments and we can make an
9 adjustment for the penetration rate of economizers,
10 assuming that these buildings represent reasonably
11 well what an economized building looks like.

12 So, I think the key technical issue is you
13 have ^^^^ and we can give you more detailed
14 information on a per building basis. If the cooling
15 load reduction in an economized building is
16 reasonable, given your various experience, then we
17 know that we can stick with this.

18 MR. STARR: Couldn't you -- well, Dick
19 could compare his PNL models with his economized and
20 non-economized and see what that percentage is and
21 compare it to this percentage and then he would feel
22 more comfortable about it, I think. Then he could

1 say, yes, that's sounds good. I think he would be
2 able to do that with the 16 prototypes, although I'm
3 not sure how that would go into the sampling frame
4 and all that business or if he would need to or not,
5 but certainly by the -- these are just by regions
6 aren't they, so you don't really have the building
7 types split out.

8 MR. ROSENQUIST: For reach region, we
9 could show principal building activity as long as the
10 building sample was high enough.

11 MS. COUGHLIN: Again, we don't have actual
12 new buildings in the simulation database, so we would
13 have to make so assumptions about what -- you know we
14 have made those assumptions, so we could see if
15 they're any good. So yes, we could take the
16 prototypes with and without economizers and look at,
17 again, the per square foot difference and the cooling
18 load. And we could take our estimates based on this
19 with the scaling factors from AEO and compare those.
20 Yes.

21 MR. STARR: Probably the guy to talk to --
22 I mean I'm okay with it, but I'm probably not the one

1 that would have a problem with it. It would probably
2 Dick and his kind of a technical issue.

3 MR. WHITWELL: This is Bob Whitwell with
4 Carrier.

5 I wasn't on the call late last week, and I
6 haven't had a chance to catch up with Dick on the
7 outcome of the call and his thoughts on it. I did
8 hear that he said, well, let me think about it. So,
9 I think maybe we need to get together again and just
10 review with Dick and Suzanne and just come to
11 agreement on which path we want to go. And maybe
12 there's some more modeling that needs to be done, but
13 the last that I heard -- so, if you go and you look
14 at the blast results, I mean on the building load
15 curves.

16 MR. ROSENQUIST: So, like in Chicago or
17 Baltimore.

18 MR. WHITWELL: I mean the discussion that
19 I've been involved on this you know we look at the
20 blast model and it looks the economizer is not
21 operating there, right?

22 MR. ROSENQUIST: Well, this particular

1 building is not economized on the left, so this is
2 using the --

3 MR. WHITWELL: Okay, but even the ones
4 that we looked at that had the economizer it looked
5 like the economizer was not economizing.

6 MR. ROSENQUIST: Yes. And I actually
7 looked at a handful of buildings myself and there
8 were some buildings where it looked like it was
9 working and other ones it didn't look like there as
10 an economizer at all.

11 MR. WHITWELL: Yes, so those are the ones
12 that I saw. Granted, I didn't see all of them, so I
13 think we need to look at something and maybe it's the
14 post processing that you referred to. I think it was
15 "B," right? But I think we need to get the group
16 together again and come to some consensus.

17 But right now you're saying for Path A is
18 to address this concern that Bob's describing, which
19 is to verify that the economizers are working in some
20 portion of the building. So, that seemed to be what
21 Dick was raising is that he's having trouble seeing
22 where it's working, right? So, if you can verify

1 that economizers are working in the rate of buildings
2 that you show that's what's hard to do.

3 MS. COUGHLIN: That's what the cooling
4 load per square foot is intended to demonstrate.

5 MR. WHITWELL: Okay. That's the question
6 back to Dick, and the modelers that you guys work
7 with; are those numbers reasonable?

8 MR. CYMBALSKY: So, this might be a good
9 spot to ask if we need to form a working group around
10 this. So, I know we might want to form one around
11 the equipment too. It's basically continuing what
12 you guys have already done.

13 So, I would suggest that because we do
14 have a couple weeks until our next meeting.

15 MR. ROSENQUIST: I would say that for the
16 May 11 and 12th meetings, again, the objective there
17 is to present life cycle cost results, right, with
18 some modified version of the analysis to take into
19 account all these revisions we've been talking about.

20 Now, this one on economizing I would say
21 is likely not to occur for that meeting just because
22 of the level of work that would be required to create

1 an economized sample from a non-economized sample, I
2 would say that. I guess following up on what Katie
3 said I mean -- and this could be on us too as well is
4 to try to verify whether economizers reduce cooling
5 load per square foot on some of the basis that we're
6 seeing here. That's another thing that should be
7 checked, right? And Louis was suggesting looking at
8 the 90.1 buildings and seeing if there's a comparable
9 value. I don't know if there is one. I kind of
10 doubt it because it's such a small building set,
11 right, and I don't think that was the mission of that
12 activity was to get after that.

13 So anyway, for the 11th and 12th, it will
14 probably just using Path A. And I mean certainly we
15 can continue ^^-

16 MR. CYMBALSKY: You could still continue
17 the dialogue

18 MR. ROSENQUIST: Continue the discussion
19 to figure out. If that's not satisfactory to a group
20 of the stakeholders, then come up with an alternative
21 down the line.

22 MR. STARR: The reason I would say

1 comparing the 90.1 models and what you might find is
2 that the overall impacts to the analysis there may
3 not be that much change or additional energy savings,
4 and so you may not need to do any more work because
5 it doesn't matter. And so that's why I was thinking
6 if there was a quick way to do it you could just see
7 that you know using the blast model you come up with
8 this number and this other one you come up with 10
9 percent more energy savings.

10 And you know maybe that could be
11 negotiate, the difference between those two numbers
12 or some version of that seems like that's what I'm
13 saying is it may not make much difference overall. I
14 don't know if that's a quick way to do it or not,
15 looking at those two.

16 But I can tell you it's not going to be
17 the same because it's going to assume a 30 percent
18 economizer failure rate in the blast models and in
19 the PNL models they assume that they work perfectly,
20 so there'll definitely be a difference.

21 MR. ROSENQUIST: So, I think you heard
22 from me that for the 11th and 12th I think if the

1 goal is to look at life cycle cost results with a
2 revised analysis we're going to be looking at Path A,
3 at least for the economizers. And then I think
4 concurrently with that doing research, investigation,
5 possible development of some sort of modified
6 building sample would have to be done, so just trying
7 to be realistic.

8 MR. CYMBALSKY: That's appreciated.

9 So, we have a half hour. We want to try
10 to get through the rest of what Greg has in his --

11 MR. ROSENQUIST: Well, I only had one
12 more item here -- well, actually, I forgot about the
13 life cycle costs.

14 MR. CYMBALSKY: Right. That's another set
15 of slides.

16 MR. ROSENQUIST: You've heard me talk
17 about this before when Detlef was presenting. I
18 think we're going to go ahead and do this. Detlef
19 can provide revised fan power consumption at elevated
20 static pressures. So, we're analyzing that in the
21 energy use analysis.

22 So, I mean we have some ways to do that.

1 We already know that the blast simulations used
2 external statics of .75 and 1.25. So, we could run
3 with those values and have Detlef provide us with
4 those power consumption values and process that in
5 our energy use analysis.

6 I think without hearing anything else
7 that's probably what we'll do, but looking for any
8 input of whether or not you think that's a good idea?

9 Again, what we try to do in the energy and
10 life cycle cost analysis is try to reflect field
11 conditions. And what we had done for the NOPR did
12 not take this into account, so I think it's an
13 appropriate thing to do to try to capture reality
14 here.

15 So, I'm seeing nods. We'll just go ahead
16 and do that. Okay.

17 MR. THARP: The question is what static
18 are you going to use at reduced stages? So, if
19 you're operating at 1.25 stat -- 1.25 inches on high
20 stage, what are you going to use for lower stage
21 static?

22 MR. ROSENQUIST: I'd hope they'd use the

1 fan law, or some version of it, 2.3 or some other
2 exponent that you'd back down.

3 MR. WESTPHALEN: This is Detlef
4 Westphalen.

5 We would use the standard 34360 guideline
6 for what to do with what the static pressure is. You
7 know the air flow reduces and then either simplify it
8 by using the cubic or go back to the fan tables and
9 read through the calculation.

10 (Slide.)

11 MR. ROSENQUIST: This next slide sort of
12 lays out the proposal for carrying out the revisions
13 and providing the revised results to this group. You
14 know this has been done for other working group
15 meetings, ASRAC working group meetings. So, I think
16 we've identified a lot of the methods that we're
17 going to go ahead and use. And all of them I hope
18 are going to be quantifiable and you'll see the
19 things relative to what they were in the NOPR.

20 Well, again, for the life cycle cost next
21 time we meet in person, which is on the 11th and
22 12th, so soon, very soon. You know, again,

1 conducting for sensitivity I think is probably going
2 to be important to this group when we get to issue
3 which no one's agreeing on, right, to try to figure
4 out whether or not that's important issue. So, we'll
5 certainly be doing that as well. And if those
6 sensitivities turn out to be not only just
7 sensitivities, but something that should be primary
8 to the analysis, we'll have that incorporated into
9 the analysis and present results based upon that as
10 the primary set of results.

11 I wanted to go over revisions planned for
12 the life cycle cost analysis. And again, they've
13 been touched on before during Detlef's presentation.
14 You heard that there are going to be these multiple
15 design paths as a function, whether it's a constant
16 air volume or a staged air volume variable air volume
17 system. And so we're going to capture that because
18 we have this data from CVAC's 2003 that indicates
19 what fraction of buildings are constant air volumes
20 and what are variable air volume, so we have that
21 reflected in the new LCC analysis.

22 Again, if the main fraction data that's

1 applied indicates different fractions of CAV and VAV
2 systems, we'll certainly use that to complement the
3 data we get from CVAC. But barring any data like
4 that, we'll rely in the CVAC data to figure out those
5 percentages.

6 Again, as you've heard too, I mean when we
7 get to a certain efficiency level the existing
8 constant air volume system won't accommodate that, so
9 there'll have to be changes made to controls and to
10 diffusers. And the plan there is to capture those
11 costs into the analysis.

12 And so again, when you move pass a certain
13 efficiency level where there's not a constant air
14 volume design, we'll be including these types of
15 costs at these higher efficiency levels.

16 And then, finally, you heard about the
17 conversion curve. Again, written here is that we
18 thought it was going to be happening at Efficiency
19 Level 3. Whether it happens earlier or later -- I
20 guess that was what the discussion was earlier, but
21 whenever it does happen we plan on adding that cost
22 into the analysis.

1 MR. STARR: Just a quick question on the
2 design paths there, so are you going to flip that out
3 based on size or tonnage? In other words, the 15 and
4 30 would be the AV paths or what are you thinking?

5 MR. ROSENQUIST: Yes, for 7 and 15
6 there's going to be -- currently, there's going to be
7 two design paths for EL1 and EL2. And we'd allocate
8 the constant air volume design path to constant air
9 volume buildings and the variable air volume path to
10 variable air volume buildings.

11 And then once we get to that point where
12 that design can only be accomplished with a variable
13 air volume design or staged air volume design, we
14 would start incurring these costs for replacing
15 diffusers and controls.

16 And now what square footage would be
17 affected is going to be based upon the data that we
18 get out CVAC. Some of the data we were looking at
19 earlier indicated that smaller buildings had a
20 smaller percentage of VAV systems, so that effect
21 could be more significant for the smaller buildings
22 than the 15 tons, but we'll have all those numbers

1 presented by the next time we meet.

2 Then with the 30 ton I mean one thought
3 that we had -- and again, this is a thought from two
4 weeks ago -- is that the baseline itself would be
5 variable air volume, right? So, there really
6 wouldn't be anything that would have to be done in
7 some sense. I mean anything that would have to be
8 done in the base case would also have to be done in
9 the standard case then, right, if our baseline design
10 itself was variable air volume; but we haven't really
11 talked about the 30-ton systems that much here.

12 So, I don't know, Detlef, you want to
13 provide any further comment on that?

14 MR. WESTPHALEN: This is Detlef.

15 I think the CVAC's data will show that
16 there are some buildings that may, at the 30-ton size
17 level, still be constant air volume. So, I think we
18 should consider some portion, probably a small
19 portion, to be constant air volume. Remember also
20 that the 30 ton is intended to represent 20 to 63, so
21 in the 20 to 30 range perhaps a few more CAV, but
22 properly represented as a 30 ton. The percentages

1 should reflect the full range of capacities in the
2 class. And so, hopefully, the CVAC's data and then
3 the other information that we get will provide some
4 guidance as to how to make those splits, and then we
5 would just have to provide our correlations to the
6 appropriate for CVA and VAV installation.

7 MR. MAUER: This is Joanna Mauer.

8 I thought there was some discussion about
9 how staged air volume systems would not require any
10 change in diffusers. Is that consistent with what --

11 MR. ROSENQUIST: Yes. I mean if you don't
12 go below 60 percent full air flow, then yes, you
13 wouldn't require a change in diffusers specifically.
14 If you go below that, you would. That's our current
15 understanding.

16 MR. WESTPHALEN: This is Detlef again.

17 I mean this is a point that may be should
18 be discussed fully because initially we split the
19 path staged air volume and constant air volume for
20 the 7 and 15 in response to the comments received
21 that up through EL1 and EL2 should come in a staged
22 air volume version, but then it's not clear.

1 You know one would ask why would you even
2 consider putting a constant air volume in when you
3 could put a staged air volume in, depending on
4 whether it achieves better efficiency even at the
5 same IEER, depending on the other aspects of the
6 energy analysis like the ventilation mode; but if you
7 put the ventilation mode at high, it's not going to
8 matter any way. So, I don't know if it matters.
9 Maybe we can take a look at that both ways and see if
10 it does make a difference.

11 MR. ROSENQUIST: Right. In remembering
12 that input that we received last week, I even thought
13 I heard that maybe even up through EL3 you wouldn't
14 have to make any diffuser change because at that
15 design level you're not going below 60 percent air
16 flow, at least for 15 tons.

17 MR. WESTPHALEN: 15 ton, that's correct.

18 MR. ROSENQUIST: So, you wouldn't be
19 seeing this until 3.1 or 4.

20 MR. STARR: So, I have a question. So, I
21 would say for a unit -- and I was thinking about a
22 constant air volume or one where you'd have a staged

1 one. You might use a BFD. So, typically, with the
2 unit that has two stages or you know two fan speed,
3 the one full speed or then at 66 percent and so that
4 corresponds with low stage cooling and high stage
5 cooling. But then a third place that would be handy
6 to have is the ventilation, and the only way to do
7 that would be probably through the use of a BFD, but
8 you wouldn't have to change your diffusers and do all
9 that. You' just run a lower air flow.

10 And so, what I'm wondering -- I don't know
11 and the manufacturers do people actually do that
12 because it would seem like a cheaper way to do things
13 than going through and putting in a VAV system in
14 order to run your lower air flow, but I mean if you
15 spend a lot of time in ventilation mode it seems like
16 a pretty handy thing to have.

17 MS. HOOTMAN: What, the variable speed on?

18 MR. STARR: The ventilation mode so that
19 you're running at 40 percent instead of 66 percent.

20 MS. HOOTMAN: (Off mike).

21 MR. STARR: Well, most of the people that
22 are buying a VFD are definitely hooking to AV boxes

1 for sure, right, is that what you're saying?

2 MS. HOOTMAN: No.

3 MR. STARR: Why not the two stage where
4 you have an actual VFD and you're running the hole
5 from 25 to definitely going and hooking up to the AV
6 boxes?

7 MS. HOOTMAN: So, Jill Hootman from Trane.

8 I think in answering Louis's comment if
9 you've got a VFD on it you're likely are a VAV, yes.
10 You're not putting a VFD on there. They're too
11 expensive just to run it at constant volume or you
12 know likely. I'm just saying likely.

13 MR. ROSENQUIST: Again, what we do in the
14 life cycle cost analysis in terms of capturing costs
15 for diffusers, controls, curves, that type of thing
16 is going to be dictated a lot by what the engineering
17 analysis provides to us in terms of what can be
18 accomplished with staged air flow as opposed to fully
19 variable and that type of thing. And also dictating
20 footprint as well is whether or not a conversion
21 curve is required at that efficiency level.

22 You have to remember -- I mean Detlef just

1 signed up earlier before the break to do EL2.5 and
2 EL3.05 as well, so there's a lot of work here, right,
3 one of the reasons I didn't want to necessarily
4 promise for the 11th and 12th this alternative to the
5 economizer path.

6 You know these are the parking lot issues
7 that we provide last Friday. There's probably more
8 on the list now, but maybe the thing to do is try to
9 be comprehensive here with the parking lot issues
10 that we want to carry forward. And I can just type
11 them here as we go along.

12 The first one's still an issue, right?

13 MR. WESTPHALEN: I think on the first one
14 we concluded that we'll be doing both designs and
15 CBD, depending on information we get exactly how that
16 would split.

17 MR. ROSENQUIST: I think you heard your
18 proposal on external static pressure and I think
19 we're done with that one, so that's not necessarily a
20 parking lot issue any more.

21 On the conversion curve, I think
22 everyone's sort of in agreement about the .2 inches.

1 I think along with what we're doing to address the
2 field external static pressure maybe this is resolved
3 as well. It seems like it could be.

4 MR. STARR: So, you know with the curve
5 it's really the external and it's the internal, so
6 the total

7 MR. ROSENQUIST: Right.

8 MR. STARR: It's the relative magnitude of
9 those two. So, I guess if you do Item 2, then Item 3
10 is not so much a concern; is that what you're saying.

11 MR. ROSENQUIST: Yes. Because if we're
12 running at a higher external static pressure, I mean
13 the way we would handle it is just by adding another
14 two-tenths.

15 MR. STARR: So, then you're comparing
16 apples to apples. Okay.

17 MR. ROSENQUIST: Right.

18 MR. STARR: I was suggesting to adjust it
19 down.

20 MR. ROSENQUIST: Right.

21 MR. STARR: Okay.

22 MR. ROSENQUIST: I think you heard what,

1 at least for the 11th and 12th what we're going to do
2 in terms of economizing. And you know maybe you'll
3 talk to Dick and get further information on his
4 proposal or that he maybe can bring to this group.

5 MS. HOOTMAN: And we're going to have
6 these by tomorrow or sometime this week you said?

7 MR. CYMBALSKY: Yes, they're already in
8 the docket now. This packet that was handed today is
9 in the docket.

10 MS. HOOTMAN: Okay.

11 MR. STARR: You know what I was going to
12 suggest, talking to Dick, that perhaps we could have
13 a meeting mid-week or something -- well, something on
14 the webinar or something like that, but then if you
15 didn't have a problem with they could start working
16 on it right away rather than waiting until May 11 or
17 maybe May 11 is not that far away.

18 MR. ROSENQUIST: May 11 is not that far
19 away.

20 MR. CYMBALSKY: So, the top here is do we
21 want to create a little subgroup to explore this
22 rather than the whole committee.

1 MR. DOPPEL: Paul Doppel.

2 So, I was going to ask if there was like a
3 partial step. It's like you either do a whole
4 economizer, one this way or that way, is there a
5 partial step to see what the difference?

6 MR. ROSENQUIST: I've struggled to try to
7 figure that out. You know some of the ideas, and
8 they're kind of cocky-mammy maybe. I haven't really
9 discussed them with anyone else's is look more
10 closely at the economized buildings and blast.
11 Again, that would take some effort because you're
12 going through over 350 buildings, right, and closely
13 looking -- you almost have to plod every single load
14 versus dry volt temp you know for that building and
15 eyeball it and kind of see if this makes sense. Now,
16 you could probably develop an algorithm to do that
17 check automatically for you. And maybe there's some
18 sort of ground rules that say, hey, this one's okay
19 and if it doesn't do this then it's not okay. And if
20 that's the case apply this post-processing method,
21 right?

22 Again, I'm talking a little bit off the

1 top of my head here, but that would be one idea.

2 MR. DOPPEL: So, we could do a subgroup,
3 as you were suggesting, that would include Dick and
4 then come maybe in the next couple days to reach a
5 conclusion and then how would in that subgroup --

6 MR. CYMBALSKY: So, you'd report back to
7 the working group here.

8 MR. DOPPEL: Then you get into that
9 approval, then we would have to meet to approve them
10 to go forward. So, they need the approval to go
11 forward.

12 MR. CYMBALSKY: Right. So, you know we
13 would set up a webinar of this committee. So, we
14 could set up the subgroup and then I don't know how
15 much time -- I mean these guys have to be honest with
16 how much time you can ^^^^

17 MS. COUGHLIN: The more subgroups we do
18 the less time we have to actually do work, so I want
19 to make sure everybody's clear that the economizer
20 issue changes the total heat removed in the base
21 case, right? It has no affect on the relative
22 performance of different ELs. So I think -- you know

1 my own sense is any issue that does affect the
2 relative performance of different ELs should have a
3 higher priority for the technical team because that
4 affects the decision criteria. This is something
5 that's going to affect kind of our overall estimate
6 of energy savings and probably -- again, I mean we're
7 looking at something that's probably, at most, 5 to
8 10 percent.

9 We don't even know the sign. Because
10 there was no reason to say that we're not
11 overestimating how well economizers perform, right,
12 so I think it's unclear at this point what the
13 priority on the basis of actual impacts on the
14 results is of this issue and it may be again to come
15 back to it in the next meeting. We'll do the best we
16 can to provide a quantitative ranking of the things
17 that have been discussed and see what additional
18 effort we want to put into it.

19 MR. DOPPEL: Paul Doppel.

20 So, would you prioritize these that are
21 listed on the board in a different way than this?

22 MS. COUGHLIN: No, it's at the bottom and

1 that's where it belongs.

2 MR. DOPPEL: How about the three above it,
3 though? And are you saying that those --

4 MS. COUGHLIN: Yes, I think that looks
5 reasonable to me. Yes.

6 MR. DOPPEL: Do we need a decision on
7 those before you --

8 MS. HOOTMAN: We've already agreed on.

9 MR. DOPPLE: Okay. Then they're not in
10 the parking lot, are they?

11 MR. CYMBALSKY: We still need to do the
12 work. Let's be clear we still need to do some work.

13 MR. ROSENQUIST: Yes, it's not done yet.
14 We just decided that this is how we're going to deal
15 with it.

16 MR. DOPPLE: What are you doing?

17 MR. ROSENQUIST: I'm looking for a
18 checkmark.

19 (Sidetalk.)

20 MR. ROSENQUIST: Red indicates it's taken
21 care of.

22 MR. CYMBALSKY: So, can I just maybe

1 propose that we have enough stuff to work on. And
2 then we get the stuff we've talked about today, and I
3 know that that last issue is still near and dear to
4 some people's hearts. There's some difference of
5 opinion on what difference it will make in the
6 analysis, if at all. Frankly, I'm more concerned
7 with the policy decision that this group is going to
8 try to negotiate. And if my technical people are
9 telling me that they think spending a couple weeks on
10 economizers may not have an impact on that, it'll
11 change the effected sayings for those options.

12 It's an important thing, but maybe it's
13 not our most important order of business so that we
14 kind of move forward. I'm not saying we won't do
15 some work later on that, obviously, but to just to
16 prioritize the workload let's move forward with what
17 we've identified. We can set up a webinar here and
18 now if we think an interim meeting would be something
19 we should do, or should we just let these guys get to
20 work and come back on May 11th?

21 Anyone have ideas?

22 MR. DELASKI: This is Andrew.

1 I mean they've got a lot of work to do,
2 and we come back on May 11. I wonder a little bit
3 you know are we going to be able to use two full days
4 at that time? We've got two full days booked. I
5 presume if we finish earlier then we'll just finish
6 early.

7 MR. CYMBALSKY: Right.

8 MR. DELASKI: A day probably isn't enough.

9 MR. CYMBALSKY: Right. And I think that's
10 where get people home earlier on earlier flights.
11 Yes, I think you can count on that.

12 MR. DELASKI: There might be other issues.
13 We didn't go through to see if there are other
14 parking issues here. I'm not sure we want to at this
15 late hour. I assume you guys have pretty complete
16 notes.

17 The one issue that I think is a pretty
18 significant issue out there, I wished we'd left some
19 ambiguity, is at what point do you apply the
20 conversion curve costs? We had some discussion
21 around that you know and how does that applied?
22 That's a pretty big adder. You know someone said it

1 amounted to a thousand dollars. And when that kicks
2 in that's really going to affect the curve,
3 potentially, so that's one area where I don't know
4 that we've resolved that issue today.

5 You guys are going to do your analysis and
6 come back to us. That's an important issue.

7 MR. ROSENQUIST: That particular one
8 because it's an installation cost -- it's an input
9 the LCC model. It's an easy one to handle, very easy
10 to handle a sensitivity. We can maybe handle it in
11 real time, right, at the next set of meetings.

12 I mean if Detlef comes back and says,
13 okay, this is the point at which a conversion curve
14 is needed according to the data I'm looking at and
15 other people feel, wait a minute, it should be
16 earlier or later, you know that's something we can on
17 the spot I just think make that modification and see
18 what the result and impact is.

19 MR. STARR: I was also thinking, though,
20 for the conversion curve the sheet metal guys should
21 be pretty good ones to talk to about pricing because
22 they make those as well, and also pressure drops too.

1 I mean they're not here any more, but they would be
2 seems like good people to talk about that as well.

3 MR. ROSENQUIST: Anything else cross your
4 mind, Andrew, about the parking lot issues?

5 MR. DELASKI: Well, we had the legal
6 issues, but I put those back. I think that's outside
7 the scope of the folks in Eric's -- I don't know.
8 There are other things that folks in our caucus,
9 maybe not parking lot, but ambiguous on some level.

10 And Jill, on the costs you talked about --
11 is HRI collecting the economizer sales?

12 MS. HOOTMAN: Shipments, yes.

13 MR. DELASKI: Shipments I meant to say,
14 yeah.

15 MS. HOOTMAN: (Off mike.)

16 MR. DELASKI: So that would come in with
17 the data? That's all I have.

18 MS. HOOTMAN: (Off mike.)

19 MR. CYMBALSKY: That's a good question.
20 When we were discussing the meeting, and I read
21 through this I said, hey, you know what, it doesn't
22 say anything about Mike didn't even show up to the

1 meeting, so that's an interesting development there.

2 No.

3 (Laughter.)

4 MS. HOOTMAN: (Off mike.)

5 MR. CYMBALSKY: No one's really focused on
6 that really. From what I understand there was the
7 one issue that was brought up at the public meeting.
8 Yes. And so you know I haven't sifted through
9 anything, other than we heard that issue. I don't
10 know what you all discussed. It sounds like you
11 focused more on the ruling side.

12 You know certainly if that point is the
13 only point then I'm just going to simplify it as
14 quickly that should it be 82? Should it be 81? You
15 know that to me that's negotiation.

16 MR. DELASKI: Well, there were some
17 technical issues that were raised by the
18 manufacturers as to having to do with when are you
19 incurring the costs for condensing and condensing
20 material changes that aren't incorporated in the
21 analysis, so I don't know when the time is for that
22 to be -- for you guys to lay that out for the

1 committee consideration.

2 Now, whether we have time next time or --
3 I kind of agree that there's a lot of -- air
4 conditioner we don't want to detract from this
5 important analysis, but I would like if we could give
6 an hour to look at the issue.

7 MR. CYMBALSKY: Well, we should set aside
8 a time on the agenda for next time. Actually, we got
9 through more than I thought we would today.

10 MR. DELASKI: Do it right now. That's a
11 joke.

12 MR. CYMBALSKY: I know you were joking.
13 You notice how I didn't laugh.

14 (Laughter.)

15 MR. CYMBALSKY: The worst joke you've ever
16 told me.

17 MR. FERNSTROM: This is Gary.

18 I was talking to Steven Rosenstock this
19 morning of EEI and he wants to make sure that you all
20 seize the equal opportunity for improvement that
21 electricity does.

22 MR. DELASKI: Condensing levels Steve

1 wants.

2 MR. CYMBALSKY: We'll draw up an agenda
3 for the May 11 and 12th, and make sure we put a few
4 hours down for that. We're not overlooking it at
5 all.

6 MR. DELASKI: John, when do you think
7 we'll see that agenda? I want to make sure we've got
8 the right people lined up at least on the phone.

9 MR. CYMBALSKY: Yes. So, let's give these
10 guys some time to do some work and we'll be able to
11 more fully understand where we are with some numbers,
12 but yes, we'll pass it out at least several days
13 before the meeting.

14 You'll be happy to know I put this agenda
15 together last night at 4:30. And Eileen got me her
16 slides at 4:45. And I still made it to the hockey
17 game and dinner beforehand by 5:45, so we made it.

18 (Sidetalk.)

19 MS. HOFFMAN: The Capitals. They're doing
20 very well.

21 MR. CYMBALSKY: Okay, then the other thing
22 is the facilitators are going to put together the

1 ground rules and those types of files, process-type
2 files. We'll put them out there. We have the share
3 point. We'll get that set up and we'll communicate
4 all this to the members and the alternates. I've
5 already gotten a few emails. Thank you for those
6 who've submitted those.

7 And then I guess just to finish up today
8 we usually reserve public comment time, but you know
9 I'm looking around and the public already went public
10 on us, but thank you for everyone. I think today
11 went very well. I think it bodes well for us making
12 our deadlines. It's going to be a lot of work, but I
13 think today --

14 MS. HOOTMAN: (Off mike.)

15 MR. CYMBALSKY: The subgroups I think
16 we've decided we're going to do our work now and
17 tackle on May 11.

18 MS. HOOTMAN: Okay. We'll look forward
19 to seeing you on May 10 and 11th. And if there's a
20 webinar in between, we'll get back to you. And it's
21 been a pleasure. Thank you.

22 MR. CYMBALSKY: May 11 and 12th.

1 (Whereupon, the meeting concluded at 5:00
2 p.m.)

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

A				
a.m 1:12 59:11 66:17	achieved 120:14	168:10 170:2,3,16 258:5	34:10,13 35:3,18 37:14 56:10 69:14 104:16 118:21 146:9 148:13,20 154:16 171:18 174:8 181:20,22 189:4 200:12 206:19 209:6 296:3	276:16,19,20 277:8,13 278:8,8 278:9,10,13,13 279:5,10,17,19 280:9,12,19,19,22 281:2,3,15,22 282:9,14 283:18 296:3
abides 54:13	achieves 281:4	adequate 209:5	agreed 17:7 20:6 54:4 104:18 226:13 290:8	Air-Conditioning 2:16,18
able 39:13 40:2 53:15,15 82:22 84:1 94:9 118:14 165:8 181:13,19 194:1 204:14 205:13 218:20 236:17 255:4,16 264:16 267:2 292:3 297:10	achieving 119:16	adjust 266:3 285:18	agreeing 18:7 54:2 137:14 276:3	airport 44:15 48:4
absent 37:21 132:7	acknowledge 129:8	adjusted 156:2	agreement 40:20 57:20 63:14 64:16 67:20 69:2,20 78:3 104:14 223:8 268:11 284:22	algorithm 287:16
absolute 121:7 204:19 247:3,10 247:11	act 16:9 28:2 29:2 111:17	adjusting 252:1	agrees 23:17 67:11 67:20 69:2,20	Alison 3:4 8:11 111:9
absolutely 52:9 93:22	acted 27:17	adjustment 125:7 169:21 255:21 266:5,9	ahead 15:15 24:15 36:6 96:15 168:11 179:16 230:16 273:18 274:15 275:17	Alliance 7:6
abstention 52:10	acting 38:19	adoption 69:3	AHRI 111:22 155:12,20	Allied 3:6 8:21 189:3 198:3
AC 152:4 255:7	action 54:3 68:22 69:3 110:17 111:11,16 132:15 218:18	advance 104:10	AHRs 131:4	allocate 155:8,14 278:7
AC's 96:2	activities 27:14	advantage 173:9,12 252:10	aiming 117:4	allow 36:6 40:17 42:14,15 43:14 46:17 153:14 162:20 257:20
AC/FURNACE 1:2	activity 267:9 271:12	advantageous 137:20	air 1:3,4 3:6 6:20 7:10,14 8:21 23:16 55:8 57:19 95:21 101:6 112:19,21 113:2 120:18 123:19,19 123:22 125:5 128:10 131:17 143:21,22 144:5,7 144:12,13,15,16 144:17,18 145:10 146:21 147:6,6,15 147:17,18 149:15 150:16 151:4 152:2,11,17,20,22 153:6 156:5 159:10,15 177:5 181:8 183:8 189:6 189:11,18 192:6,8 198:5,12 210:9 225:11,15,16 226:12 238:9,11 239:5 241:18 242:7 247:6,8,11 247:12 252:2 275:7 276:16,16	allowed 22:19 33:21 42:16 46:8,19 48:22 62:3 63:3
ACCA 3:11 44:22 46:15 48:12 56:9 57:1 59:7	actual 27:8 55:22 75:14 118:21 161:18 180:16 211:22 222:15,16 226:16 267:11 283:4 289:13	advantages 195:17	air 1:3,4 3:6 6:20	allowing 22:20
AC's 96:2	adapters 170:21	adverse 68:22	air 1:3,4 3:6 6:20	allows 162:14
AC/FURNACE 1:2	add 62:22 64:9 103:2 160:1,9 168:9 208:19 209:10 213:19 253:4 261:8 262:1	advice 19:1 26:7 30:4	air 1:3,4 3:6 6:20	alluded 125:5
ACCA 3:11 44:22 46:15 48:12 56:9 57:1 59:7	added 104:15 161:11 202:10,12	advocates 52:22 53:2	air 1:3,4 3:6 6:20	alluding 117:14
accept 35:1	adder 180:7 183:22 292:22	AEO 255:20 256:14 267:19	air 1:3,4 3:6 6:20	altering 216:6
acceptable 129:12 207:4	adding 164:6 213:20,22 277:21 285:13	affect 26:14 29:3 133:11 136:14 163:12,17 183:11 190:13 223:20 229:21 231:13,14 231:18 248:4 256:8 263:14 288:21 289:1,5 293:2	air 1:3,4 3:6 6:20	alternate 19:19 34:2 34:3,7,21 35:8,16 35:17 36:1,10,19 37:15,20 38:6,13 39:21 42:6,10,21 60:15 61:16 82:20 86:6 88:7 89:9 93:21
acceptance 21:3	addition 37:22 102:18,19 159:7 183:8 208:20 228:8	affiliation 8:19	air 1:3,4 3:6 6:20	alternate's 90:6
accepted 184:21	additional 105:12 110:3,6 114:15 140:18 158:12,18 160:5 161:18 163:17 202:8 208:17 209:3,5 213:2 215:9 272:3 289:17	afternoon 79:19 80:16 87:12 156:16	air 1:3,4 3:6 6:20	alternates 18:11 25:4,5,5,9 33:15 33:16,21 34:8,13 35:1,4,5,6,20 36:6 36:15 37:9 59:18 61:2,9,10,12 79:3 82:12 298:4
accepting 23:9 68:6 77:17	address 25:7 26:15 29:22 65:7 74:2 113:10 115:7 269:18 285:1	agencies 27:3	air 1:3,4 3:6 6:20	alternative 31:17,21 32:10 45:6 63:9 73:10 271:20 284:4
access 10:15 26:16 90:6 172:9	addressed 17:4 47:4 73:22 196:22 202:18 227:4	agency 5:2 15:7,15 26:4 103:7	air 1:3,4 3:6 6:20	alternatives 31:9,10 45:6
accommodate 171:22 277:8	addressing 128:7	agenda 17:7 19:13 100:12 296:8 297:2,7,14	air 1:3,4 3:6 6:20	ambient 190:11,13 191:5,7,10,15
accommodating 153:14		aggressive 4:7 101:18	air 1:3,4 3:6 6:20	ambiguity 37:20
accommodations 172:8		agnostic 91:2	air 1:3,4 3:6 6:20	
accomplish 118:4		ago 14:20 15:14 138:7,8 139:16 197:12 279:4	air 1:3,4 3:6 6:20	
accomplished 278:12 283:18		agree 24:5 28:16	air 1:3,4 3:6 6:20	
accomplishing 118:5			air 1:3,4 3:6 6:20	
account 39:22 184:12 190:18 195:15 206:14 226:20,22 270:19 274:12			air 1:3,4 3:6 6:20	
accounted 256:11			air 1:3,4 3:6 6:20	
ACEEE 41:3 42:5 98:13 102:9 139:15 254:16			air 1:3,4 3:6 6:20	
achieve 22:9 190:20			air 1:3,4 3:6 6:20	

292:19	277:22 281:6	Applause 64:18	Arlington 89:18	259:13 260:2,13
ambiguous 294:9	283:14,17 291:6	apples 205:10,10	93:12	261:14
America 7:15	293:5 295:21	285:16,16	arm 16:3	assumptions 127:7
American 2:21 7:8	296:5	Appliance 2:9,10	arose 46:18	248:3 259:17
amount 51:22	analytical 106:8	6:9 10:19 27:6	arrived 9:18	267:13,14
149:20 159:9	127:9	application 152:20	article 252:4	Atlanta 94:10
163:17 179:7	analytically 80:18	applications 177:8	Asheville 48:13	attack 174:15
185:15 198:20,21	analytics 96:17	194:18	Asia 79:7	attempt 34:5 37:15
252:8	analyze 140:1 215:2	applied 167:19	aside 175:19 296:7	87:7 106:15 215:1
amounted 293:1	analyzed 114:14	176:2 247:22	asked 22:3 163:6	attend 37:16 86:6
Amrane 2:18 139:7	246:7 262:8	277:1 292:21	203:4 213:8	attendance 37:18
analyses 22:3 98:1	analyzing 273:20	applies 192:6	asking 103:3 148:21	attended 34:6
107:5 124:10	Anderson 2:6 8:2	apply 159:3 163:8	149:14	attention 30:2,7
125:3 126:21	9:12,12	163:14 164:2	aspect 195:5 197:14	65:6 77:11 214:7
183:10 187:20	Andrew 2:9 9:18,19	174:16 183:22	201:5	attributable 105:5
191:3 209:4	10:17,19 12:21,22	234:8 240:4 256:5	aspects 109:7	attribute 160:18
analysis 11:16	35:2 41:12 44:8	287:20 292:19	124:10 178:6	255:8
21:22 23:10 24:12	47:2 55:18 65:10	applying 234:19,20	281:5	auction 54:22
97:2,11,12 98:8	75:9 83:5 93:15	appoint 76:5	ASRAC 1:3 9:9	audience 8:2 40:16
98:16 100:1 104:2	99:20 104:13	appointed 28:5 38:7	11:1 12:4,5,18,20	authority 75:14
104:3 106:5 107:8	106:11 115:5	38:14	12:21 13:1,4,21	authorized 39:21
108:16 109:16	156:22 172:13	apportion 153:12	14:3 21:1 23:1,18	74:18
110:1 112:8,8	174:8 198:4	appreciated 273:8	36:20 43:19 49:17	automatically
113:6,11 114:9	211:20 215:20	approach 75:6	56:15 67:6,11	287:17
115:22 118:19	245:8 249:22	98:16 102:12,13	103:19 152:16	AV 278:4 282:22
119:1 120:3 123:1	291:22 294:4	127:2 193:17	275:15	283:5
123:17 124:22	anomolized 131:20	198:16 211:4,17	assessment 154:8	availability 82:13
125:7 128:18	anonymous 81:17	212:18 253:5	170:11 202:1	91:2 130:14
133:12,18 138:17	answer 23:2 104:5	258:11	assigned 107:14	available 79:8,19
140:7 141:13	129:22 141:9	approaches 211:7	assignment 231:21	85:22 88:13 93:6
143:22 144:6	142:16 148:2	244:12	assist 76:10	94:5 108:5 142:12
145:2 150:19	157:2 214:4,11,13	appropriate 114:5	associated 123:2	219:13 222:16
157:13,15 158:6	256:21	130:7,9 159:16	157:20 158:11	263:17
161:9 163:2	answering 283:8	166:2 274:13	194:17 210:19	Avenue 1:9
165:12,20 168:1	answers 104:10	280:6	243:6 265:19	average 115:9,10
169:2 172:22	157:3	appropriately 130:5	association 260:9	211:16 216:18
173:5 174:1	anti-backsliding	approval 288:9,10	assume 102:17	245:21
175:13,14 176:8	99:4 105:3	approve 288:9	117:2 137:16	averaging 222:17
181:2 184:7,14	anticipated 103:11	approximating	141:4 185:6,7,8	aversion 78:19
187:12,21 189:17	anybody 21:9 69:14	259:4	186:2 233:12,12	avoid 48:11 125:17
192:15,20 193:18	106:17 128:2,16	April 1:16	248:21 249:1	award 254:10
199:7 201:14	158:13 185:22	arduous 177:4	258:7 259:7 265:5	aware 18:20 28:20
202:9 204:20	202:16 212:14	area 86:13 125:12	272:17,19 292:15	206:13
206:12,12 210:5	218:1 225:19	125:13 128:10	assumed 191:4	Awareness 2:9,10
210:12 211:4,15	anybody's 126:10	169:12,14 193:9	229:17 250:5	10:20
215:6 219:2,18	anyway 57:20 75:13	226:18 243:18	assumes 248:14	aways 246:3
222:13 228:22	147:7 187:9 190:5	293:3	249:8	awkward 94:3
231:8 232:22	233:21 246:18	areas 189:8 198:17	assuming 15:3 61:3	
239:19 242:16	271:13	234:11,15 243:9	167:13 190:12	B
243:20 252:16,17	anyways 132:5	argue 55:9 253:6	192:8,22 205:19	B 194:22 195:2,3
253:2 256:11,19	apparently 169:1	arguing 209:11,14	212:17 233:2	206:11 249:6,19
259:18 262:8	Appeals 9:5,7	argument 133:5	239:6 247:8	252:18,18 253:1
263:8,12 270:18	appear 206:15	136:9 204:2	266:10	261:3 264:20,22
272:2 273:2,21	Appearances 2:1	225:20,20	assumption 58:18	269:15
274:5,10 276:8,9	appears 33:13	arises 62:21	232:10 235:9	BAB 148:16,17
276:12,21 277:11	appendix 248:17	arithmetic 140:7	236:21,22 247:7	149:7
				back 4:6 8:18 12:5

12:12,15 18:11 25:16,18 27:18 30:12 33:10 37:8 42:6 46:7 49:6 55:21 59:8,21 60:3 62:16,17 65:12 73:21 74:21 75:13 76:18 78:4 81:2 82:17 85:19 87:11 91:16 95:19 96:8,12 100:18 104:1 106:22 112:6 115:14 122:18,19 125:18 132:15 133:11 156:9,12,17,20 157:1,18 164:17 183:19 187:21 190:6 191:18,19 196:17 203:13 204:16 209:14,20 213:15 214:5 219:20 220:3 221:1 222:7 228:12,14,15 232:3 270:6 275:2 275:8 288:6 289:15 291:20 292:2 293:6,12 294:6 298:20 backed 229:14 background 11:3 31:3 96:1 bad 48:4 72:18 227:22 bail 143:7 balance 133:17 181:13 balancer 179:20 Baltimore 247:18 247:19 264:6 268:17 Battle 2:5 4:22 5:13 5:14 20:2 24:20 24:22 25:22 30:12 37:3 39:12 40:3 40:21 41:11,20 42:8 46:2,6,13 47:2,8,17 49:4 50:13,16 51:15,18 53:5,11,17 57:21 58:10 59:2,15,20 60:3,9,14 61:9,20 61:22 62:4,21 63:15,19,22 64:5 64:20 65:1,6,9	66:8,15 72:5 73:10 77:6,10,14 77:21 78:7,10,17 79:2,6,11,22 80:3 82:5,10 84:22 85:3 86:1,15,18 86:21 87:3,19 88:5,15,18 90:8 91:4,13 92:5,13 92:16,18 93:11 94:7 106:19,22 156:16 Barkas 2:4 4:21 barring 186:8 277:3 base 107:7 116:19 129:13 131:10 175:1,7 184:13 243:4 263:14,15 263:18 279:8 288:20 baseball 5:5 based 24:12 34:11 49:7 98:16 107:5 107:10 108:14 109:2 110:4 115:21 120:3 122:4,5 123:9 128:8 130:14 132:9,16,18 135:14 137:5 140:3,7 156:2,5,8 172:19 179:8 180:18 184:7 190:9 213:9 215:2 222:14 223:22 229:17 230:14 232:5 235:11 259:7 261:4 267:18 276:9 278:3,17 baseline 33:19 98:15 124:2,3,6 128:22 129:2 132:19,21 133:14 135:12 137:2,8,12 137:16 139:17 141:13,19 157:12 157:13 204:1 279:4,9 bases 125:16 133:13 basic 32:16 172:22 196:21,22 basically 5:6 15:5 16:9,12 26:20 28:8 95:4,18 96:3 151:17 158:18	159:2,14 160:4 185:6 188:11 191:12 201:12 211:1 222:19 231:7 232:19 235:1 239:4 252:8 270:11 basing 112:8 119:21 157:15 165:11 193:17 211:4 basis 48:19 71:16 104:3 130:22 163:15 165:13 169:3 245:19 246:9 247:3 255:1 266:14 271:5 289:13 batch 169:14 bathroom 43:3 Battaglia 2:7 8:13 8:13 219:15,19 224:8 Beach 247:17 Beard 26:6 beginning 33:11 78:20 91:13 behaved 16:16 41:9 believe 14:10 21:4 41:22 43:9 53:12 74:14 78:14 91:7 109:8 123:20 225:9 230:2 belongs 290:1 belt 229:19 230:10 237:13 247:9,12 247:13,21 benefit 13:8,8 80:15 177:19 254:7 Berkeley 3:4 8:9,12 9:11 229:6 236:14 best 11:10 18:2 22:3 24:2 31:10 39:2 86:5 115:11 121:3 121:7,8 209:1 228:10 289:15 better 15:8 31:20 44:19 55:16 84:7 88:21 101:4 107:19 112:21 120:21 203:21 204:10 211:16 218:11 232:13 236:9 257:7,14,15 257:18 261:4 281:4 beyond 37:14	177:22 231:14 264:10 BFD 282:1,7 bias 161:14 big 10:7 25:12 45:13 47:13 70:5 146:1 148:5 149:11 164:8 173:12 175:8 208:6,10 214:19 219:6 223:2 243:19 246:8 247:7 292:22 bigger 146:2 158:20 169:18,19 171:5 197:22 207:19 biggest 149:19 150:5 billion 248:1,2 bit 13:6 25:17 32:18 67:3 69:13 70:12 98:19 108:18 124:15 127:18 138:19 140:11 142:13 151:8 154:6,14 157:5 176:14 181:19 184:9 191:22 192:12 195:19 206:1 211:19,21 215:22 216:6 237:9 241:12 287:22 292:2 blank 146:12 blast 90:7 169:1 229:11 234:17 238:3,20 242:1 244:17 245:9,14 245:18 246:1,7,20 248:9,16 249:3,8 249:17 257:2,20 258:5,9,14,17 260:11 261:19 262:3,6 265:13 268:14,20 272:7 272:18 274:1 287:10 blasting 244:13 block 53:2 58:5,6 83:17 blocker 31:13,18,19 32:7,21 blocks 55:8 blowing 144:8 board 77:18 118:6 235:14 289:21	Bob 8:4 43:3 44:2,3 44:16 48:9 74:22 108:10 111:19 132:17 170:16 171:18 175:21 268:3 Bob's 269:18 bodes 298:11 body 17:10 bogged 125:17 book 41:19 83:17 87:1 90:13 booked 91:5 95:4 292:4 borne 148:3 bottom 124:19 191:1 201:13 245:21 289:22 bound 244:7 bounds 102:6,16 box 148:18 194:21 194:22,22,22 195:1,2,3,3 206:11,11 207:19 208:1 211:12,13 214:19 249:12 boxes 153:3 282:22 283:6 break 17:18 32:1 66:10,12,16 85:6 100:15 156:14 167:7,7,9 221:18 228:14,17 260:1 284:1 breaks 17:15,16 149:4 breakthroughs 198:19 brief 11:1,2 156:19 briefed 19:19 35:12 35:14,17 37:11,17 38:21 61:12,14 briefing 24:16 29:18 95:13 briefly 4:13 26:9,13 43:14 210:6,11 230:4 bring 25:10 29:6 30:6 40:7 65:6 66:3 75:11 76:9 148:10 156:17 190:6 221:14 242:3 286:4 bringing 40:11 105:14 110:5 266:6
---	---	--	---	--

broad 113:9	262:17 264:14	230:5 244:15	38:4 52:10 74:1	271:14 276:5
broke 259:12	265:12 266:4,10	245:4,8,16 246:22	102:8 117:10	277:2 295:12
brought 27:1 30:2	267:12 269:7,8	250:11 263:1	140:2,16 151:5	certainty 73:3
76:3 120:8 158:1	270:1 271:8	265:1 268:5,7	158:20 165:4	certification 57:13
189:7 214:6	276:19 278:9,10	called 17:5 27:5	175:2 184:13	57:15,16 73:22
223:16,19 295:7	278:19,21 279:16	153:5 202:10,13	194:6,9 200:14	cetera 200:15
BTU 129:16 188:18	287:10,12	calling 43:9,10	206:17,21 236:19	CFM 152:8,9
217:11	built 165:15 189:17	capability 181:3	242:19 243:4	183:13
BTU's 188:19 248:1	193:1	capable 236:2	263:14,16,18	challenge 69:18
248:2	built-in 173:5	capacities 153:12	279:8,9 287:20	209:8
BTUs 212:2	bullet 96:13	166:9 195:1	288:21	chance 15:6 268:6
bucket 132:19,21	bump 166:10,14	203:16,17 211:22	case-by-case 48:19	chances 179:3
bucks 176:5	bunch 14:12	212:5 280:1	cases 109:6,15	Chandra 2:12 6:19
build 200:17 254:3	bunched 232:17	capacity 29:3	170:7 225:10	121:10 195:11
building 1:8 10:6,7	burden 114:15	117:19,21 128:21	237:14,17 241:6	change 54:11,12
94:15 146:1,2,7	business 21:13	129:15,17 133:5,7	casing 193:12	56:19 72:15 87:4
148:5,9,20 149:1	267:4 291:13	145:14 146:20,22	catalog 130:11	88:10 119:9
149:21,22,22	buy 134:21 135:5	150:22 153:15	210:18	124:18 127:20
150:2,9 153:13	135:15 201:7	155:15,15 161:5	catch 268:6	171:5 176:22
154:2,3,5,12	buyer 136:14	171:13 180:4	category 167:20	189:6 190:10
162:4 173:6	buying 134:16	181:10 188:12	caucus 294:8	191:4 197:18
179:13 201:17	136:14 282:22	189:6 191:10	cause 120:12 227:7	200:2,16 201:2
222:14 229:13,16		203:19 205:2,20	227:8	208:13 210:11
229:22 230:18	C	207:17,19 208:2	caused 195:7	216:4 217:20
232:10 234:6	C 2:13 4:1 67:15	216:6 219:21	causes 194:5	226:16,21 229:20
235:3,6 236:8,20	69:13 194:22	265:18	caution 148:11	236:7,22 244:2,8
238:19 241:1,3	CA 3:9	Capitals 297:19	CAV 151:11 153:16	263:15 272:3
243:10 244:14,18	cabinet 169:20	capture 37:11 46:2	153:22 277:1	280:10,13 281:14
246:2,4 247:1,2	194:7 195:8,17	48:21 115:3 175:3	279:21	282:8 291:11
247:19,20 248:6	197:18 206:16,20	176:15 199:7	CBAKS 145:8	changed 77:15
249:11 250:21	cabinets 167:2	208:12,14 236:17	149:4	191:6 210:13
251:1 255:22	cafeteria 10:15	239:12,14,16	CBD 284:15	222:13
256:4,5,5 258:3	caffeine 20:4	243:17 274:13	CEC 103:19	changes 53:4 99:22
258:14,17 260:13	calculated 210:18	276:17 277:10	center 235:5 241:13	99:22 118:6 256:1
264:9 265:20,22	248:13	captured 219:22	central 99:17 231:2	277:9 288:20
266:11,14,15	calculating 233:4	238:12	centralized 150:5	295:20
267:6,9,10 268:14	242:18 247:3	capturing 49:5	certain 36:10 37:9	changing 142:7
269:1,20 271:10	calculation 107:13	124:1 199:6	46:22 117:2 119:4	171:9
273:6 287:14	107:16 179:17	283:14	138:6 162:4 175:2	characteristic
building's 264:12	229:15,16 231:10	care 230:6 238:6	176:11,12 185:8	235:21
buildings 113:22	248:8 249:4 275:9	245:3 290:21	185:14 194:18	characteristics
144:7,10 146:22	calculations 176:15	careful 39:20 49:15	195:1,2 196:6	114:13 152:14
147:10 148:15	191:19 237:4	176:15 188:4	198:20,21 227:6	characterization
149:15 153:15	240:20	201:22 205:9	232:14 235:11,12	124:6 167:6 216:1
154:12,13 221:20	calendar 45:3 79:18	Carolina 48:14	248:18 252:7	characterize 99:16
228:21 229:2	84:21 89:22 90:2	79:13	258:7 277:7,12	114:12,20 133:22
230:12,15 234:9	93:10 95:9	Carrier 8:5 74:22	certainly 79:19	143:12 146:15
238:15 240:18,19	calibrated 188:5	108:10 111:19	98:10 107:6	166:18 216:9
244:17 245:11,17	California 7:18,19	118:1 132:17	109:18 111:13	characterized 63:8
245:18,20 246:10	7:20 34:21 38:4	171:19 174:14	116:1,5 125:2	124:3 197:4
246:11 252:21	40:13 53:1 82:15	175:21 268:4	126:6 137:11	charges 85:7
256:6,15 257:21	99:12 129:20	carry 36:3 76:17	146:7 186:7 202:4	Charlie 3:11 7:14
257:22 258:20,21	162:12,16 231:2	141:20 284:10	206:12 212:9	42:4 43:2 44:22
261:6,8,11,11,16	254:2	carrying 149:15	215:15 227:21	45:13 46:13,15
261:17,18,19	call 4:5 29:22 75:17	275:12	229:9 235:11	48:12 54:22 56:8
262:1,2,6,10,16	93:7 129:8 145:7	case 10:9 13:22 27:4	262:3 267:5	57:1 59:6 79:12
	158:17 171:9			

<p>83:11,11 Charlie's 45:13 47:13 48:8 55:19 58:4 80:21 chart 33:12 128:20 charter 23:2 24:1 chartered 4:6 12:4 charts 98:21 chassis 207:9,10,11 207:13,18 208:13 214:7,19 216:4 cheap 149:12 cheaper 134:15 282:12 cheapest 134:21 135:5 149:18 check 32:7,13,15 86:15 110:10 218:1 249:12 287:17 checked 271:7 checkmark 213:4,6 213:7 290:18 checkmarks 212:13 checks 32:12,18,20 Chicago 268:16 Chicago's 264:7 choice 30:19,22 264:19 choices 84:7 143:13 171:14 choose 113:3 116:13 118:10 119:7 124:5,17 174:14 chose 112:22 113:1 124:11 135:13 circle 178:20 circles 97:1 circuit 128:20,20 129:1,10,12,16,18 132:20,21 133:3 133:22 138:15 225:17 226:15,20 circuiting 224:20 circuits 132:22 198:20 225:12,12 225:13 226:14,19 226:21 227:17 circulate 95:9 circumstance 242:3 circumstances 46:18 48:1,18 49:1 63:4 citing 254:18 clarification 32:5,9 53:17 105:11</p>	<p>clarify 58:12 111:15 230:20 261:21 class 113:15 119:6 121:22 124:21 129:15,17 131:2,5 131:8,14,17 133:5 133:7 134:6,19 135:3 146:11 154:21 280:2 classes 99:1 131:14 155:15 192:13 215:12 218:14 classified 148:17 cleanup 94:1 clear 23:18 24:1 140:17 141:11,12 191:22 198:7 280:22 288:19 290:12 clearly 100:6 105:20 251:3 climate 2:12 6:20 241:12 264:12 close 44:12,13,13,14 57:20 205:16 212:5 223:8 closely 38:5,15 240:19 287:10,12 closer 211:21 cloth 101:12 clothing 233:19,21 co-worker 8:1 Coast 91:15 Cochran 6:17,17 cocky-mammy 287:8 code 139:4,5 256:1 codes 138:5,14,15 138:15 158:11 coefficient 231:21 coffee 10:14 coil 123:7 186:20 187:4,19,19,21,22 198:12,12 200:20 200:22 201:2 210:15 224:20 226:17 coils 192:11 197:16 200:13,16 cold 144:19 235:5 238:8 colleague 4:22 colleagues 6:2 collect 111:3 139:9 139:10,11 140:21 140:21 141:3</p>	<p>collecting 131:12 147:21 155:13 294:11 color 17:9 column 105:12 111:7 combinations 117:15 124:21 combining 23:13 come 25:16,18 27:13,15 28:13,16 45:3 46:6 56:12 62:12 64:16 72:8 101:9,10 105:7 113:20 114:4 125:18 131:9 138:22 156:12 165:9 173:13 179:4 186:12,14 213:15 215:5,14 225:6,7 228:14 252:22 256:20 264:21 268:10 269:16 271:20 272:7,8 280:21 288:4 289:14 291:20 292:2 293:6 294:16 comes 10:15 15:17 21:1 55:13 69:8 70:18 73:1 97:8 109:18 151:14 152:15 187:7 258:8 293:12 comfort 138:19,21 comfortable 87:13 148:22 253:5 266:22 coming 4:16 29:17 46:14 62:15 80:5 90:11 103:12 142:8 185:4 248:13 comment 38:11,12 53:4,16 58:2 62:1 111:10 112:7 125:20 136:9 151:9 156:19 157:20 222:11 279:13 283:8 298:8 commented 212:17 comments 18:5 40:16 41:7 47:17 53:5 62:2 67:18 67:21 68:4,10,11</p>	<p>68:18,19 71:21 78:18 97:15,16,21 107:4 108:2,2 126:6 127:21 158:13 187:18 189:13 190:8,21 192:1 202:16,18 203:5,8 204:2,16 280:20 commercial 1:2,3,4 53:8 73:21 154:5 159:14 187:6 255:1,7 256:15 commit 18:12 66:6 commitment 41:6 committee 12:21 13:1 15:19 18:10 18:17 22:8 27:5,7 27:7,12,15 28:15 29:8 37:21 43:19 55:21 56:2,16 73:1 74:16 75:7 75:14 102:2 103:5 286:22 288:13 296:1 committee's 65:18 103:4 committees 21:7 26:9 64:12 committing 66:4 73:2 common 148:6 251:21 communicate 19:9 45:14 46:1 298:3 communicated 46:18 communicating 48:5 communication 46:11 community 251:8 companies 21:14 company 2:6,15 7:21 121:5 136:3 136:6 139:13 200:2 comparable 162:6 271:8 compare 205:5 266:2,19,21 267:19 compared 161:11 162:15 comparing 245:19 247:5 272:1</p>	<p>285:15 comparison 162:20 compatriots 55:4,5 compelling 141:22 compensate 235:8 competitive 164:22 competitors 173:15 compile 81:20 complement 277:2 complete 203:22 224:18 292:15 completely 35:12 102:1 103:15 114:11 115:6 120:17 206:3 216:13 260:20 compliance 20:8 23:14 101:21 102:1,2,7 196:21 197:1 comply 54:5 172:21 component 107:9 107:12 109:1 110:18 116:9,21 components 107:14 comprehensive 284:9 compressed 19:10 34:12 45:2 125:14 compression 112:18 113:1 120:17 135:7 239:7 241:16 compressor 115:21 128:21 133:14 135:12,21,22 137:8,12,17 138:9 141:5,19 142:12 142:14,19,22 143:4,10 190:14 202:14 223:3 225:14,18 239:9 compressors 130:13 131:2,11 138:1 142:18 143:9 224:13 238:10 conceive 224:6 concept 32:17 143:22 160:13 205:17 225:20 conceptionally 102:21 concepts 67:2 concern 17:22 32:10 36:4 46:11 51:1 108:19 111:6</p>
--	--	--	--	---

<p>115:8 119:3,5 158:17 214:3 269:18 285:10 concerned 28:12 29:21 30:3 291:6 concerning 68:11 176:18 concerns 26:15 30:18 31:3,8 45:13 47:3 51:6 69:15 88:15 208:16 Conciliation 5:2 concluded 147:3 284:14 299:1 conclusion 288:5 concurrently 273:4 condenser 125:12 125:13,14 128:6 128:11,12 170:18 190:17,19 227:16 condensing 191:6,8 295:19,19 296:22 condition 233:2,6 234:21 conditioner 95:21 296:4 conditioners 1:3 23:16 101:7 conditioning 6:21 7:11,15 57:19 192:7,8 198:5 conditions 162:18 163:3 178:17 191:15 247:6,10 274:11 conduct 186:3 conducting 125:4 276:1 conflict 9:2 28:1,12 28:18,21,22 29:20 30:9 conflicts 28:7 81:3 conforms 124:15 confused 198:11 connecting 243:15 consensus 13:16 16:15 20:14,21 21:18 25:13,13,15 25:18 26:1 30:12 30:13 31:6,11,20 31:22 32:7,12,18 32:20,22 33:1,2,3 33:6 37:4 47:10 47:12 51:19,19 52:3 53:6,18,19</p>	<p>53:19 54:3,5 55:22 56:12 59:1 59:2,5 60:1,9 67:1 77:19 78:2 101:5 102:14 168:4 212:9 213:9 215:8 215:10,11 218:19 237:20 269:16 conservatism 173:5 174:1 199:8 consider 20:21 68:10 100:12 110:2 113:10,13 126:6 129:1,15 135:19 141:20 143:18 170:10 190:10,17 192:15 208:4,20 209:21 279:18 281:2 considerable 203:6 consideration 110:7 114:6 179:14 203:12 204:1 208:18 226:14 296:1 considerations 25:3 144:9 considered 27:11 49:19 97:22 145:6 147:6 153:8 considering 110:4 144:3,5,7,15 150:17 151:6 158:5 168:3 192:21 225:11 consist 75:2 consistencies 187:1 consistent 127:8 280:10 consolidated 235:19 constant 123:19,22 131:17 143:9 144:7,12,13 145:9 146:21 148:9,16 148:18 152:20,22 153:18 154:22 191:1,3 276:15,19 277:8,13 278:8,8 279:17,19 280:19 281:2,22 283:11 constituents 18:20 constraints 40:1 194:2,4,5 construct 211:8 236:16 construction 147:10</p>	<p>167:14 266:7 constructive 100:2 consultants 209:21 consultation 100:17 consulting 8:14,16 30:7 97:8,10 consumed 236:8 consumption 176:16 239:1 263:16 273:19 274:4 content 4:18 87:11 95:12 96:21 context 103:3,8,18 continue 98:7 228:1 271:15,16,18 continued 262:8 continuing 270:11 contract 253:21 contractor 55:6 180:22 182:20 contractors 7:15 108:5 180:12 198:1 contribute 111:14 contributing 75:17 control 109:9 147:18 190:8,13 190:20 191:12 controls 277:9 278:15 283:15 controversial 237:6 convenience 10:9 conveniently 249:17 convening 18:8 conversation 164:19 228:10 255:13 conversations 228:8 converse 149:14 conversion 158:2,11 158:18,19 159:18 160:4,6 161:4,12 163:7 164:1,17,21 165:2,16,21 166:3 166:7 167:10,15 167:22,22 168:5,7 169:10 170:1 171:6 173:10,21 174:17,18 175:2 176:10,21 180:20 181:1 182:7 183:22 184:5,6,7 184:16 186:4,6,7 193:11,15 195:21 196:3 277:17</p>	<p>283:20 284:21 292:20 293:13,20 conversions 198:1 convert 261:17 convince 58:6 cool 58:21 140:10 144:20 190:11 242:7 cooled 246:5,6 258:18 cooling 109:11 151:17 152:8 229:19 230:10 232:8,8 233:4 234:19 237:11 238:7,18 239:1,8 239:13 240:9,14 240:15 241:5,19 242:2,8,12,13,22 242:22 245:19,21 246:2,10 247:15 248:1,2,6 254:14 255:21 264:6,9 265:11,17 266:6,6 266:14 267:17 270:3 271:4 282:4 282:5 cooling/heating 238:17 coordinate 38:15 core 234:6 corner 10:8 corollary 102:10 correct 58:17 61:18 61:22 75:3 78:7 78:15 79:2 89:12 109:12 110:21 112:1 147:19 153:4 188:6 225:22 226:12 281:17 corrected 232:1 correction 231:17 231:20 correctly 29:11 correlation 103:17 correlations 183:7 190:9 191:13,18 201:17,22 237:13 280:5 corresponds 282:4 corrupting 30:6 cosmetics 234:13 cost 110:7 121:7 133:16,17 136:10 136:13,15 137:8,9</p>	<p>137:19 138:11 139:3,5 144:5 150:17,20 158:10 164:17,22 165:16 173:7,9 175:14,22 176:4,4,7,17 177:14 178:1,4 180:5 182:16 183:9,20,22 184:12,17 193:1 198:2 201:14,15 201:20 205:3,3,5 205:19 206:12 207:3,6,7,11 208:13 209:15 210:6 211:1,8,13 211:15 215:6 219:2,18 221:2,4 222:13,14,15,16 222:17 223:5,20 224:15 270:17 273:1 274:10 275:20 276:12 277:21 283:14 293:8 costs 110:3 144:15 174:2 176:9,19 178:6 183:9,20 185:3 186:4 193:2 193:5,6 197:22 201:15 210:18 223:5,10,22 251:17 273:13 277:11,15 278:14 283:14 292:20 294:10 295:19 Coughlin 3:7 9:10 9:10 236:13 244:4 254:18 255:18 257:20 263:13 265:7 267:11 270:3 288:17 289:22 290:4 COUGLIN 243:3 Council 2:21 3:2 7:4 7:8 counsel 4:16 6:18 100:7 Counsel's 6:16 count 52:10 60:21 154:12 246:4 250:22 251:1 292:11 counted 238:6 counter 70:15 234:13</p>
---	--	---	---	---

counting 41:14,14 241:9	219:18 233:2 239:3 243:4 265:18 278:6	49:2,12,21 50:6 50:15,17 51:14 52:4 54:6,8,15 56:21 57:3,7,14 57:18 58:3,18 60:1,7,17 61:1,5 61:13,18 63:11 66:1,9,18 68:9 69:17 70:9,16,20 70:22 71:5,13,18 71:21 72:13,20 73:12,15 74:5,17 75:4,19 76:10 77:1,4,9,22 78:16 79:12,16 80:9,11 81:18 82:3,19 83:2,4,8,10,16,20 84:1,9,17 85:2,5 85:13,21 86:7 87:1,9 88:6,14 89:3,12,16 90:1,4 90:10,22 91:18 92:1,9,21 93:18 93:22 94:14,19 95:4,18 96:7,12 105:16 106:1 141:10 142:2,10 148:5,22 155:17 156:11 189:15 199:13 206:7 212:12 213:3 214:1,15 215:19 217:6 218:5,10,17 218:21 219:5,10 219:14 221:10,14 221:19 222:2,4 224:21 225:6 226:4,7 228:19 242:15 243:21 254:20 255:12 259:20 270:8 271:16 273:8,14 286:7,20 288:6,12 290:11,22 292:7,9 294:19 295:5 296:7,12,15 297:2 297:9,21 298:15 298:22	110:16 111:12 115:19 118:13,18 121:12 130:16 131:5,12,20 132:8 135:18 140:3 141:3,9,21 142:4 145:4 147:21 148:3,21 149:4 154:11,11 155:13 155:19 161:5 166:16 169:1 188:6 189:2,16 190:1,2,10 209:17 212:9 219:13 220:3 221:4 222:16,18 224:15 224:18 234:22 239:16 253:17 255:5,15 256:12 257:20 276:18,22 277:3,3,4 278:17 278:18 279:15 280:2 293:14 294:17	deal 5:6 28:6 51:8 124:7 171:21 197:22 208:7,11 257:5 290:14 dealing 110:22 239:17 dealt 232:3 dear 291:3 decent 246:21 decide 49:16 98:11 103:7 111:2 155:13 177:17 decided 48:19 69:9 155:11 211:14 237:10 290:14 298:16 decides 12:20 51:3 73:6 decision 30:18 93:17 115:3 132:14 140:13 143:8 289:4 290:6 291:7 decision-making 19:21 30:16 decisions 19:22 74:19 124:13 161:22 173:2 213:16 declare 156:12 decoupled 201:13 210:8,10 decoupling 202:3 210:5 213:6 dedicate 221:7 deep 125:13 default 25:15 Defense 3:2 7:4 defer 100:18 define 16:13,14 25:14 33:2 122:19 122:20 defined 37:4 39:7 67:1 123:10 defining 25:13 42:20 49:11 54:9 149:1 definitely 23:9 88:9 106:7 171:15,16 172:11 219:22 240:15 245:1 246:12 272:20 282:22 283:5 definition 47:13 54:11,12 63:12 definitions 30:14
country 39:16 82:18 84:18 93:7 136:15 241:13 counts 39:18 couple 24:21 29:17 29:18 43:20 81:4 85:5 98:4 168:18 200:2 213:4 223:16 243:12 245:2 248:7 251:20 270:14 288:4 291:9 course 15:15 23:20 132:15 201:8 207:13 229:8 court 69:22 courtesy 41:6 65:22 Courthouse 89:19 cover 66:21 149:20 182:18 covered 23:6 covering 186:19 covers 64:7 129:15 crack 221:11 create 67:8 210:2 228:1 265:8 270:22 286:21 created 84:18 creates 56:2 creative 165:8 credible 265:15 credit 252:9,13,14 criteria 104:15 289:4 critical 80:22 152:2 169:15 critically 99:18 cross 294:3 cross-reference 87:6 cross-referencing 80:13 cross-sectional 169:12 CUACCWAF 4:4,4 cubic 275:8 curious 95:1 current 85:8 96:3 98:16,17 122:8 123:6 148:3 157:14 165:20 265:22 280:14 currently 92:6 120:21 121:15	curve 158:19,22,22 159:18 160:4,6,10 161:4,12 164:1 165:15,16,21 166:4,7 167:15,22 168:1,5,7 169:10 169:15 170:1,8,21 173:10,21 174:17 174:19 176:10,21 178:5 180:20 181:1,16 184:1,5 184:7,16 186:4,6 186:7 192:17 196:3 197:19 207:3 209:16,17 211:8,14,15 215:4 216:9 277:17 283:21 284:21 285:4 292:20 293:2,13,20 curve's 195:21 curved 175:2 curves 158:2 163:7 164:17,22 165:2 165:10 167:10 169:10 171:7 182:7 184:6 193:11,15 201:15 268:15 283:15 customers 182:7 cut 156:1 182:16 205:18 CVA 154:6,9 280:6 CVAC 153:13,21 154:7,11,11 277:3 277:4 278:18 CVAC's 276:18 279:15 280:2 cycle 176:9 234:1 270:17 273:1,13 274:10 275:20 276:12 283:14 cyclic 231:6 cycling 190:19 Cymbalsky 2:3 4:2 4:3 6:7,9 8:8,17 9:13,17,22 10:21 15:14 20:3 23:1,5 25:21 29:14 33:20 35:18 36:12,16,18 37:12 38:17 39:9 39:14 42:13,18 43:1,6,17 48:2,15	110:16 111:12 115:19 118:13,18 121:12 130:16 131:5,12,20 132:8 135:18 140:3 141:3,9,21 142:4 145:4 147:21 148:3,21 149:4 154:11,11 155:13 155:19 161:5 166:16 169:1 188:6 189:2,16 190:1,2,10 209:17 212:9 219:13 220:3 221:4 222:16,18 224:15 224:18 234:22 239:16 253:17 255:5,15 256:12 257:20 276:18,22 277:3,3,4 278:17 278:18 279:15 280:2 293:14 294:17 database 267:12 date 12:7 22:6 36:11 37:9 70:4,8 70:9 81:6 85:14 90:8 93:16 101:21 102:1,8 111:2 173:14 dates 23:14 78:19 78:19 79:8,22 80:7,22 87:20 91:2,19 93:19,21 95:9 102:2 daunting 22:8 Dave 3:6 8:20 189:3 198:3 day 52:1 79:18 83:1 84:2,6,10,21 86:6 86:9 90:13 93:2,4 152:4,4 292:8 day's 246:22 days 70:10,13,16 78:10 83:19 85:5 87:14 88:22 90:13 91:10 92:4,11,12 288:4 292:3,4 297:12 DBD 137:9 DC 1:10 deadline 16:5 22:17 22:22 deadlines 85:4 298:12		
	D			
	D 4:1 115:14 194:22 D.C 61:8 dangerous 39:5 data 12:16 21:12,13 21:16 23:7,7,8 23:11 24:13 81:22 82:1 109:7,7			

definitive 46:9 81:6	dependent 114:11	details 5:20 89:18	54:17 75:15	dimension 210:2
degradation 231:6	depending 69:9	222:21 227:9	102:11 164:5,8	dimensional 194:2
231:21	104:21 132:5	228:3 237:2	188:8 191:5,7,8	dimensions 193:19
degree 101:22	148:15 171:13	determinate 204:14	243:19 248:13	diminishing 138:7
229:17 247:9	177:3 243:5	determination	249:2,10,16 253:2	dinner 297:17
degrees 230:9,15	263:10 281:3,5	69:22 70:1,5	261:10 263:9,10	direction 138:11
264:10	284:15	determine 108:6	265:5,11 267:17	163:2 218:20
DELAKE 77:12	depends 71:6 82:21	113:20 165:21	272:11,13,20	directions 214:4
DELASAKI 76:20	214:13 242:9	184:2 229:12	281:10 287:5	directly 223:7
deLaski 2:9 9:19	264:11	238:1	291:4,5	directory 113:6
10:19,19 12:21	describe 22:21	determined 229:15	differences 188:7	217:16 218:2
35:2,2 36:8,13,17	255:2	231:9,11	258:18	219:1 220:12
41:12,12 44:8,8	described 43:2	determining 231:6	different 20:19 21:4	disaggregated
45:12,19,22 47:6	216:4 243:2	Detlef 2:8 8:15 97:9	32:12 39:15 42:14	154:6
47:9 50:9 51:1,12	describing 148:11	99:21 106:2	42:20 44:1,4	disagrees 128:2
55:18 65:10,10,16	200:8,9 245:9	111:20 152:5	46:14 48:3 63:11	disappears 48:8
65:21 70:7 71:7	261:4 269:18	168:11 184:18	69:7 99:1 103:6,6	disconnecting 252:1
71:14,20 75:9	description 123:9	186:12,14 197:4	103:8 107:14,15	discontent 261:15
76:13,15 77:3	design 104:15,19	202:17 212:18	113:3,13 114:14	262:5
83:6,9 93:14,20	105:5 119:21	213:8 217:15	117:13,14 118:3	discount 28:16
94:3 99:20 100:21	121:4 123:18,21	224:12 273:17,18	119:16 120:14,17	discouraging
101:2 103:22	143:12 155:6	274:3 275:3	123:6 124:10,11	102:14
106:11 115:5	156:4 177:5	279:12,14 280:16	141:15 142:4,9	discrete 256:12
125:19 126:10,17	178:15,22 182:4	283:22 293:12	143:12,13 147:17	discretion 62:4
129:7 130:2 133:8	197:21 210:19	Detlef's 276:13	153:12,13,15	discuss 12:1 80:7
133:20 134:5	229:10,17,19	detract 296:4	155:14 156:4	98:21 105:22
136:8,13,19,22	230:9,10,14,21	develop 19:11 74:1	162:14 166:10	106:17 237:3
137:18 138:10,16	231:3 257:19	127:14 173:8	168:19 174:15	discussed 80:6
141:6 172:13	276:15 277:14	287:16	178:6 186:17	129:3 280:18
174:16,20 175:1,5	278:2,7,8,12,13	developed 107:10	187:10 190:16	287:9 289:17
175:14 183:19	278:13 279:9	127:9 190:9	195:13,14,17	295:10
196:12 200:7	281:15	210:15 256:4	200:10 206:4,20	discussing 221:2
202:17 205:12	designate 35:5	developing 26:17	206:20 207:1,9,11	244:11 256:20
206:5 208:12	36:18 146:3	191:13	211:6,7 223:22	294:20
209:8,19 216:7	designated 26:4,7	development	226:19 233:22	discussion 11:2
217:2,5,7,13,18	35:6,15,22 36:6	201:15,16,22	235:2,17,18,20	16:17 30:17 32:14
218:7,16 220:20	37:11 61:3,12	273:5 295:1	236:11 249:1	40:11 46:3 81:15
245:7 249:21	designation 145:13	deviate 50:2	253:8 256:13	98:10 105:17
250:7,10 251:1,16	145:15,20	dialogue 271:17	259:21 263:20	128:2 139:3 145:2
253:17 254:12	designed 119:22	diameters 195:14	277:1 288:22	147:8 151:12
291:22 292:8,12	120:3 121:8	Diane 2:15	289:2,21	155:1 158:7
294:5,13,16	166:20 181:11	Dianne 7:12 122:21	differential 205:3,4	164:14 170:13
295:16 296:10,22	185:10,14 193:22	dibs 94:21	205:5	185:22 198:6
297:6	222:21	Dick 76:16 249:10	differentiation 54:2	202:15 220:7
delays 43:9,16	designer 187:19,19	251:10 257:6	differently 34:9	257:4 259:7
deliver 150:16	187:22 210:15	262:19 266:18	103:9 166:21	268:18 271:18
185:12	designing 178:15	268:2,6,10 269:21	212:21 229:9	277:20 280:8
demonstrate 244:16	179:13	270:6 286:3,12	difficult 139:11	292:20
270:4	designs 166:19	288:3	diffuser 144:20	discussions 104:3
Department 1:1,7	182:17 224:5	Dick's 76:16	178:21 281:14	105:19 111:21
2:1 9:3 16:11 26:5	284:14	dictate 123:21	diffusers 144:17	dishwasher 102:6
27:18 33:7 101:22	desire 146:5	dictated 283:16	150:21 151:11	dispersed 136:19
156:20	detail 109:19 116:6	dictating 283:19	277:10 278:15	disposal 165:8
Department's 27:19	126:9	Diego 7:19	280:10,13 282:8	dispose 175:16
66:22	detailed 11:15	differ 75:6 142:16	283:15	disputes 5:4
depend 152:13	266:13	difference 42:9	diligent 11:13	disregarded 111:8

disruptive 35:13	213:2 215:18	drops 51:7 150:2	243:17 248:18	139:3,5 165:16
disseminate 64:10	223:15 224:3,5	158:10 186:11,13	249:8 251:14	246:16
dissimilar 194:17	228:11 229:21	293:22	253:8 257:18	effectively 256:10
distinction 52:8	235:9 236:2	dry 229:19 230:10	258:3,7,16 259:8	effectiveness 133:17
75:15	237:21 239:3	237:13 247:9,12	260:10,21 261:1	137:9,19 138:12
distribute 185:18	246:1 247:16	247:13,20 287:14	261:10 263:7	efficiencies 128:11
distribution 145:5	248:9,10,12 258:4	dual 102:10 110:1	268:20 269:4,5,10	179:5,6 208:17
151:7 152:2 153:1	273:4 276:5	128:20 129:1,11	272:18 284:5	efficiency 7:6 20:11
distributions	284:14 285:1	129:16 132:20	287:4 288:19	107:11 108:6
144:16	290:16 297:19	144:3	294:11	113:16 119:22
diverse 119:17	dollar 226:8	duck 13:6	economizers 136:2	120:5,7 127:11
136:4	dollars 205:4 293:1	duct 169:18 180:17	246:8 248:14,21	130:21 135:4
divide 265:1	don't 296:4	ducts 169:12,14,22	249:12 250:2,3,14	143:21 144:5
dividing 132:2	doodle 78:9,11 79:5	170:6,19 171:11	250:17 251:11	158:3 160:22
docket 113:4 202:18	80:13 85:8 87:20	ductwork 144:13,14	252:3,5,9,19	161:15 165:9
286:8,9	87:21 90:9	153:7 177:17	253:11 254:3	166:20 174:20,21
dockets 14:8	door's 20:19	178:10,20 187:3	255:3,9 256:9	176:11 179:8
document 68:17	Doppel 2:11 8:6,6	ductworks 150:6	257:7,14,21 258:1	189:6 192:13,18
70:17 72:2 74:6	39:3,3 47:19,19	due 158:19 256:2	258:19 259:14	202:8 207:19,21
documents 87:6	53:21,21 54:7,14	dwelling 254:7	261:7 265:19	208:5 213:19
90:7 95:11	82:21 83:3 91:9		266:3,9 267:16	214:18 215:22
DOE 2:3 4:3 6:10	92:3 105:10,10	E	269:19 270:1	223:16,18 226:17
6:17 10:15 12:5	109:22,22 110:11	E 4:1,1 68:22	271:4 273:3	227:6 235:18
12:12 13:4,9,20	111:6 162:1,1	112:18	289:11 291:10	237:15 277:7,13
14:3,7 18:18	165:18,18 166:5	earlier 81:15 84:2,3	economizing 102:22	277:15,18 281:4
20:21 21:2 22:1	166:12,22 167:4	172:14 173:3,7	135:19 238:19	283:21
23:17 33:18,20	180:3,20 194:16	192:12 196:17	240:11 241:3,4	efficient 2:22 7:9
35:19 38:18 43:18	199:14,14 200:4	217:8 221:22	242:20 244:10	139:18 177:20
49:12 52:4 54:2,4	235:15,15 240:4	222:11 277:19,20	246:16 247:16	243:6
54:13 58:3 67:11	243:14 245:4	278:19 284:1	263:3 269:5	effort 20:15 21:12
68:10,17 72:21	251:10 254:13,19	292:5,10,10	270:20 286:2	34:14 39:2 287:11
74:8 100:6,13	260:9 262:18,18	293:16	Economy 2:22 7:9	289:18
101:2,5 102:13	263:4 287:1,1	early 81:9 82:3	edge 179:2 185:7,9	EIA 255:1
103:19 107:4	288:2,8 289:19,19	85:14 292:6	edges 182:5	eight 10:12
132:8 141:10	290:2,6	easier 32:2 86:11	Edison 2:20 7:19	eight/ninth 92:6
155:17 156:21	Dopple 179:12,12	93:4 123:5 137:16	9:8 22:15	eighth 90:22 91:6
159:14 189:15	290:9,16	142:8	EEI 296:19	92:16,17 94:16
254:20	doubt 17:17 165:6	easy 41:6 168:16	EEL 108:13	Eileen 2:4 4:21 5:14
DOE's 9:4 11:19	271:10	209:9 236:4	EEL3 108:14	5:15 24:20 31:12
20:7 21:19 54:3	doubts 31:8	264:16 293:9,9	EER 98:15,17,19,22	33:4,11 46:2 49:4
54:15 70:5 108:4	downsize 181:19	eat 17:13 198:2	99:9,14 100:10	62:5 65:3 75:1
113:6 202:20	downstairs 17:13	EBBR 107:13	101:3,4,4,7 113:7	297:15
doing 13:13 14:21	downstream 114:10	economically 20:12	115:1 116:13	Eileen's 91:14
15:22 17:1 18:16	142:8	economist 226:7	117:6,8,12 121:16	either 20:4 28:16
43:11 45:16 54:11	draft 15:18	economize 247:14	121:22 122:1,4	45:7 54:18 75:22
65:18 84:19 93:1	drag 24:2	256:22	123:9 125:6	86:22 165:14
99:21 109:16	dramatic 236:7	economized 244:14	157:14,19,20	176:10 190:18
114:9,10,11 115:8	draw 297:2	244:18,18 245:18	188:12 191:10	193:2 228:1
120:21 131:13	driver 136:12,18	246:1,10 247:2	effect 68:1 69:6 70:2	238:17 275:7
138:2 141:14	140:20	258:16 260:14	101:11,12,15	287:3
150:18 172:18	drop 150:1 158:19	261:6,16,18,18	124:2 172:16	EL 108:18 116:20
184:4 185:20	159:9,10 160:1,5	262:2,6,17 265:11	196:18,19 237:22	121:21 122:4,14
188:11,21 190:12	161:18,19 163:22	265:12 266:11,15	260:17 263:11,18	123:1,2,4 125:11
191:16 192:20	180:16 183:13,15	266:19 269:1	263:19 278:20	134:14 160:11,19
203:14 204:11	226:19 227:14	271:1 287:10	effected 291:11	169:16
206:1 209:16	dropping 183:14	economizer 135:20	effective 70:4,8,9	EL0 117:2
		238:5,9,20 241:16		

<p>EL1 123:18 128:22 141:20 142:1,11 143:16,18 144:4 155:7 171:12 278:7 280:21 EL2 121:14 123:18 144:1,4 155:7 278:7 280:21 EL2.5 284:1 EL3 144:2 159:2 166:2,7,15,15,19 167:13,16,17,21 167:22 168:3 170:10 174:5 184:3 203:6,21 204:8 208:6,10 209:2 217:18,19 217:20 281:13 EL3.05 284:2 EL3.1 174:5 202:11 EL3.5 174:5 EL4 166:19 170:18 202:11,13 203:3,6 203:21 208:6,10 Electric 2:6,11,20 7:20 8:7 9:9 22:15 53:22 electricity 255:1 296:21 electronic 233:18 electronics 257:10 element 196:1 elephant 22:5 111:1 elevate 172:5 elevated 273:19 elevator 44:20 45:9 eliminates 194:16 ELR 217:10 ELs 110:2 144:3 208:20 221:3 288:22 289:2 else's 287:9 email 43:21,21 48:5 63:10 126:15 emailed 43:12 emailing 39:17 44:15 emails 90:6,6 298:5 emergency 10:9 Emerson 2:12 6:20 121:11 195:12 Emily 9:15,16,21 emphasis 203:8 emphasizing 71:9 employ 148:8 employed 255:3</p>	<p>employees 27:8,8,22 29:1,1 enable 203:11,20 ended 43:11 ends 230:17 247:16 energy 1:1,7 2:1 7:6 7:9 9:3 16:11 18:1 20:11 97:2 99:10 99:16 105:4 114:11 119:4 121:8 144:6 152:22 160:21 175:12 176:2,13 176:16 179:8 201:13,17 204:20 211:3,4 224:15 229:13 235:17,22 236:8 238:1,7 239:5 241:10 242:18 243:4,8 244:7 248:9 263:7 263:16,17,21 272:3,9 273:21 274:5,9 281:6 289:6 energy's 238:5 Energy- 2:21 enforcement 56:11 57:6,10 engaged 42:21 engineer 50:11 183:6 188:16 221:7 260:21 engineered 180:11 210:21 211:2 engineering 97:2,7 97:10 114:10,12 123:17 141:18 165:7 167:9 168:12 170:1 191:17 201:14 215:16 222:5 283:16 engineers 163:6 173:7 198:18 225:4 engineers' 182:17 enhancement 188:8 enormously 171:13 enriched 15:18 ensure 26:22 41:15 enter 14:7 entered 48:7 entering 17:21 18:6 Enterprises 3:6 entire 131:14</p>	<p>entirely 125:17 entries 95:9 entry 136:10,14 environmental 11:18 52:22 254:7 254:10 envision 170:7 EPAC 127:8 EPCA 24:7 equal 50:8 296:20 equation 183:20 247:14 equations 107:15 191:14 248:11,11 equipment 6:10 114:13,14 119:6 134:12,15,16 146:20 147:4 149:20 150:5 151:2,5,15 152:7 154:17 160:9 162:20 176:18 178:19 179:5 180:1,6,18 181:11 182:14 199:20 222:14,15,16 227:2 228:2 229:3 229:13 231:11,12 233:1 238:22 242:19 252:10 256:2 270:11 equitable 162:5 equivalence 99:7,7 equivalent 193:2 265:8 ER 112:13 113:5 117:9 119:12 ERE2013-BT-SD... 113:5 Eric 6:15 100:12,13 103:3 156:21 Eric's 294:7 ESP 164:10 177:17 especially 129:14 156:22 180:5 194:18 231:18 espousing 28:9 essentially 46:20 150:18 152:19 153:1 157:15 193:1 248:20 establish 11:5 13:15 20:11 25:1 99:6 establishing 12:6 estimate 127:5 128:12 153:14</p>	<p>186:9 223:5,22 263:16 265:10 289:5 estimated 188:9 227:5 estimates 126:21 127:15 223:8,9 267:18 estimation 186:6 et 200:15 ethics 4:15 24:16 25:19 26:2,5 evacuate 10:12 evaluate 177:17 evaluating 191:17 EVAP 197:16 198:8 evaporator 170:19 225:17 227:15 evaporators 192:9 event 44:10 83:7 everybody 13:11 34:18 37:14 41:9 88:22 92:2 95:10 189:2 everybody's 67:9 93:9 187:13 235:6 249:14 288:19 everyone's 16:20 30:17,18,19,22 77:4 90:2 212:16 284:22 exact 83:18 180:9 exactly 71:18 76:19 117:5 120:13 130:6 164:11 169:22 185:10 193:3 204:21 225:1 232:15 284:15 examine 214:21 example 58:4 63:10 76:16 214:8 233:8 246:13 247:17 264:7 examples 117:20 231:1 264:3 exceptions 47:1 exchange 198:20 exchanger 128:10 197:16 198:17 210:22 222:22 224:13 exchangers 169:17 192:6,8,10 198:22 223:3 exchanges 192:5</p>	<p>exclude 45:10 Excuse 205:12 exercise 10:12 266:1 exist 21:16 existence 29:9 existing 144:10,12 144:17 145:5 147:10 151:10 157:16 158:4 165:10,12 167:17 170:8,12 178:9 179:22 180:17 182:9 184:18 193:18 211:5,6 215:2 257:15 262:2 277:7 exists 21:16 expect 24:16 35:22 137:7 expectation 82:1 130:19 expecting 116:10 126:8 expensive 143:5 283:11 experience 5:9,16 33:18 42:2 60:11 64:9 116:2 266:16 experienced 21:9 expert 256:15 expertise 22:2 75:5 75:11 experts 5:19 21:20 74:16 76:3 114:4 explain 31:15 32:8 210:6,11 explained 106:3 212:18 explanation 169:8 explore 286:21 exponent 275:2 expressed 12:14 extent 21:15 67:22 69:4 70:1 105:4 109:4 110:22 116:19 188:13 196:2 256:14 extenuating 47:22 48:18,22 63:3 external 161:19 162:3 169:2 186:19 187:1 274:2 284:18 285:2,5,12 extra 23:10 75:5 179:1 214:18</p>
---	--	--	--	--

extrapolated 210:17	105:3 112:4	38:3,10,12 39:19	51:13,14 76:4	151:5 152:11,17
extrapolation 211:1	fan 5:5 115:20	40:13 49:18 52:19	82:9 86:22 88:4	177:5 183:8 189:7
extreme 236:18	126:20,22 127:5,6	53:14 54:19 56:17	88:14,22 107:18	189:11,18 225:15
eyeball 287:15	127:14 128:6,8,11	57:9,16,19 59:17	111:15 151:10	225:16 226:12
	128:12 138:15	60:6 63:6 64:14	244:14,20	233:16 275:7
	152:21 159:18	82:14 99:11	finish 4:8 24:5	280:12 281:16
F	160:21 163:14	107:17 108:20	221:16 292:5,5	282:9,14 283:18
f 3:10 67:15 233:4	168:12 179:5	129:19 130:6	298:7	flowed 13:3
FACA 26:8,10,10	185:11 186:20	132:12 134:7	finished 157:8	flows 128:10
26:13,19 29:8	187:2,3 190:17	139:1 146:18	firmed 87:22	fly 214:5 240:17
30:10 54:9	237:7,17,19 238:5	147:9 162:11	first 4:3 14:20 19:5	flying 91:15 94:10
face 125:12 128:10	238:7,11 239:1,5	230:7,19 254:1,10	20:7 24:17 25:3	FMCS 5:15 30:14
faced 103:16	240:9 241:10	296:17	30:13,15,19,22	focus 80:4 96:20
facilitate 94:13	242:1,3 243:1,6	field 162:14,18,21	31:7,15 32:1,12	218:6,11
facilitation 5:21	273:19 275:1,8	163:3 178:16	33:14 35:11 60:15	focused 125:16
31:13 91:6	282:2	184:21 274:10	80:3,7 88:16	243:22 255:13
facilitator 2:4,5	fan's 238:16 241:6	285:2	89:11 91:9 92:15	295:5,11
16:1 41:15	242:13	fifth 29:12,14,16	94:20,21 107:3	focusing 198:5
facilitators 4:13,21	fancy 252:9	89:8	123:7,8 126:19	folks 33:22 79:1
14:13 16:2 33:5	fans 190:19	figure 48:20 91:21	137:21,21 138:2	114:16 294:7,8
41:17 62:5 65:7	fantastic 167:9	94:11 97:7 141:3	156:1 160:17	follow 77:19 81:14
78:15 91:5,11	far 21:3 42:7 80:2	154:9 160:3 171:3	180:11 181:14	99:13 104:18
92:9 94:4 297:22	116:10 131:22	200:21 219:10,12	194:10 205:18	120:22 172:14
fact 28:1 38:20 99:8	144:20 175:18	220:3 223:11	229:10 231:15	193:15 224:8
110:12 118:10,14	250:16 260:11	252:20 259:3	233:16 239:19	follow-up 149:3
138:5,10 187:18	262:15,16 286:17	271:19 276:3	256:19 284:12,13	249:21
260:4	286:18	277:4 287:7	first-class 138:21	following 39:4 115:6
factor 24:7 178:22	fashion 128:8	figured 182:21	fit 102:3 158:22	271:2
231:5,10 237:22	fast 197:6 214:13	figuring 187:6	159:1 165:10	foot 146:13,14
256:6	222:9	file 67:20 68:3	194:1	245:22 267:17
factors 205:14	fathom 127:10	187:10 232:3	five 24:16 32:1	270:4 271:5
255:21 256:13	favor 53:16 61:19	files 230:1 232:4	138:7 142:20	footage 145:21
267:19	feasible 20:12	298:1,2	189:21,22 241:15	146:11 245:11
factory 185:4	features 102:12,15	fill 13:1 203:5,21	fix 259:22	246:6,7 250:2
factual 142:15	February 95:20	filled 204:9	fixed 257:9	251:2 258:18
Fahrenheit 191:21	96:8	filling 6:21 7:21	flag 223:14	261:10 278:16
230:15	federal 5:1,2 6:11	146:12 204:12	flatly 155:3	footers 149:11
failing 260:20	22:16 26:7 27:3,8	filters 187:4	flexibility 101:21	footprint 171:9,10
fails 259:9	28:1 29:1 71:10	final 14:4 32:18	flexible 84:3	193:14 283:20
failure 248:18	96:3,5	67:20 68:14 69:2	flight 43:8,16 82:21	forced 138:14,14
249:20 251:6,9	feedback 106:12	69:4,5,10,20 70:1	84:7	139:4
252:8,19 253:6,7	124:16 125:2	70:20 71:3,14,16	flights 292:10	foreign 39:16 93:7
253:9,11,12,16	144:22 223:6	72:10 93:16	flip 14:15,17 33:12	forever 200:3,5
256:22 258:8	feeds 223:4	173:13	278:2	forget 214:16
259:10,16 260:19	feel 33:17 55:12	finally 69:18 277:16	floated 12:20 67:5	forgot 53:3 130:11
260:22 272:18	66:4 98:6 118:12	finance 221:7	184:2	254:15 273:12
failures 252:6 253:9	137:13 148:22	financial 29:3	floor 10:13 25:11	form 13:4 73:9
fair 17:22 26:22	232:13 244:22	find 10:8 12:10	40:9 94:16 149:9	105:14 113:14
160:22 166:18	266:21 293:15	17:12 45:4 65:17	150:3 153:21	270:9,10
167:6 209:15	feeling 36:5	143:17 146:20	233:11	formal 32:19 98:4
216:1 228:13	feels 34:9	166:5 173:8,18	floors 10:12 149:5,6	147:2 244:10
fairly 109:10 225:10	feet 172:5	203:10,14,20	149:8	formed 12:5 74:7
faith 21:5,6,8,12,21	Fein 9:6,6	204:5,14 205:14	flow 41:7 62:16	76:2
38:19,20 61:13	felt 62:15	272:1	112:22 120:18	formulation 196:17
fall 72:11 84:21	Fernstrom 3:9 7:17	finds 65:12 223:4	143:21 144:1,5,16	Forrestal 1:8
96:5 97:15	7:17 34:20,20	fine 34:2 39:10	144:17 150:16	forth 12:12,15
falls 121:18 206:18				
familiar 10:5 15:3				

forthcoming 104:6	37:16,17 38:21	generalized 263:6	106:16 109:19	98:18 104:9
fortunately 222:22	61:12,14 216:7	generally 49:16	110:9 117:20	106:13,14 110:7
forum 69:22	261:1 280:18	63:2 134:10 150:3	118:21 125:8,10	110:15,19 111:21
forward 5:7,11 14:3	283:18 297:11	159:15	133:1 134:16	112:6,21 113:21
20:22 22:1 33:8	fun 5:3	getting 19:1 21:17	142:2,17,20 143:8	118:12 119:3
62:17 64:20 67:10	function 201:16	36:5 37:8 44:6	145:1 150:1	120:17 123:22
96:17 103:19	214:3,7 216:1	50:19 72:1 81:11	157:18 173:1	124:20 125:20
106:5 128:18	237:13,19 247:20	93:16 125:17	175:18 180:15	126:10 133:4,11
139:22 140:18	276:15	169:18,19 179:7	182:3 185:1	133:14 134:8,20
145:1 197:7 225:8	functioning 250:2	185:18 193:13	191:22 195:3	135:5 137:7
237:18 284:10	258:15 261:2	200:19 205:14	196:18 200:17	138:18 152:7
288:10,11 291:14	furnace 23:16 95:22	215:8 221:4	201:17 207:6,8,16	155:18 156:6,11
291:16 298:18	194:1 196:15	225:21 238:3	207:16,18 209:14	157:2 159:3
found 11:19 40:15	198:9 200:20	249:7 258:10	212:12 213:16	160:20 161:14
41:5 217:8,10,13	201:8	259:18	214:6 216:21,22	162:7 163:9,17
217:14 219:1	furnaces 96:7 198:6	ghost 55:15	222:6,19 227:20	164:2,5,17 165:21
253:9,10 260:19	198:8 200:15	give 11:3 30:4 36:10	228:20 230:16	167:17 172:2,16
four 12:8 52:8 53:3	further 12:5 69:13	40:8 83:4 103:22	244:5,5 252:12	172:20 173:9,12
53:10,16 54:16,20	130:17 170:20	201:5 203:22	253:16 256:2	173:15,16,17,20
55:12 57:22 172:5	204:18 205:15	204:13 207:20	260:7 266:1 267:3	174:2,13 176:21
196:19 218:4	232:5 279:13	217:15 218:20	268:11,13 273:18	178:13,16,19
253:11	286:3	220:20,21 244:7	274:15 275:8,17	179:2,3,6,14
four-stage 231:16	future 27:15 167:3	266:13 296:5	276:11 280:12,14	180:13 181:1,3,4
fours 119:18	224:5 257:15	297:9	284:11 288:10,10	181:5,12 182:4,18
fourth 52:2 89:8		given 99:14 104:4	292:13	184:1 185:19
128:19	G	112:14 115:1,2	goal 20:17 81:8	195:10,20 196:3,5
fraction 50:19	G 4:1	117:12 121:21,22	273:1	196:18,20 197:1,3
155:10 243:8	gained 23:13	139:9,10 170:12	goes 21:1 41:2	197:8,20 202:22
276:19,22	GALLAPUDI	170:12 212:8	50:21 69:13	203:2 206:16
fractions 145:19	121:10	215:6 225:17	101:10,11,11,15	207:6,7,20 208:2
277:1	gallery 8:18	266:16	104:19 115:20	208:19 209:3
frame 267:3	game 297:17	gives 16:8 71:16	122:18,19 172:16	215:10,14,15
Frankly 71:5 291:6	Gary 3:9 7:17 34:20	77:7 142:22 143:1	196:18 206:17	221:5,5,11 222:1
free 33:17 102:1	38:3,9 39:19	189:2	going 4:8,9,10,12,13	225:19 227:18
241:19	40:13,20 49:18	giving 26:20 105:4	6:14 10:2,10,11	231:19 232:5
freedom 77:8	52:19 53:14 54:19	114:6	10:11 11:1,2,4,7	234:10,14 235:16
frequently 40:16	55:3 56:17 59:17	glad 202:17 204:11	11:12 13:12,20	235:20 236:5,10
Friday 85:14,20	61:4 63:6 64:14	glass 186:16	14:22 15:5,22	236:15,17,22
245:16 262:20	82:14 99:11	glorious 120:1	16:13 19:20,22	237:18 238:19
263:1 284:7	107:17 108:20	go 4:9,10,14 6:5,7	24:8,12 25:4 26:9	241:3,11 242:14
Friday's 244:15	129:19 131:10	10:1,10,11 11:1,5	30:5 31:6,7,7,8,9	243:6,11 244:2
friend 245:4	132:12 134:7	11:7 12:2,10 13:1	33:14 34:2 38:16	247:14,15,22
front 110:10 115:9	139:1 146:18	13:13 14:3 15:10	40:2 42:7,14 45:4	248:22 255:8
187:14	162:11 230:7	15:15 20:9 21:10	45:15 46:17 47:10	258:12 262:4
front/back 225:12	254:1 296:17	21:16 22:2,19	47:11,12 48:1	263:8,9,11,15
fulfill 65:17	Gary's 60:20	24:9,11,17 25:17	51:20 52:16 53:7	272:16,17 273:2
full 20:8 27:15	gas 2:6 7:20,20	26:1,9 33:8,10	54:9,20,20 55:11	273:18 274:18,20
49:16 144:17	198:22 220:8,17	37:3,4,5,8 39:5	58:8 60:3 65:18	275:17,18 276:1
150:14 181:9	gas-heat 220:6	42:6 43:2 48:16	66:5 67:6,7,7,14	276:14,17 277:18
183:8 191:14	gears 257:9	50:18 51:10 54:18	67:16 68:5,21	278:2,6,6,17
202:1 211:22	general 4:16 6:15	55:10 59:8,21	75:13 76:17 79:20	281:7,15 282:13
224:1,18 241:11	6:18 37:9 40:3	60:2,3 62:16 67:6	80:6,14 84:5 85:6	283:5,16 286:1,5
280:1,12 282:3	88:19 150:15	67:9 68:16 78:4	86:10 88:11,12	286:11 287:2,12
292:3,4	164:10 169:10	85:7 87:10 91:19	89:6 90:4 92:22	289:5 290:14
fully 19:19 35:14,17	179:2 187:13	93:8 96:12 98:5	94:21 95:14 96:2	291:7 292:3 293:2
35:22 36:1 37:11	198:16 261:15	104:7,17,21	96:20,21 97:4	293:5 295:13
	262:5			

297:22 298:12,16 Gollapudi 2:12 6:19 6:19 122:3,7,18 GOLLPUDI 195:11 good 5:13 14:1,10 16:19 18:10,13 20:2 21:5,6,8,11 21:17,17,20 24:14 24:15 26:3 33:19 34:12 38:19,20 47:14 52:16 55:19 61:13 73:16 77:3 79:10 81:2 83:1 83:10 85:9,10 94:19 95:7,8 99:17 100:17 103:11 105:1 115:19 130:8 144:18 147:15 155:21 156:16,18 159:22 188:10 191:2 197:10 209:7 213:13,14 220:22 225:7 247:17 267:1,15 270:8 274:8 293:21 294:2,19 Goodman 3:1 73:20 86:3 104:12 112:11 188:3 208:15 226:10 Goodwin 7:1 Google 87:20,21 90:9 Gordon 9:4,4 26:3,4 29:16 gotten 22:11 80:1 87:14 298:5 government 26:16 27:1,8,22 28:22 graduates 154:14 granted 195:9 269:12 great 9:13 77:22 83:16 85:18 163:1 171:21 213:8 214:1 225:3 234:2 greater 127:20 137:7,9 greatest 121:5 Greg 3:8 114:7 123:14 125:4 145:11 153:20 176:6 186:2 190:1 228:19 245:8 249:22 273:10	Greg's 265:8 gritty 72:1 109:19 ground 10:13 11:5 11:6,21 16:14 19:7 25:1,20 33:10,13 64:12 65:11 66:19 68:7 72:14 73:17 74:11 74:12 104:8 287:18 298:1 group 1:2 4:4,6,18 10:3 11:10 12:4 12:19,22 13:16,16 13:21 14:11 16:16 20:22 21:1,18,22 22:4,10 23:7 24:1 24:13 25:2,10,14 27:5,10,11,14 28:10,17 29:15,16 30:2,15 33:3,6,16 33:22 35:7 36:5 37:21 39:12,22 40:6,8,10 41:8 42:1,3 45:14,16 47:18 49:8,10 52:1 53:6,20 54:1 54:10 58:1 60:10 62:5 69:11 73:5 73:11 74:19,21 75:3,12,13,16,16 75:18,22 76:3,5,5 76:8,18 77:8 78:1 86:5,7 88:16 91:18 92:5 93:5 94:20 97:18 98:11 109:19 111:22 113:20 145:1 147:2,2 155:10,20 157:3 168:14 173:4,22 175:18 186:8 208:4 212:22 213:9 216:2 230:2 232:4 232:6 240:3 244:10,20 269:15 270:9 271:19 275:13,14,15 276:2 286:4 288:7 291:7 group's 13:3 groups 18:21 19:11 28:2,11 33:18 34:22 35:20 40:15 66:20 94:21 grow 174:13 194:6 195:7	growing 194:9 guess 22:5 33:14 39:20,22 41:13 45:15 46:16 53:10 53:10 65:11,14 83:5 88:19 98:18 99:1 103:2 105:2 108:13 112:6 113:12 115:14 121:12 124:4 126:11 137:10 138:16 139:8,21 143:15 158:16 160:17 175:17 176:20 178:10 183:1 186:1 189:14 196:12 208:3,16,22 216:2 216:6 223:14 233:8 234:5 235:10 242:21 243:13,20 245:13 248:7 251:7 256:21 264:10 271:2 277:20 285:9 298:7 guidance 19:1 124:13 280:4 guide 76:4 guided 94:4 guideline 50:4 275:5 guidelines 153:10 227:13,21 guy 6:12 267:21 guys 81:16 206:19 209:11,20 253:17 270:6,12 288:15 291:19 292:15 293:5,20 295:22 297:10	61:5 73:13 77:18 handed 286:8 handful 100:3 240:18 269:7 handle 165:19 196:8 210:9 232:13 285:13 293:9,10,10 handler 159:11 181:8 handlers 159:16 handling 44:14 hands 59:15,16 63:15 64:2 73:12 86:16,17 157:5 handy 282:5,16 hanging 170:7 happen 83:15 167:7 172:9 221:8 234:14 247:21 251:20 252:2 277:21 happened 34:4 56:16 95:3 101:14 happening 44:17 148:19 171:12,12 207:16,22 239:8 245:14 277:18 happens 44:11 171:15,16 172:11 177:5 277:19 happy 5:15 16:6 54:18 67:10 122:16 187:14 297:14 hard 103:20 139:13 139:14 141:7 207:2 214:13 221:5,17 238:18 239:14,15 259:2 270:2 harder 103:21 hardest 139:14 Hardin 3:10 8:22 8:22 harking 18:11 Harvey 2:21 7:8 37:19 41:3 53:3 59:13 61:22 62:13 94:12 98:13 99:3 102:9 103:14 104:13 139:15 140:5 149:2 169:7 171:20 Harvey's 39:4 99:13 hat 24:9 68:4	hate 59:8 Hawaii 48:8 he'll 12:22 30:1,7 82:18 head 11:20 99:5 121:13 156:20 166:16 190:8,12 190:20 191:11 212:17 253:14 288:1 heading 79:13 165:11 hear 100:20 212:14 215:9 226:2 241:6 262:21 268:8 heard 15:13 16:20 19:12 26:21 30:17 46:12 63:4 105:19 129:7,10 141:6 151:9 184:3 232:5 245:7 250:19 261:9 268:13 272:21 273:16 276:14 277:6,16 281:13 284:17 285:22 295:9 hearing 46:10 48:2 49:1 140:2 155:18 221:12 241:22 274:6 Hearings 9:5,7 hearts 291:4 heat 1:4 112:22 113:2 128:10 169:17 192:5,6,7 192:10,10 197:16 198:17,20,22 210:22 220:8,13 220:17 222:21 223:2 224:12 235:7 241:5 288:20 heating 2:16,18 7:11 151:17 198:12,12 232:8 234:19 235:4 237:7,8 238:17 239:2,3 242:2,12 242:13,22,22 255:21 heats 241:18 held 22:11 90:12 94:15 97:18 help 18:2 23:8 31:19 33:11 76:4 80:18 87:15
H				
	Hagerman 5:10 half 51:12 130:22 130:22 133:21 134:3 142:20 197:12 208:21 209:22 218:13 222:10 225:1,1 265:2 273:9 halfway 216:21 hall 126:15 hammer 66:11 Hanameyer 254:13 260:6 hand 25:11 42:11			

155:13 234:4 257:3 helpful 56:15 100:20,22 172:7 helps 171:21 216:8 223:2 hey 84:12 88:10 287:18 294:21 Hi 4:20 114:7 123:14 176:6 229:1 hierarchy 123:11 high 121:2,6,18 125:6 167:1 172:11 177:2,7,9 177:14,20 223:16 223:18 237:10 238:1,12 239:2 241:8 242:4 244:6 246:19 267:10 274:19 281:7 282:4 higher 108:12,15,17 112:17 117:8,20 117:21 119:12 120:5 127:18 133:15 135:1 152:9 159:2,2 160:11,19,21,21 161:15 165:3,4,9 166:3 168:13 174:3 179:8,9 184:20 186:11,13 193:5 202:12 207:20 230:21 233:5 241:15 243:7,7 246:14 253:6 277:15 285:12 289:3 highest 127:19 231:22 HIR 113:6 hire 16:10 hired 16:10 history 95:16 hit 11:21 214:2,7 217:6 219:3,4,6,6 227:6 hitting 215:22 hockey 154:15 297:16 Hoffman 2:4 4:20 4:21 6:5 14:16 15:13,21 16:8,22 17:9,20 18:5,15 19:4,15 34:15,18	36:22 37:7 38:1,8 38:11 46:4,8 48:17 49:3 51:10 51:17 58:16,20,22 59:4,10,13,16,19 59:21 60:5,12,16 60:19 61:2,7,11 61:15,19,21 62:2 62:7,18 63:2,13 63:18,21 64:4,11 64:19,22 65:5,8 65:15,20 66:13 74:14 78:8,22 79:10 83:18,22 84:5 86:20,22 91:21 94:6,9 218:19 219:4 221:17,21 222:3,9 225:3 228:13 297:19 HOI 139:7 hold 94:1 hole 283:4 home 90:11 292:10 honest 212:15 288:15 honestly 20:19 72:1 hooked 153:2 hooking 153:2 178:9 182:9 282:22 283:5 Hootman 2:13 8:3,3 42:19,19 43:5 70:11,19,21 71:4 89:6 90:15 95:1 110:14 118:8 119:8,11,14 120:10,13,16 121:1 131:13 132:2 136:3,6,11 136:17,21 138:4 138:13,20 139:12 142:6 143:2,11 145:11,15,17,20 146:2,8,17 147:12 147:22 148:13 149:8 150:7,9 153:5 154:16,20 159:19 171:1,4,15 171:17 172:4,8 174:7,18,21 175:4 175:12 176:17 177:1,19 178:3 181:20,22 182:11 183:3 190:22 194:3,12,15 195:4	197:10 198:7,11 198:22 199:22 200:6,12 201:1,4 201:10 205:22 206:15 209:13 221:4 234:10 253:21 260:3 282:17,20 283:2,7 283:7 286:5,10 290:8 294:12,15 294:18 295:4 298:14,18 hope 11:9,14,19 12:15 13:22 19:5 19:16,18 65:16 100:4 104:1,11 156:17 202:3 204:15 212:21 237:6 257:9 274:22 275:17 hopefully 15:8 16:10 17:2 43:15 61:16 103:22 104:9 106:16 118:22 229:2 251:16 280:2 horsepower 125:15 127:5,12 hot 99:15,17 235:6 hour 129:16 156:13 197:12 217:12 242:12 273:9 292:15 296:6 hourly 247:3 hours 224:22 240:11,21 241:20 244:5 247:5 297:4 house 251:13 housing 5:10,17 15:2 Houston 264:4 HR 159:21 HRI 89:17 93:11 126:11 217:16 218:1 220:12 294:11 huge 114:22 115:1 180:6 263:11 humidity 247:3,9 247:11,12 hundred 56:4 61:21 151:18 Hunt 7:21 Hurst 2:14 7:16,16 34:10,17,17 49:22 49:22 89:10,13,21	90:3 254:4,4 hypothesis 136:10 203:15 <hr/> I <hr/> i.e 127:7 idea 16:19 20:14 34:13 40:3 56:4 74:20 100:14 114:19 130:17 159:22 216:12 228:1 236:16 261:5,8 274:8 288:1 ideas 287:7 291:21 identified 229:5 275:16 291:17 identify 11:9 250:12 IEER 96:4 98:19,22 99:9 116:14,17 117:5,8,18 122:6 122:8 132:19 201:16,20 217:4 223:11 242:16 281:5 IER 109:14 112:14 112:17,20 113:5,8 114:14,20 115:1 117:2,21 118:5 121:16 122:4,5 131:7 132:21 134:17 135:1,4 139:13 191:18 212:4 220:1 ignore 130:7 246:4 imagine 199:11 207:4 227:12 impact 97:11 161:17 218:8 226:15,22 227:5 237:1 242:15 244:6 264:13 265:17 291:10 293:18 impacts 109:14 225:14 272:2 289:13 impartial 17:22 implementing 27:19 implications 257:12 implied 54:3 important 5:8 12:14 12:17 13:17 17:14 29:7 37:18 52:8 52:11,17,17 66:21 93:19 96:13 99:14 99:19 131:1	140:12 149:16 162:16 183:18,21 213:21 231:6 244:3 276:2,4 291:12,13 293:6 296:5 impossible 265:7 improve 12:5 improvement 243:6 296:20 in-person 84:15 87:18 incent 35:16 incentive 63:1 inch 163:10,10,14 177:11 179:1 181:11 182:10 185:11,16 inches 159:17 160:3 160:19,20 168:17 172:1,1,2 184:20 274:19 284:22 include 52:22 60:17 183:7 190:3 256:6 288:3 included 102:15 181:5 includes 64:1 102:12 including 50:13 51:15 78:15 91:5 277:14 inconsistent 69:21 incorporate 67:12 68:19 255:22 incorporated 256:16 276:8 295:20 incorporating 102:22 158:6 256:8 incorporation 70:18 incorrect 49:9 229:18 231:10 increase 174:2 193:12 215:3 226:17 235:22 incremental 133:15 214:18 incurring 278:14 295:19 Independence 1:9 independent 5:2 indicate 98:2,5 130:12 indicated 278:19
---	---	---	--	--

indicates 130:8 258:19 276:18 277:1 290:20	inside 14:11 186:21	investigation 273:4	237:2 243:11	jumping 168:11
indicating 17:10	insights 15:10	investment 200:14	251:16 291:10	207:10,12
individual 31:14	install 165:17	214:19	Italy 7:22 82:17	June 11:8 22:6,17
47:3,4 125:22	251:17	Investor 7:18	item 126:19 128:19	24:5 78:11,12,12
individuals 25:10	installation 184:17	invite 89:22	129:6 224:19	78:12 89:4 90:9
40:12 41:1 52:21	185:2,3 280:6	involved 15:7 97:12	273:12 285:9,9	90:12,12 93:12,12
67:19 69:1,19	293:8	108:3 112:5	items 232:2	93:12,13,13 111:2
indoor 125:5 126:20	installations 257:18	176:14 247:2		justifiable 208:22
126:22 127:5,14	installed 162:8	268:19	J	209:1
143:22 144:5	251:21 253:19	involves 16:18	J 2:14,20 3:3	justified 20:13
240:9 247:5,8,12	installing 178:5	IOU's 3:9	jail 139:18	
247:13	instance 233:17	IOUs 34:21 38:4	Jakobs 2:15 7:12,12	K
industry 11:17	257:8	40:14 82:15 99:12	122:21,21	k 239:7
193:4 197:4	instances 234:18	129:20 162:12	James 2:7 8:13	Karen 7:13 82:11
211:16 224:18	institute 2:17,19,20	irrespective 58:13	219:16	Karim 2:18 139:7
influence 26:17	7:11 9:9 22:15	issue 28:7 34:8	Javier 6:2 91:5,16	Katie 3:7 9:10
info 82:7	28:9	44:13,14,14 45:17	Jeremiah 89:21	154:10 236:13
infomercial 14:17	integrated 135:20	55:13 63:5 103:17	Jill 2:13 8:3 42:19	255:18 271:2
inform 23:9	intended 111:15	107:3 108:13	70:11 110:14	keep 14:22 20:9
information 15:9	270:4 279:20	113:10 125:18	118:11 120:4	35:16 62:6 103:20
22:17 82:11 109:5	intent 105:18	127:16 128:7	136:6,8 143:2,6	112:12 150:4
109:18 111:4	165:19 168:2	143:20 159:4,5	147:19 149:3	186:18 194:9
112:10 127:3	inter-fan 237:11	160:18 161:8	153:22 170:16	196:3 204:20
128:9,13 130:8	interaction 196:16	164:1,3,13 169:10	171:17 174:7	226:18 261:6
132:11,15 139:9	interchange 225:16	170:1 175:8,9,10	196:13 199:15	key 11:9,18 13:15
139:10 140:8	interest 18:1 28:1	175:10,18 187:17	283:7 294:10	20:10 23:6,20
158:13 188:13	28:12,18,21,22	188:2 190:7 191:9	Jill's 172:14 217:22	166:9 188:14,17
210:20 211:20	29:4,21 30:10	191:12 192:4	253:14	222:21 266:12
215:6 223:1,4	interested 215:8	201:12 202:8,16	Jim 139:16	keying 238:21,22
224:12 256:17	227:9	207:2 224:9,14	Joanna 2:10 211:18	kicked 95:19
266:14 280:3	interesting 67:13	225:10 231:5	214:6 215:20	kicks 293:1
284:15 286:3	139:2 203:1	236:1 243:22	220:11 280:7	kind 5:3 6:3 14:19
informed 49:8 61:1	204:10,12 227:1	244:22 266:12	job 6:13 76:20	16:2,17 23:5 29:8
inhibit 69:3	295:1	268:2 276:2,4	178:14 181:6,13	29:18 30:14 32:1
initial 29:10 104:1	interests 31:2,2	284:12,20 288:20	Joe 5:10	39:4 49:9 53:8
125:6 236:15	interim 291:18	289:1,14 291:3	John 2:3,14 4:2	54:10 64:7 73:16
initially 101:18	intermediate 207:5	292:17,18 293:4,6	5:10 6:5,8 7:16	75:15,21 84:19
250:19 280:18	208:5 213:19	295:7,9 296:6	15:14 18:8 19:12	87:9 89:1 90:16
inoperable 250:6,8	221:2	issues 10:4 11:10,12	24:20 28:6 29:22	92:11 93:16 95:19
input 15:18 24:13	internal 188:7	11:12,18 13:15,18	29:22 33:7,17,20	100:3,10 110:5
97:22 98:7 105:12	255:21 256:1	17:3 23:6 28:12	34:10,17 35:18	116:19 117:14,17
109:10 110:3,6,8	285:5	29:21 47:13 56:11	38:17 43:18 49:12	119:5 120:3
111:18 126:21	International 2:14	78:1 98:6,9	49:22 52:4 58:3	123:10 131:9
128:8 143:16	interpolate 207:5	103:16 105:21	63:8 70:7 71:7	135:14 137:13
153:10 158:9,12	252:4	127:21 129:2	75:1 78:14 80:5	152:5 157:5 163:7
168:14 170:9	interpret 63:5	157:9,20 161:20	84:12 88:10 89:21	165:11 177:6
183:9 186:1,8	interspersed 41:7	161:22 196:21	97:14 111:1	185:18 187:6
187:10 190:15	intertwined 225:11	197:19 224:10	141:10 148:13	189:4 198:4
227:9 232:5,19	introduce 4:13 6:3	227:4 229:5 284:6	155:17 189:15	204:18 213:15
244:19 274:8	8:1 10:18 62:9	284:9 292:12,14	199:11 226:2	220:8 223:3
281:12 293:8	introduced 144:1	294:4,6 295:17	254:4,20 297:6	227:18 235:2
inputs 124:11,12	introducing 144:4	issuing 68:13	John's 30:7 177:19	236:1 239:6
127:14 168:21	introduction 10:3	it'd 242:7	join 58:6	243:21 249:19
188:6,7	introductions 4:10	it'll 19:9 69:10	joke 296:11,15	268:2 271:9 287:8
	4:15	119:9 185:15	joking 296:12	287:15 289:5
	invested 200:15	214:12 225:1	jump 156:11 207:21	291:14 296:3
			208:6,10	kinds 5:6 31:17

227:18 235:11 knew 131:8 know 5:22 9:13,18 10:14 11:11,22 14:14 17:1,13 18:12,21 19:16 20:5,7,15 21:6 22:6 25:7,11 29:12 32:13 33:5 33:7,17 34:4,8,18 38:16,22 39:15 40:8 41:16 43:14 43:17,19,22 44:3 44:3,5,7,12,16 45:4,4,12,13 47:9 47:13 48:3,8,10 48:20 50:7,10 51:2,3,6 52:8,15 52:16 53:9 54:22 55:9 61:15 65:3 66:1,3,4 67:3 72:2 72:9,18,22 73:8 73:17 74:1,2,10 74:20 75:8,20,20 75:22 76:1 79:12 80:20 81:3,14 82:6,12,16 84:3 85:14 88:21 90:16 90:18 92:22 93:3 94:19 95:3,18 97:18,19,22 98:3 99:15 100:7,11,12 100:19 103:3,5 104:5,6,18 105:2 105:21 106:4,10 106:17 107:7,10 108:4,7,8 109:5,7 109:8,9,11,13,14 109:18 110:6,17 110:22 111:1,2,12 113:21,22 115:8 115:17,19,20,21 116:1,5,8,15 117:19 118:12,19 120:7 122:1,13,15 122:16 123:5,10 124:8,15,19 125:4 125:8,12,13 126:4 127:17 128:16 129:4,21 130:15 130:16,20 131:2,5 131:17,20 132:10 133:1,12 134:14 135:18 137:4,5,9 138:1,5,7,17,20 141:16,17,21	142:13 143:11,16 146:6,9,12,14 148:20 149:10 151:20 152:6,7 154:7,10 155:2,2 155:3 157:18 158:13 159:7,11 159:12 161:6,21 163:5,20 164:10 164:13,16,20 165:4,9 166:17 167:2,5,6 169:3 170:4,6,9 173:2 173:19 174:4,4,5 174:13 175:5,8,8 175:13,17 177:6 178:1,8,9,19 179:3,16,20 182:6 183:21 184:1,9 185:3,16 186:2,6 187:12 192:22 193:3,4,10,17 195:1,21 196:8,9 196:20 199:7 200:1,13 203:2 205:1,7,14,20,20 206:11,12 207:4 207:16 209:13 210:15,16,19,21 210:21 211:5 212:4,15,15 213:8 213:13,14 214:4,9 214:10,16,20 215:3,8,8,17 216:3,9,10,13,21 216:22 217:22 218:1,3 219:17 220:8 222:17 223:9 225:15 226:4 229:9 230:20 233:21 234:18 236:16 237:2 238:9,14,18 238:21 239:14 241:11,12,14 243:15 244:11 248:10,20 249:14 251:6,7,7,10 253:4,18,18 255:10,17 256:18 257:6 258:12 259:3 260:7,11,19 260:22 262:7,12 262:14,15,16,20 264:11 265:3,3,15 266:17 267:13	268:19 270:10 271:9 272:7,10,14 274:1 275:7,14,22 279:12 281:1,8 282:2,10 283:12 284:6 285:4 286:2 286:11 287:7,14 288:12,14,22 289:9 291:3 292:3 292:21,22 293:3 293:16 294:7,21 295:8,10,12,15,21 296:12 297:14 298:8 knowing 13:9 131:4 knowledge 45:16 148:7 known 188:12 knows 89:17 Kristen 254:13 Kristin 260:6 <hr/> L <hr/> L 2:11 Lab 9:11 236:14 labor 5:4 Laboratory 3:5 8:10,12 LaFont 94:16 laid 210:9 laissez-fair 16:4 land 122:9 land's 149:12 landing 198:16 language 17:10 77:5,17 large 102:11 112:13 125:12,12 148:17 148:18 150:1 210:22 211:11,13 233:9 235:3 243:11 255:3 262:10,17 264:8,8 larger 134:9,10,11 146:21,22 148:9 148:14 154:13 158:4,21 161:4 165:15 180:3 186:10 245:12 258:20 264:7,12 late 26:14 268:5 292:15 laugh 296:13 Laughter 50:12 55:2 60:22 226:6 226:9 245:5 254:9 295:3 296:14	launch 107:2 law 275:1 Lawrence 3:4 8:9 8:11 9:10 236:13 laws 26:14 27:2 lay 295:22 layman's 68:2 layout 117:16 lays 275:12 LBNL 3:7,8 114:8 123:15 153:11 156:1 183:6 228:20 255:18 LCC 215:16 265:21 276:21 293:9 lead 5:18 leak 194:15 leaning 142:13 leap 184:10 learn 80:16 learning 80:15 leave 77:7 89:2 93:2 134:1 215:18 252:15,21 left 10:10 48:9 222:5 245:17 247:19 269:1 292:18 legal 71:15 100:3,6 102:5 156:19 202:21 294:5 legally 101:22 legwork 96:15 lends 12:11 176:7 Lennox 2:14 7:16 34:17 50:1 254:5 let's 25:17 50:9 60:7 66:18 116:13 122:14 130:10 160:2,7 197:6 206:22 209:4 213:16 232:20 247:18 290:12 291:16 297:9 Letter 67:15 letting 47:15 level 101:15,16 108:6,9 113:16 114:15,20 116:6 116:14 117:12,15 118:3,20 120:1 121:6 122:2,4,8 123:1,2,4,9 124:21 125:6 126:8 127:11 134:17 146:6	166:3 168:3,4,6 170:10 173:19,20 174:20,22 192:19 198:15 202:12,14 202:22 203:3 206:6,6 207:5 208:5 213:2 214:18 216:17,20 218:13 223:19 224:9 227:6 246:20 254:22 255:15 270:22 277:7,13,19 279:17 281:15 283:21 294:9 levels 102:18,20 107:11,15 108:13 108:18 116:20 117:18,21 118:9 118:22 119:11,13 119:18 120:6,7,8 121:3 124:11 127:19 133:15 134:14 135:1,4,4 143:21 153:15,18 158:3 160:12,19 160:22 161:15 165:3,5,9 166:15 174:3 176:11 192:13,14 202:9 208:17 209:5,7,10 213:19,20 214:6 215:9,11 216:15 218:2,3 223:22 224:1 226:17 235:17,18 237:15 242:16 263:15 277:15 296:22 life 176:9 270:17 273:1,13 274:10 275:20 276:12 283:14 lift 115:15 light 106:7 152:3 234:12,14 lighting 233:21 limit 40:11 41:1 102:5 225:14 237:15 limitations 193:21 limited 101:22 208:19 limiting 203:15 limits 100:8 line 23:17 124:19 196:10 201:13
---	---	---	---	---

208:2 259:19 271:21 linear 207:8,11 lined 297:8 lines 104:13 linkages 257:8 linking 204:16 list 33:15 37:5,6 51:18 60:2 63:19 64:9,21 84:16 93:8 284:8 listed 189:11 289:21 literally 195:4,7 literate 188:14 literature 109:6 110:20 112:10 127:4,13 128:9 177:16 189:12,18 222:20 227:17 litmus 71:22 little 11:13 13:5 25:17 44:4 56:2 62:22 67:3 69:7 69:13 70:12 79:14 84:2 87:22 98:19 124:15 127:18 130:17 140:11 141:14 142:13 151:8 154:6 157:5 163:17 176:14 181:19 191:21 192:12 195:19 204:9 206:1 211:19,21 215:22 216:6 220:21 233:19 238:16 240:8 261:4 286:21 287:22 292:2 live 30:20 31:1 230:21 LLC 3:10 Lloyd 251:10 262:19 load 107:15 109:12 144:1 150:14 151:19 152:3 183:8 230:11 231:5,8,10 232:8 232:12,15,21 233:2,4,5,13,19 234:12,14 236:10 237:22 245:19,21 246:2 247:15,20 247:21 248:1,2,6 255:8 258:2 264:6	264:9 265:11 266:15 267:18 268:14 270:4 271:5 287:13 loads 229:14 232:6 233:12 255:22 256:2,4 266:6,7 locations 254:8 lock 87:17 logical 71:19 long 14:20 21:16 36:4,6 81:20 107:19 139:16 180:10 228:14 259:2 267:9 longer 50:21 94:5 237:6 257:8 look 5:7,11 55:5 102:6 105:6 111:3 112:4 115:19 116:8 117:20 121:12,22 123:3 123:12 125:16 127:4 130:14,20 131:1,19 161:10 166:20 167:3,16 168:5 174:9 186:22 192:16 201:20 207:22 209:4,15,18 211:14,15 212:8 214:5 219:20 220:2 222:20 237:1 240:10 244:6 246:5 251:8 252:18 254:21,22 255:16 256:14 264:2 265:14,17 267:16 268:13,19 269:9,13 273:1 281:9 287:9 296:6 298:18 looked 52:6 55:3,4 135:9 141:21 145:8 154:11 159:12,13 166:6,7 166:8 168:18 187:5,9 203:10,13 203:18 212:16 219:21 249:11 258:2 269:4,4,7,8 looking 52:20 73:21 76:21 79:17 82:6 83:19 84:22 85:8 86:2 87:21 106:12 107:21 108:8	113:4,12,13 121:15 140:13 148:7 166:9 168:22 183:19 186:1 189:9 201:15,19 202:8 203:12 208:1 209:16 220:6,16 220:19 224:5 232:18 238:15 240:19 241:1 244:19 249:10 253:11 258:17 259:22 264:2 271:7 272:15 273:2 274:7 278:18 287:13 289:7 290:17 293:14 298:9 looks 16:16 52:21 85:9 116:1 172:1 212:1,3 266:11 268:20 290:4 loop 35:17 lose 173:16 losing 105:8 loss 161:4 losses 186:21 lost 200:19 lot 11:19 12:16 17:5 22:7,11 32:2 62:4 66:4 96:14,15 97:19 103:21 109:17 118:3,10 122:11 124:12 126:7 138:4 148:6 148:7 149:11 159:20 160:20 164:13 178:10,13 178:17,22 182:6 185:15 194:9,16 199:2 200:13 213:11 215:13 221:6 222:22 223:1 229:5,7 230:14 234:17 240:12 241:3,4,16 241:20 248:3 252:2,6 255:6,8 256:12 260:7 264:9 265:5,6,9 275:16 282:15 283:16 284:2,6,9 284:20 290:10 292:1 294:4,9 296:3 298:12	lots 14:10 119:15 148:8 235:7 Louis 7:5 53:11 82:6 85:11 88:2 90:16 116:18 158:15 178:7 195:4 210:4 213:5 233:7 240:8 271:7 Louis' 136:9 Louis's 283:8 Louisiana 246:15 low 109:10 125:11 126:20 128:6 130:21 136:10,13 232:9 233:1 237:15,16 282:4 low-cost 143:3 lower 87:22 98:15 110:2 117:8,18,19 118:3 119:13 120:7 126:22 127:12 134:4,14 135:4 143:21 144:3,16 152:7,8 152:10,11,17 154:13 157:14 166:15 193:5 194:15 246:11 251:16 274:20 282:9,14 lowest 117:3 134:18 253:10 lucky 6:10 lunch 10:16 100:15 104:6 156:14,18 224:22 lunchtime 156:12 241:17	23:15 24:14 120:20 121:3 204:17 205:9 212:13 235:7,8 298:11 MALE 60:20 malfunctions 257:10 man 80:17 manage 41:17 44:11 manager 6:9 147:14 mandate 20:8 mandated 20:10 mandates 158:3 manner 28:10 113:14 114:5 manufacture 174:12,12 manufactured 5:17 137:13 manufacturer 23:15 103:21 109:3 112:14,16 113:1 125:22 141:7 171:14 172:15 175:6 211:10,11 214:14 manufacturers 118:9 119:3,19 139:8 140:9 142:16 158:8 165:1,7 166:10 184:4 193:5 194:21 195:16 199:18,19 209:20 211:7 214:16 223:1,7 251:4 282:11 295:18 manufacturing 2:15 3:1 5:10 7:2,13 15:2 194:3 mapping 96:4 148:11 March 4:7 12:4 229:6 marching 103:19 140:17 221:22 Mark 9:19 markers 33:13 market 129:22 136:20 138:10 155:8 167:11,14 172:21 173:11,17 176:12 183:2 Marketing 6:22,22
M				
M 2:15 machine 142:22 macro 254:22 255:15 Macy's 234:13 magic 53:13 magnitude 159:9 265:16 285:8 mailbox 36:21 main 35:20 119:2 200:4,8,11 276:22 maintain 101:3 maintained 247:8 major 24:22 64:7 227:5 majority 34:6 making 15:8 20:3				

<p>marketplace 123:3 173:13 174:10,13 Marshall 7:21 82:11,15,16 Mary 2:6 8:1 9:12 Maryland 210:16 mass 260:16 massive 43:8,16 match 117:5 189:6 matches 257:1 258:9 matching 188:11,14 188:21 material 97:8 126:4 295:20 materially 69:21 math 50:9 53:10 133:13 206:1,22 224:21 248:22 249:1 mating 254:8 matter 58:14 72:9 137:4,5 152:9 163:16 167:8,8 175:19 201:3 272:5 281:8 matters 29:2 75:18 281:8 Mauer 2:10 211:18 211:18 220:11,15 220:18 221:1 280:7,7 max 202:12,19,19 202:22 204:1,11 maxed 177:6,6 McCrudden 3:11 7:14,14 42:4,9,16 44:22 45:18,20 46:15 48:12 54:21 54:22 56:8,20 57:1,4,8,12 59:6 59:11 79:15,17 80:1 83:14 MCRUDDEN 55:3 mean 47:12 50:6 54:15,16 55:3 56:4 66:2,2 70:8 72:20 74:17 77:5 78:1 81:8,20 90:16 91:18 94:3 104:4 107:12 109:16 111:7,11 111:16 112:3,21 114:21 115:15,18 117:2,6,8,9 122:3 122:10,15,16</p>	<p>124:8,9 125:2 132:4,10 133:11 135:17 137:3,10 142:7 146:8 149:9 153:2 154:19 155:2,8 157:19 160:17 163:19 164:4,10 166:15 168:9 169:18,19 170:9,13 175:7,9 175:10 176:19,20 178:1 180:8,10 181:7 182:8 183:1 184:2 186:7,10 187:11 189:5,14 189:17 194:10 195:15 196:10,21 198:16 200:1,12 204:22 207:22 208:21 209:8,9 212:7 214:1 215:7 215:13 216:3,8,9 218:7,10,18,21 219:8 220:6,10 227:21 231:1 233:14 234:2 236:15 238:22 239:12 242:11 243:9,11,16,21 249:15,17 251:7 251:18 253:18,19 254:15 257:5 258:11 259:15,16 264:5 267:22 268:14,18 271:3 271:14 273:22 277:6 279:2,7 280:11,17 282:14 283:22 285:12 288:15 289:6 292:1 293:12 294:1 meaning 128:21 means 17:5 21:15 21:21 63:9 68:2 68:15 111:11,16 134:18 135:6 141:17 144:6 170:21 209:15 239:4 meant 41:6 212:17 243:1 294:13 measure 226:16 measurement 109:12,14 measurements</p>	<p>158:9 190:3 mechanical 241:5 mechanics 260:7 Mediation 5:1 mediator 5:14 18:17 mediators 11:3 medium 253:12 meet 38:21 118:22 120:8 157:16 172:17 197:19 198:14 231:8 233:13 236:9 275:21 279:1 288:9 meeting 1:1 2:1 4:4 10:22 19:5,6 23:2 25:7 29:13 34:1 35:9,10,11 38:14 38:21 39:15 42:11 42:21 49:14,14 59:9 75:17 84:15 89:17 94:15 96:16 97:16 100:19 104:9,10 116:10 157:4 215:14 227:20 229:6 260:15 262:19 270:14,21 286:13 289:15 291:18 294:20 295:1,7 297:13 299:1 meetings 5:7 11:8 11:11,17 18:22 19:8,9 22:10 34:6 35:21 50:21 78:5 87:18 97:13,18 98:4 112:5,17 270:16 275:15,15 293:11 meets 31:1 71:15 Meg 3:2 7:3 72:6 88:6 222:6 253:3 member 9:9 12:21 19:20 25:10 27:11 34:3 35:20 37:21 38:7,14 40:2,8,9 42:12 62:12 63:8 72:21 members 9:18 11:22 18:9 25:6,6 30:2 40:6 41:8 42:1 43:10,12,20 49:19 50:14 51:16 74:14,15 75:7,7 76:2,5,6,8 78:1</p>	<p>81:10,16,22 82:1 298:4 Memorial 84:21 86:9 memorialize 65:1 74:12 memory 149:4 mention 15:1 255:19 mentioned 5:16 20:22 24:8 33:5 75:1 97:14 111:1 127:2 153:20 186:16 266:5 mentioning 211:21 met 232:21 metal 293:20 metals 194:18 metering 150:10 method 24:3 117:13 203:11 233:3 234:8,20,20 244:21 247:1,22 248:5 287:20 methods 23:22 123:6 147:18 189:5 243:2 244:20 245:2 275:16 metric 102:10,22 metrics 101:6,8 metro 89:19 Mexico 86:4 Meyers 7:13 MIAs 10:1 Michael 85:10,10 88:2 micro-channel 192:5,9,10,18,22 193:13 194:4 195:17 198:8 200:16 micro-channels 192:11 193:6,8,20 193:22 194:9 197:5 199:4,17 mid 26:14 mid-June 4:8 mid-week 286:13 middle 116:14 135:3 225:2 midpoint 218:3 midst 32:14 might've 144:2 migrating 133:2 mike 7:7 37:13 40:8</p>	<p>58:11 79:4 84:13 106:19 217:2,5,6 219:15 259:6 282:20 294:15,18 294:22 295:4 298:14 mikes 206:8 Mislak 7:10,10 81:8,13,19 82:4 93:6 131:16,22 132:4 mind 6:13 13:6,12 20:9,17 43:2 56:19 63:12 80:22 87:17 88:20 98:14 112:13 139:4 141:12 158:17 163:22 186:18 229:4 249:9 294:4 minds 73:19 106:3 minimum 20:11 112:20 119:14,22 147:7 166:20 260:16 minimums 119:15 minor 188:7 minus 205:21 219:17,21 minute 56:19 182:3 293:15 minutes 24:17 47:11 66:15 156:13 224:22 225:1 228:15 Misiak 2:16 missed 35:11 79:5 190:22 missing 82:11 mission 271:11 mistake 44:16 180:5 mistaken 56:12 106:4 Mitsubishi 2:11 8:6 39:3 47:19 53:21 235:15 mix 130:18 131:21 141:4 144:19 mixture 140:21 183:1 mode 238:5,17 241:4,8 242:20 281:6,7 282:15,18 model 116:19,20 119:21 120:2,20 129:11 130:22 131:8 133:4,9</p>
--	---	--	---	---

134:15 135:20 138:6 140:11 168:21 169:1 172:18 183:13 186:16,22 187:5 203:20 204:15 217:22 220:10 224:10,14 229:12 245:14 248:9,14 248:16 263:10 268:20 272:7 293:9	money 182:16,21 monopolizes 41:15 Montello 9:1,1 monthly 255:1,16 months 22:20 morning 4:9 5:13 20:2 26:3 79:20 235:5 240:13 296:19 mornings 241:17 motor 127:11 128:11 177:7,9,14 177:20,21 178:2 179:5,10 182:4 185:1,6,19 186:10 motors 127:7 177:2 177:8 move 22:1 36:2 64:20 80:15,18 96:17 106:5,19 126:19 128:18 129:5 140:18 157:21 163:1 165:4 169:16,22 170:17 177:8,13 187:17 190:5 192:2 218:20 221:1 224:19 225:7 277:12 291:14,16 movement 113:2 moving 20:22 40:5 41:22 49:6 112:19 128:5,19 139:21 143:19 150:13 157:8 169:19 170:18 191:9 201:11 237:18 multi-regulated 197:2 multiple 103:18 117:11,20 118:4 133:10 188:19 204:6,7 276:14 multiples 41:5	Natural 3:2 7:3 naturally 62:21 nature 12:19 148:19 Navigant 2:7,8 8:13 8:16 97:8,10 111:22 114:15 132:16,18 156:20 168:12 184:19 186:12,14 Navigant's 140:17 NDA's 21:15 near 291:3 nearest 102:4 necessarily 77:15 78:17 110:17 112:21 130:16 162:21 166:18 167:2 180:13 196:14 224:18 251:19 259:4 265:4 284:3,19 necessary 21:21 30:4 38:6,13 68:13 94:1 111:18 141:1 165:2 257:1 NEEA 158:15 178:7 210:4 233:7 need 4:17 17:3 19:10 20:7 22:12 23:10 24:10 32:6 36:3 39:9 41:10 49:14 50:10 58:6 59:8,11,12 67:14 74:2 77:15 82:22 90:13 91:19 98:17 99:15 104:2 106:4 106:4,7,9 110:15 110:18 111:12 112:12 113:10 121:16 128:1 129:21 137:1 140:20 158:2,22 164:21 166:3 167:15 168:14 169:8 173:21 175:16,16 176:3 177:1 178:14 184:19 185:10 188:4,5 193:14 202:19 205:1 211:15 214:5 215:17 267:4 268:9 269:13,15 270:9 272:4 288:10 290:6,11	290:12 needed 74:8 165:22 184:13 195:9 227:8 230:12 245:13 293:14 needing 74:11 needs 20:9 31:3 167:14 182:15 185:16 195:15 226:13,20,22 268:12 negative 17:12 67:18,21 68:4 negatively 67:20,21 69:2,19 negotiate 13:10 100:9 102:2,4 202:22 272:11 291:8 negotiated 14:20 15:4 16:9 22:19 60:11 101:13,14 102:7 negotiating 19:6 21:7 22:8 negotiation 11:4 13:19 20:5 22:22 24:11 43:7 101:8 295:15 negotiations 12:1 21:5 210:1 negs 62:7 nests 254:3 neutrals 17:21 never 24:5 120:2 259:9 new 66:3 105:7 147:9 167:14 172:15,17,21 178:12 180:2 196:17 201:8 203:3 237:3 248:11 255:22 256:6 257:17 266:7 267:12 276:21 newer 179:5 195:18 nice 48:15 100:14 238:8 nicely 176:8 Nicholas 2:16 Nick 7:10 81:13 126:12 131:15 night 297:15 nine 92:18 ninth 91:1,6 92:10	92:13,14,16,17 93:15 nitty 72:1 109:19 no's 52:6 56:1,1 61:5,10 77:21 no-economizer 261:7 nobody's 20:4 nodding 40:19 nods 274:15 nominal 206:19 219:21 nominally 182:2 nominated 95:2 nominating 41:1 non-blast 249:3 non-economized 245:17 246:11,22 258:14,20 260:12 261:17 266:20 271:1 non-economizer 261:11 non-gas 220:13 non-linear 215:4 non-working 41:8 nondisclosure 223:7 nonvoting 75:12 nonworking 40:6 noon 90:17,18 NOPA 202:11 NOPR 11:16,19 67:12 68:11 69:10 70:19 71:1,10,11 71:12,16,19 72:10 95:20 96:8,16,18 97:14,17 98:1 107:5 108:3 126:20 127:16,18 141:12 143:22 187:18 203:7 231:9 237:12 248:17 274:11 275:19 NOPR-phase 190:10 191:3,13 210:14 NOPRs 14:4 69:8 71:2 normal 60:8 63:9 normally 42:15 132:8 149:18 North 48:13 79:13 northern 264:12 Northwest 7:5 note 34:15 91:4
	N			
modeled 137:1 222:14 236:19 262:2 modelers 270:6 modeling 199:9 205:1 224:15 227:3,4 228:2,21 229:3 246:20 262:6 268:12 models 107:11 117:12 119:4,15 119:19 120:8 121:9 131:6,8 132:9 133:11 134:3,9 135:9 140:4 157:16 159:12,13 168:17 170:12 187:9,14 193:1,18,19 201:18,21 202:2 204:6,6,7 210:15 215:2 217:10,13 217:14,15,16,21 220:4,6,12,19 222:18,20 223:5,6 223:17,17,18 227:10 235:12 249:3,4,9 254:12 266:19 272:1,18 272:19 moderate 152:4 modest 101:17 modification 293:17 modifications 68:12 modified 270:18 273:5 modulating 143:10 modulation 143:4 moment 6:3 44:12 77:16 85:8 100:6 106:8 214:10,21 moments 15:14 Monday 79:18,21 88:21 89:1 93:3	N 4:1 naivety 169:9 name 5:14 8:19 26:3,5 61:16 97:9 nameplate 127:12 narrow 218:11 Nashville 149:10 nation 230:22 national 3:4 8:10,12 9:11 243:10 246:9			

260:18 noted 162:2 notes 67:6 124:2 141:16 292:16 notice 13:5 22:16 26:20 33:8 69:14 296:13 noticed 66:20 notion 35:3 65:12 notwithstanding 13:10 80:21 nuances 236:18 number 30:13 41:4 49:13 50:8,20 52:11 53:13 55:6 55:16 58:15 77:7 108:3,4 109:10 131:9 132:9 140:4 142:8 149:5 160:11 167:19 183:10 208:22 209:1 218:1 226:14,18,21 227:16 229:21 230:11 232:14,18 233:4 240:11 245:12 250:15 253:1,13 258:8 272:8 numbers 87:21 109:15 121:13 126:1 140:12 142:9 146:6 163:2 163:9 168:20 171:7 180:16 204:3 212:11 220:10 232:16 250:11,12 251:3 252:22 255:4 265:4,17 266:2 270:7 272:11 278:22 297:11	124:16 obviously 14:7 23:14,16 52:17 65:1 68:16 80:16 80:22 94:17 99:4 131:19 228:4 236:17 291:15 occur 45:21 179:15 270:21 occurring 28:11 234:21 odd 13:6 OEMs 170:17 offer 31:9,16 52:13 177:7 200:8 offering 31:9 200:5 200:11 office 6:16 9:2,4,7 26:6 28:6,11 148:17 149:22,22 159:15 168:19 178:15 234:6,8 235:3 264:9 officers 26:7 official 26:5 29:2 46:17 49:14 officially 39:21 44:9 47:15 60:4 officials 26:16 offset 172:1 oftentimes 162:19 oh 59:21 121:4 201:10 okay 4:20 9:13,22 10:1,21,22 12:3 14:12,22 15:22 16:2 20:5 23:4,5 24:14,20 25:22 30:11 32:3 36:17 37:7 38:8 40:5 41:22 42:8,22 47:8 49:3,6 51:14 51:18 53:20 54:7 54:14 58:10,21 59:12 60:6,10 61:21 62:18 63:2 63:13,18,22 64:4 64:5,7,22 65:9,15 65:20 66:18 68:9 70:19 71:4 73:12 74:13 75:19,22 76:7 77:3,4,5,17 77:22 78:4,10 79:6,11 81:12 82:4,10 83:2,8,10 83:16 84:9 85:3	86:15,21 87:1,3 87:19 88:5,18 89:5 90:10 92:17 92:18,21 95:7,14 108:20,21 112:2 115:22 116:11,15 117:7,22 118:21 119:12 122:3,13 124:17,22 126:17 126:18 135:22 137:11 138:16 141:16 142:4,6 143:19 145:17 146:17 148:1 152:12 154:1 155:20 156:11,16 159:6,8 163:19,21 164:15 166:3 185:2 187:15,16 190:4 191:9 194:13 196:17 198:11,13 201:11 209:19 213:12 218:12 219:5,14 220:15,22 222:3 223:11,13 228:5 230:19 235:10 237:5 240:1 249:20 254:19 262:9,13 267:22 269:3 270:5 274:16 285:16,21 286:10 287:18,19 290:9 293:13 297:21 298:18 Oklahoma 246:14 old 24:9 180:2 203:6,21 248:11 older 180:10 once 13:15 38:1 54:12,20 81:20,21 87:11 140:6 143:7 155:19 162:8 170:15 177:17 197:3 208:21 237:3 239:22 278:11 one's 21:4 230:2 276:3 284:12 287:18 295:5 one-by-one 106:16 one-third 250:19 one-year 72:7,12 73:7,13 ones 56:13 60:5 90:15 106:6	119:13 134:9 159:2 204:8 212:6 213:4 252:5 269:3 269:9,11 293:21 open 13:11 105:16 105:21 109:17 125:2 128:1 170:9 170:13 227:21 260:20 opening 12:3 50:4 66:2 openings 170:5 171:4 opens 265:9 operate 144:18 259:21 operated 127:11 236:20 256:10 operating 180:18 225:18 232:7 259:17 268:21 274:19 operation 190:11 232:1 opinion 12:9 44:4,5 119:19 171:16 291:5 opinions 28:16 opportunistically 174:9 opportunity 26:21 28:15 199:6 296:20 opposed 84:20 86:8 115:12 159:21 160:19 164:7 230:17 231:12 264:22 283:18 opposite 182:17 opt 13:20 optimally 260:22 optimistic 107:6 108:8 optimize 197:3,17 optimized 121:7 167:2 197:21 option 23:19 45:6 114:2 149:21 199:21,22 244:16 261:3 262:3 options 92:8 139:22 210:1 249:6 291:11 order 53:2 99:16 107:16 108:5 127:14 128:12	129:22 153:14 158:22 161:17 165:17 172:10 177:2 178:12,13 180:22 181:8 190:18,20 196:3 198:14 201:21 225:14 227:16 241:21 243:12 244:1,5 282:14 291:13 ordering 180:21 orderly 16:17 orders 140:18 221:22 Oregon 241:13 organization 35:7 organizations 28:4 35:16 oriented 26:21 28:8 original 181:18 210:12 originally 210:7 ought 139:6 187:16 219:20 outcome 101:8,14 146:19 244:2 268:7 outcomes 210:3 outdoor 192:7,11 197:8 247:11,12 outer 102:5 outgrowth 71:19 103:4 outlier 56:5,6 outline 25:19 outlined 78:10 outlines 80:14 output 234:17 235:8 238:3 242:1 244:14,17 257:22 258:1 outside 40:12 62:2,8 75:2 102:5 238:9 239:5 294:6 outsiders 41:8 oven 195:6 ovens 201:1 over-the-phone 39:7 overall 184:14 263:7 272:2,13 289:5 overcome 160:6 169:9 177:2 186:20
O				
o 4:1 233:4 objections 92:18 objective 270:16 obligated 17:21 obligation 17:20 202:20 obligations 202:21 observation 52:20 64:15 observe 139:2 observer 22:18 obtain 127:4 174:4 obtained 112:10				

overestimate 119:4	78:5 83:1 118:2	paths 103:18	232:12 238:2	144:22 175:22
overestimated	123:1 127:9,17	123:18 125:10	243:12 244:1	176:2,4,7 215:15
178:11	131:1 140:17	155:6 156:4	245:11,13 247:9	215:21 226:11
overestimating	144:1 175:7	276:15 278:2,4,7	248:5 250:5,7,13	persuaded 56:19
289:11	179:16 180:21	Paul 2:11 8:6 39:3	250:15,16 252:11	persuasive 55:14
overestimation	181:21 185:2	47:19 49:8 53:20	252:14,15,18,21	pertains 72:3
227:7	191:17 195:22	53:21 82:19	253:9,10,12,13,16	Pete 6:17
overlap 95:3	198:5 201:14,14	105:10 109:22	259:16,16,20	PG&E 7:19 8:2
overlay 121:16	228:21 232:12	162:1 165:18	263:17 264:5,6,7	9:12
overlooking 297:4	233:1,5 244:3	179:12 199:14	264:22 272:9,17	phase 126:20
overnight 221:8	257:5 263:2	235:15 243:14	280:12 281:15	127:16,18 191:17
oversize 178:18	partial 287:3,5	262:18 287:1	282:3,19,19 289:8	202:11
182:19,22 185:6	participant 51:2	289:19	percent/30 145:9	PHCC 57:4
oversized 182:4	participants 18:6	pause 22:13 71:7	percentage 78:14	phenomenon 255:2
185:1,19	64:2	peak 122:1	145:6 147:21	philosophy 200:16
overtime 85:7	participate 89:8	penetrating 149:6	153:18 154:13	phone 41:19 43:12
overview 11:1,4	227:2	penetration 266:3,9	155:14 161:19	93:5 145:7 158:17
20:6	participated 34:22	people 9:14 12:13	163:15 164:7	203:9 245:8,9,16
Owned 7:18	97:18	17:2 26:15,20	167:13,17 185:8	250:13 297:8
owner 150:7	participating 25:8	35:4 36:10 43:9	253:6 266:20,21	physics 198:18
ownership 150:9,10	62:15 65:13	44:15,20 49:13	278:20	pick 123:8
	262:21	50:8,20 51:22	percentage-wise	picking 209:16
	participation 40:5	52:9 58:14 65:16	160:2	239:5
P	participatory 19:20	66:6 74:8 75:2,21	percentages 153:21	pictorial 18:16
P 4:1	particular 26:11	76:9 77:10 84:2	154:9 155:19	piece 180:1 219:6
p.m. 156:15 228:18	28:9 29:20 78:20	96:14,15 97:19	277:5 279:22	242:18 252:10
299:2	99:2 102:1 103:9	112:4 116:3	percolating 157:2	pieces 187:6
Pacific 2:6	109:13 144:4	117:11 118:15	perfect 25:22 249:8	piggybacking
package 1:3 158:3,4	150:21 193:19	120:22 126:15,22	perfectly 58:5	210:20
packet 286:8	197:16 203:16	134:15 135:5	248:15,21 272:19	place 13:19 21:17
packing 251:15	211:9 215:5	138:2 142:5 178:5	perform 289:11	33:19 39:5 48:15
page 32:16 67:15	216:10 242:18	180:4 193:4	performance 99:15	166:2 181:14
143:20 192:2	248:6 268:22	250:13 251:19	162:22 183:7	241:2 257:3 282:5
paid 5:3	293:7	255:19 282:11,21	184:19 191:20	placeholder 87:16
pairs 17:11	particularly 73:8	291:8 292:10	192:21 226:16	places 170:6 206:10
Palm 247:17	99:14 108:14	293:15 294:2	235:20 288:22	plan 111:17 277:10
Pam 9:1	117:19 119:7	297:8	289:2	277:21
panacea 196:4	264:8	people's 73:18	performed 231:8	planned 95:8
paper 251:6 260:7	parties 15:5 31:2	291:4	performing 182:13	276:11
parachute 35:13	parts 30:15 84:18	percent 19:17 21:3	182:15	planning 156:4
parameter 188:12	176:12 260:4,5	42:2 49:16 50:7,8	period 42:12 70:3	168:11
234:7	party 67:18 69:1,18	50:10 51:12 56:3	72:7	plans 86:10
parameters 100:8	pascals 187:7	56:4 61:20,21	permanently	platform 206:10
158:10 162:4,9	pass 40:8 277:12	121:14 133:3	104:20	play 55:7 109:12
169:11,16 188:15	297:12	144:17 145:9,9,10	permits 11:14	138:22
188:17 235:4	passed 21:2 27:18	150:13,14,16	person 31:19 34:5	playing 162:14
parent 12:20 27:5,7	67:10	151:4,4,18,19,21	88:13 221:7	plays 135:19
27:12 28:15 43:19	passions 16:18	152:4,12,15,18	275:21	Plaza 94:16
55:21 56:2	path 52:13 110:1	154:5 155:9,9	personal 29:3	pleasant 21:9
parking 17:5	125:8 144:3,6,8	160:5,9 167:11,18	personally 34:7,7	please 8:18 24:1
164:13 284:6,9,20	165:11 177:4,13	167:18 175:9,10	54:17 80:20 87:12	170:15 206:8
290:10 292:14	193:2 220:9 262:4	175:10,12 203:19	163:19	pleased 14:19 15:16
294:4,9	268:11 269:17	204:4 205:13,21	perspective 28:5	pleasure 16:12
parse 255:16	271:14 273:2	207:17 211:22	53:4 54:16 66:22	298:21
part 11:16,22 17:6	278:8,9 280:19	219:17 225:21	71:10 127:22	plod 287:13
18:8 23:21 24:4	284:5	229:19 230:10	128:17 141:17	plot 223:10
27:4,19 33:6				
41:17 67:13 75:21				

<p>plug 216:12 plugged 36:1 39:2 plugging 191:18 plus 205:21 219:17 219:20 PNL 159:12 187:5 187:14 266:19 272:19 podium 14:14 97:5 point 6:1 12:18 14:1 14:2,12 21:10,17 21:19 27:14,16 31:12 34:1 36:9 43:17 46:14 52:15 65:2 66:9 71:9 74:3 82:16 90:5 90:14 92:22 94:5 95:10,12 96:18 97:3 98:18 100:5 104:17 105:11 106:2 110:11 114:21 121:1 123:16 132:13 136:9 147:5 158:14 163:15 165:10,11,12,14 170:5 172:15 184:10 188:10 189:10 191:2 193:18 197:3 203:7 208:7,11 213:3 215:19 216:10 218:8 221:2 223:15 239:22 242:9 278:11 280:17 289:12 292:19 293:13 295:12,13 298:3 pointed 108:2 pointing 157:12 points 66:19 167:10 188:17,20,22 189:8,19 191:20 199:2 212:13 239:20 260:21 policies 26:18 policy 46:21,22 244:2 291:7 poll 80:13 85:8 populate 209:22 population 115:11 115:12 185:9,14 portion 34:11 37:18 95:13,21,22 129:9 147:15 173:11</p>	<p>196:6 216:22 242:5 269:20 279:18,19 portioning 140:7 Portland 240:11 241:2 pose 175:17 196:13 position 31:4 50:4 52:16 54:9 69:20 171:10 263:19 positioning 169:13 positive 210:2 possibility 124:5 possible 81:10 83:12 105:6 142:2 157:4 159:1 162:18 163:4 175:4 182:13 208:12 212:11 228:4 243:3 256:7 256:19 273:5 possibly 23:8 45:21 81:9 174:3,21 176:5 177:1 post 74:6 243:18 249:7 258:6,15 261:5,6 269:14 post-process 244:17 post-processing 243:17 287:20 posted 239:21 potential 27:20 28:7 45:10 51:7 99:22 101:8 158:2,10 164:20 178:1 197:12 226:15 potentially 93:13 124:9 144:15 151:11 153:10 158:8 186:3,9 193:16 215:9 234:20 244:21 293:3 power 109:10 115:20,20 125:14 126:20 127:6,15 128:6,8,12 186:11 186:13 190:18 210:9 237:13,19 239:1 273:19 274:4 powers 168:12,13 practice 148:6 preamble 67:22 68:13 69:5 70:2 precise 203:17</p>	<p>preclude 46:11 precluded 105:14 prefer 85:12 86:7 preferable 55:17 preference 44:9 66:12 preferred 58:9 premium 167:1 prepared 98:21 prescriptive 102:12 102:15 present 18:19 19:2 39:6 47:4 49:20 270:17 276:9 presentation 25:19 28:13 116:6 126:14,16 128:14 128:14 276:13 presented 13:18 98:1 244:15 245:16 246:21 249:6 254:16 279:1 presenting 273:17 presents 258:22 pressure 56:3 158:10,19 159:9 159:10,18 160:1,3 160:5,11 161:10 161:11,18,19,20 163:14,22 168:9 168:15,21 173:18 178:13 180:16 181:11,15 183:15 184:20 185:11 186:11,13 187:1 190:3,8,12,20 191:12 226:19 227:14 275:6 284:18 285:2,12 293:22 pressures 160:9 161:9 162:3 168:13 169:2 178:12 179:21 212:8 273:20 presumably 139:5 presume 292:5 presumption 36:14 pretty 12:7 16:16 66:2,21 81:21 99:8 102:7 109:17 118:5 119:17 137:19 166:13 205:16 235:6 237:16 241:11</p>	<p>250:18 282:16 292:15,17,22 293:21 prevailing 212:20 prevalent 256:9 Prevention 9:2 previous 34:22 49:7 64:8 72:14 111:21 246:22 previously 22:11 51:19 67:19 69:1 69:19 228:2 264:3 price 134:20 pricing 293:21 primary 34:5,13 40:2 276:7,10 principal 267:9 prioritize 289:20 291:16 priority 289:3,13 privately 101:13 probably 6:1 10:13 18:9 22:11 25:18 31:10 50:17 55:7 55:16 56:15 66:21 77:14 81:1 97:20 103:21 117:3,10 119:17 120:20 123:11,11 129:17 134:16,19 136:2 137:19 146:19 147:9 154:22 155:1 159:8,16 163:21 165:15 178:13 179:3,6,10 182:1 198:2 199:16 206:18 207:15 220:9 228:3 235:2 236:7 238:11 239:5 243:12 248:9 249:20 256:15 257:9,16 267:21 267:22 268:1 271:14 274:7 276:1 279:18 282:7 284:7 287:16 289:6,7 292:8 problem 31:5 40:21 50:19,22 51:5 79:6 80:3 85:17 110:12 134:1,6 151:22 160:16 189:7 196:6,15 197:2 239:14</p>	<p>258:22 268:1 286:15 problems 62:20 194:17 257:13 265:9 procedures 159:21 186:18 proceed 183:5 proceeding 24:4 proceedings 13:12 39:2 process 4:11 5:18 5:19,21 10:4 11:4 12:6,9,11 13:14 15:5 17:15,17,21 18:6 20:5 26:10 26:17 27:19 29:8 29:11 30:6,10,16 32:11,19 33:1,2 36:1,9 40:7,11,17 40:22 41:1,17 56:6 60:11 65:2 67:4,9 69:9 70:6 72:9,11 81:21 102:16 157:1 180:14,21 213:21 243:18 261:7 274:4 process-type 298:1 processing 249:8 258:6,15 261:5,14 269:14 produce 121:5 199:19 200:13 produced 120:1,2 product 28:14 73:1 109:6 112:10 127:4,13 128:9 129:15 131:5,14 131:14,17 146:11 147:13 172:17 173:10 177:16 189:11,18 196:21 206:4 222:20 227:17 production 123:13 129:21 195:7 198:2 224:1 productive 237:3 products 13:7,9 22:7 23:14 123:3 123:12 179:8 199:20 profile 116:21 118:7 120:18 121:8 122:8 210:9</p>
--	---	---	---	--

profiles 107:9,12 109:1 113:14 116:9 120:6 125:21 126:5 249:11 program 6:9 94:11 programming 260:21 progress 104:3 progression 166:9 Project 2:9,10 10:20 projected 99:9 promise 284:4 promulgate 15:15 promulgating 15:10 proper 153:14 properly 61:3 144:18 206:14 279:22 proportion 184:12 proposal 47:12 55:19 72:17 96:9 159:11 261:20 265:9 275:12 284:18 286:4 proposals 13:7 propose 32:10 291:1 proposed 13:5 31:4 33:9 67:22 68:12 69:4 96:4 198:15 244:12 proposing 245:2 261:19,21 262:1 proposition 201:9 prospective 28:19 protecting 254:11 protocols 19:7 prototypes 159:14 187:11 267:2,16 provide 17:22 21:12 21:14,21 26:7 31:21 74:9 89:18 110:16,18 111:18 131:4 140:9 168:12 184:19 211:19 224:11 227:20 273:19 274:3 279:13 280:3,5 284:7 289:16 provided 22:1 71:15 97:16 109:3 116:8 124:14 126:4,5,7 128:15 provides 283:17	providing 158:9 183:6 254:7 275:13 provisions 105:4 proxies 46:17,20 47:16 proxy 38:22 42:10 42:14,17,20 43:1 43:11 44:10 46:8 46:21,22 47:21 48:6,10,21 63:2 63:12 83:3,4 pseudo 6:3 PTAX 57:3,6,13 public 1:1 14:6 19:2 25:9,11 40:9 62:10,10 68:10,17 68:17,19 97:16 295:7 298:8,9,9 publication 22:16 70:10,13,17 97:17 published 95:20,22 97:15 188:14 pull 182:2 221:8 pulled 217:16 pulley 178:2 pulling 238:11 242:7 pump 127:10 pumps 1:4 43:7 53:8,18 56:21 192:10 pure 218:7 purpose 10:22 246:18 push 85:18 158:3 179:2 213:12 put 55:8 80:12 87:16 90:1 94:7 94:17 96:5,7 100:12 103:13 105:21 133:13 134:21 152:21 165:16 167:15 176:21 178:22 180:6 192:16 198:9 209:19 210:1 216:13 223:10 239:2 244:12 258:6 281:3,7 289:18 294:6 297:3,14,22 298:2 puts 114:15 putting 17:4 195:22 251:20 281:2	282:13 283:10 <hr/> Q <hr/> qualitative 133:12 quality 140:8 quantifiable 275:18 quantitative 289:16 quantities 224:1 quarter 186:17 207:1 query 154:7 question 22:13 32:5 32:9 33:14 36:8 36:14 70:7 72:7 80:4 81:5,15 83:5 84:12 90:12 98:14 100:11 101:2,20 104:18 105:1 106:20 107:18 109:11 115:14,15 115:19 119:10,14 120:19 123:20 124:7 129:11 130:1,3 133:8 138:20 139:8 140:11 142:15 149:3 150:12,14 153:22 154:4 157:19 164:16 175:17 176:1,20 183:21 189:14 193:7 196:13 197:10 202:4 208:13 213:9 214:2 216:2,17 218:21 230:8 238:4 246:15 249:21 251:5 263:6 270:5 274:17 278:1 281:20 294:19 questions 5:20 25:12 30:9 31:7 72:5 85:10 100:4 100:16 103:11 104:5 157:1 189:13 190:21 205:6,8 quick 22:21 40:6 66:10 81:21 102:7 193:7 272:6,14 278:1 quickest 64:16 quickly 5:1 14:16 16:1 80:5 100:22 106:16 212:11 228:3 295:14	quietly 166:13 quite 14:21 32:4 99:5 129:3 160:22 174:3 196:12 203:6 205:2 208:7 208:10 241:12 quorum 13:15 16:14 25:12 41:22 42:2 49:6,8,11,13 51:5,22 59:8 60:13 63:21,22 64:1 78:2,18 92:10 quotes 55:8 <hr/> R <hr/> R 4:1 raise 31:8,8 61:5 73:13 77:18 223:14 raised 30:18 45:1 187:18 295:17 raises 99:5 raising 114:16 269:21 Ramirez 6:2 randomized 191:15 range 113:9,9 114:22 115:1 116:14 120:11 125:11 130:21 191:14 205:16 217:14 260:22 279:21 280:1 ranged 260:20 ranking 289:16 rate 21:3 175:2 248:18 249:20 251:6,9 252:19 253:6,16 258:8 260:16 266:9 270:1 272:18 rated 107:7 108:9 168:13 rates 253:9 259:10 260:19 261:1 rating 108:12 112:15 123:6 ratings 107:8,19,21 108:15 112:9 ratio 195:5 197:15 201:5 re-look 181:4 re-optimize 169:20 reach 16:5 31:6,19 32:13 92:10 111:5 195:16 267:8	288:4 reached 33:7 102:14 118:20 reacted 126:2 reactions 126:1 read 41:19 43:21 67:16 96:2 217:8 275:9 294:20 reading 48:6 72:14 212:21 readout 87:14 real 12:12 13:19 112:9,9 118:21 127:3 214:2 293:11 real-world 161:13 realistic 127:1 161:8 162:9,17 236:21 273:7 realistically 178:8 reality 107:6 233:14 236:3 251:18 274:13 realize 198:9 really 5:18 13:22 16:4 20:20 24:14 24:15 26:19 31:3 31:3 32:10 47:21 51:3 66:4 72:22 80:12 85:9,17 96:20 97:6 100:1 109:12 116:3 118:12 124:22 135:6,16 136:11 136:16,18 149:13 152:20,22 154:9 159:7 160:20 161:18 162:15 163:16 164:3 169:8 201:20 202:19 203:2 206:18 215:17 221:15 223:2 225:7 231:13,14 234:1 239:13 244:1 246:4,5 248:8 249:7 262:21 265:3,15 267:6 279:5,10 285:5 287:8 293:2 295:5,6 reason 18:13 20:19 21:4 31:21 50:2 109:8 148:10 189:19 200:7,8,9 202:2 203:14
--	---	--	---	---

225:7 271:22 289:10 reasonable 132:14 192:16 205:20 212:6 251:9 252:11 266:16 270:7 290:5 reasonably 266:10 reasoning 210:11 reasons 121:2,9 143:13 200:10 265:16 284:3 Recalling 56:17 receive 68:17 received 144:22 280:20 281:12 recognize 45:8 62:22 103:6 recognizing 102:11 172:19 recollection 108:11 recommend 35:1 208:4 recommendation 14:3 153:11 recommendations 13:3 27:13,17 recommended 69:3 record 10:18 14:6,6 20:3 32:19 43:22 43:22 48:7,13 56:15 67:7,17 recorded 34:16 records 14:9 recuse 20:16 red 97:1 290:20 redesign 172:16 196:20,22 199:1,2 redesigned 164:21 reduce 174:2 246:2 247:15 271:4 reduced 274:18 reduces 275:7 reducing 143:22 225:14 229:21 reduction 190:17,19 230:11,11 248:5 255:7 264:6 266:15 refer 171:7 referenced 24:21 referred 269:14 referring 111:20 164:9 refinements 156:7 reflect 232:22	265:22 274:10 280:1 reflected 232:4 276:21 refresh 229:3 refrigerant 188:20 188:22 189:8,19 226:15 refrigerate 188:17 refrigeration 2:17 2:19 7:11 53:9 reg 62:7 regarding 26:8 143:15 168:9 regardless 74:10 regards 246:1 region 245:20 246:12,14 267:8 regional 56:10 57:10 245:19 regionalization 136:5 regions 215:5 246:13 267:5 regulated 15:6 regulations 26:18 regulatory 71:10 95:16 rehearse 97:6 reheat 235:3 related 101:20,21 121:18 161:21 251:12 relates 100:10 191:11 relation 244:13 relationship 99:18 161:12 200:21 201:20 207:8 relative 134:11 159:9 171:10 247:9 263:19 275:19 285:8 288:21 289:2 relatively 101:17 232:9 relevant 68:11 reliable 205:16 rely 75:5 277:4 relying 118:18 remain 165:3 remaining 37:20 remarks 12:3 remember 32:8 52:11 174:9 194:21 210:7	279:19 283:22 remembering 147:20 281:11 remind 255:19 remote 64:1 removed 98:17 288:20 repair 260:8,8 repaired 259:9,12 259:18 repairing 259:11 repeat 128:14 replace 174:14 197:13,13 258:14 258:16 261:18 262:11 replacement 158:5 165:14 167:11 184:18 195:22 197:20 replacements 168:6 replacing 92:15,16 144:11 174:10,11 180:9 278:14 replicate 236:3 report 55:20,21 56:14 74:20 75:13 132:5 156:9 179:19 288:6 reporting 118:15 represent 29:6 105:19 116:16 127:10 266:10 279:20 representative 6:11 28:10 113:17,17 114:20 115:13,16 115:17 116:4,7,12 119:6 121:18 122:9,10,15,19,20 124:20 125:21 129:17 133:6 134:19 135:3 162:18,21 163:3 212:6 representatives 4:16 18:21 27:9 27:21 29:5 represented 27:2 279:22 representing 7:18 8:2 28:3 34:21 115:12 represents 115:11 202:19 request 239:18	240:4 require 167:10 168:4,7 184:7 198:20 280:9,13 required 23:1 105:13 158:12 166:6 185:3 227:6 270:22 283:21 requirement 39:1 105:5 requirements 24:8 71:15 152:21 260:16 requiremnts 127:8 requires 151:14 264:20 research 30:4 186:3 273:4 reserve 298:8 reserving 45:20 residential 57:17 101:6,12 resign 51:8 65:14 65:19 resolution 9:2 16:5 37:1 resolve 13:18 129:4 205:7 244:22 resolved 5:11 98:6 98:10 129:3 205:8 229:7 230:3 285:2 293:4 resolving 188:1 Resources 3:2 7:4 respect 197:5 respond 222:12 response 68:10 88:17 92:20 96:16 105:2 106:21 128:4 157:22 192:3 202:6 226:1 280:20 responsibilities 26:8 26:12 31:18 32:21 responsibility 19:16 rest 11:8 73:15 161:9 273:10 restrict 73:5 restrooms 10:8 result 124:18 125:1 156:2 183:11 232:11 233:3 293:18 resulting 230:17 results 32:19 78:9 107:4,8,19,22	108:8,12,15 156:10 161:14 162:17 176:9 188:9,18,20 191:15 215:16 221:15 225:21 230:10 268:14 270:17 273:1 275:13 276:9,10 289:14 retail 233:9,11,17 234:9 retailer 148:18 retails 234:10 retrofit 163:8 return 138:7 169:12 169:14,22 170:5 170:19 187:3 reverse 233:20 reversed 210:21 211:2 review 108:5 228:2 268:10 revise 240:16 revised 109:16 123:16 239:19 273:2,19 275:13 revising 230:7 revision 107:7 112:7 129:1 142:3 144:2 157:15 233:3 revisions 97:22 98:2 270:19 275:12 276:11 revisit 145:2 reweighting 266:4 Rheem 2:15 7:12 122:22 RIF 95:19 right 4:16,17 6:7 9:22 10:7 22:6 25:17 35:12 36:16 38:1,2,17,20 39:9 41:16 43:1 44:13 45:17,22 47:6,11 47:15 48:2,7 50:10 51:17 54:10 56:1 58:16,20 59:22 61:2,11,19 63:13 65:5,8 66:6 70:21 71:13,20 72:13 78:4,16 81:18 83:10 84:17 85:2 87:9,13 89:19 93:18 99:8
---	--	---	---	---

101:4 102:18	right-hand 105:12	283:13 284:17	232:11,12 233:13	saw 117:10 130:20
103:4 106:9 107:1	rightful 188:1	285:7,11,17,20,22	234:12 238:11	217:21 269:12
110:19 111:22	rigid 204:14	286:18 287:6	282:19 283:4	saying 31:14,16
114:9,22 115:10	riser 171:22	290:13,17,20	285:12	36:15 39:1 45:9
115:16 116:13,20	risk 44:18	293:7 294:3	rush 61:4	46:20,20,21 47:3
117:1,17 118:8,19	RM 135:14	Rosenstock 2:20 9:8	Rusty 3:1 7:1 73:19	47:20 56:7 62:12
119:15,17 122:5	road 24:3 104:20	9:8 22:14,14 23:4	73:20 86:3 104:12	68:18,21 89:7
126:12 129:5,10	258:12	296:18	112:11 114:21	90:21 91:11
130:4,13 131:12	Robert 3:3	roughly 215:11	117:14 120:14	102:17 111:7
131:15 136:17,19	role 5:21 10:3 25:4	217:3 248:5	122:13 170:18	114:1 117:6 120:5
137:20 142:10	25:8 27:10 32:22	round 104:22 192:5	188:3 189:4	131:10 135:15
145:16 147:3,4	33:15,16 55:7	192:17,21 195:13	206:11 208:15	137:11,22 146:10
148:14 151:1,7	roles 26:11	199:4	226:10	150:15 152:5
152:13 153:3	roof 134:22 149:16	rounds 104:16	Rusty's 115:7	154:20 155:2
155:5,6 156:3,4,6	165:15 172:9	route 178:20	121:16	182:10 196:14
157:7 161:13,17	rooftop 23:15 148:8	row 98:14 126:19	<hr/> S <hr/>	198:15 202:4
162:20 166:22	180:6 251:13	rule 5:8 11:3 15:6,8	S 4:1	204:19 206:11
167:4,15,20 168:4	room 1:8 6:6,8,12	15:8,10,16,17	Sachs 2:21 7:8,8	230:9 232:19
170:6,10 172:18	10:10 12:16 13:11	18:2 23:14 33:9	37:19,19 41:3,3	233:10 241:7
173:6,13,17,20	20:13,18 21:10	47:12 64:12 65:11	62:13,13,19 98:13	242:21 254:6
175:5,15 176:1	22:5 39:10 40:4	65:21 68:19 69:10	98:13 99:3,3	256:21 269:17
177:15 178:3	52:21 81:3 83:21	70:4,20 71:3,14	102:9,9,19 103:2	272:13 283:1,12
179:19 180:11,15	85:21 86:16 87:2	71:17 72:11 95:22	103:14 139:15,15	285:10 290:3
182:13,17,21	89:3,10 91:1	173:14	140:5 142:15	291:14
183:15,16,17	96:14,15 97:19	rulemaking 5:17	143:6,14 149:2,13	sayings 291:11
184:15,17 185:7	111:1 165:7 181:9	12:17 13:5 14:20	169:7 170:15	says 15:21 16:10,22
185:10,15 186:5	215:18 242:10	15:4 16:9 20:15	171:2,8,20 172:6	69:12 74:17 91:18
187:10 189:22	rooms 90:12	23:9 27:6 29:7	safe 254:7	105:12,13 106:17
199:20 207:9,14	Rosenquist 3:8 8:9	33:1 60:11 70:4	safety 178:22	110:1,2,5,6 142:4
208:6,9 209:10,22	114:7,7 123:14	70:17 95:19	sale 157:17	152:16 189:21
210:1,3 211:14	145:7,13,16,18,22	104:22 202:21	sales 118:13 119:20	242:1 253:15
212:22 215:14,18	146:5,16 147:1	rulemakings 12:8	121:12,14,16,17	293:12
218:8 220:13,18	148:2 154:10,18	14:7 22:19 127:10	121:18,22 122:2,8	scale 192:19 205:13
221:10 222:18	155:5 156:3 168:8	rules 11:5,6 14:5,9	130:16 131:4,10	205:14,19 209:9
223:13 224:7	168:22 169:6	16:14 19:7 25:1	173:11 265:17	209:10 219:7
225:4 227:16	176:6 184:16	25:20 26:13,18,19	266:2 294:11	scaled 265:21
233:19 236:6,8,18	185:5 186:5	26:19 27:2,20	Sammy 6:21	scales 205:15
238:7,13 239:10	228:20 229:1	28:1,21,22 30:10	sample 220:1	scaling 191:7
239:13 242:2,6,12	230:13 231:1	31:18 33:10,14	243:10 265:8	205:13 267:19
242:13,19,20	234:5,17 236:5	41:10 52:12 53:8	267:10 271:1,1	scanner 98:22
243:22 244:22	237:5 238:14	54:10 64:7,8	273:6	scatter 223:10
245:18 248:10	239:10,15 240:1,6	66:19 68:7 71:2	sampling 267:3	scenarios 48:3
253:13,20 257:18	240:8,16 241:22	72:14 73:17 74:11	San 7:19	schedule 4:7 11:8
258:12 259:1,9,16	242:11,17 244:9	74:12 102:22	sanction 44:10,18	11:11 19:10 24:15
263:22 264:1,3,8	245:15 250:4,9,21	104:8 227:13,18	44:19	45:2 78:5 80:21
264:17,18 268:21	255:10 258:11	287:18 298:1	satisfaction 111:4	84:20 85:18 90:14
269:15,17,22	259:15 260:6,15	ruling 295:11	satisfactory 271:19	95:8
270:17 271:7,11	261:13,22 262:12	run 44:19 98:7	satisfy 247:10	scheduled 92:6
273:14 276:3	262:14 263:1	100:21 106:13	save 182:16,21	scheduling 11:13
279:5,9 281:11	264:1,18 265:6	150:4 152:7,8,10	263:21	34:11 66:11
283:1 284:2,12	267:8 268:16,22	160:10 198:1	savings 99:17 105:5	scope 103:5 294:7
285:7,17,20	269:6 270:15	221:22 265:4	133:16 137:7	scrap 261:12
286:16 287:12,21	271:18 272:21	274:2 282:9,14	174:2 235:22	screen 80:11
288:12,21 289:11	273:11,16 274:22	283:11	242:18 243:8	seagulls 254:2,8,11
292:7,9 293:11	275:11 278:5	running 11:21 26:8	263:17 264:22	sear 101:7
296:10 297:8	280:11 281:11,18	152:3,3 181:9	272:3,9 289:6	Seattle 241:2

second 25:8 32:6 71:8 84:2,6,10 88:16 89:11 92:15 101:19 104:17 169:13 201:12 210:5 214:17 222:10 225:18	135:2 selections 116:7 126:4 192:16 sell 139:18 253:18 260:4,5 sells 122:13 send 89:21 sense 18:7,16 19:18 21:22 23:16 37:9 45:3 46:16 75:19 76:13 109:9 160:1 191:16 195:20 211:9 214:15 218:5,16 223:14 245:22 246:20 263:8,12 279:7 287:15 289:1	200:20 201:3 211:20 222:3 242:9 251:22 255:6 260:21 271:10 273:14 276:10 288:13,14 291:17 293:11 296:7 298:3 sets 106:2 190:1 232:17 setting 19:6 settings 252:1 settle 5:4 203:2 settled 218:22 seven 138:8 241:15 seventies 26:15 Seventy 51:12 shaking 212:16 253:14 shape 73:9 113:14 share 90:5 95:10 118:15 129:22 136:20 155:8 173:17 239:21 298:2 shared 251:4,6,11 sharing 12:16 sheet 67:4,5,8,12 293:10 68:1,16 69:6,11 70:3,14,18 293:20	showing 35:10 51:4 98:22 109:17 202:9 shows 7:7,7 18:15 37:13,13 55:22 58:11,11,17,21 79:4,4,7 84:12,13 87:5 88:10 132:19 137:3 247:14,20 259:6,6 shut 260:20 side 17:3 55:6 58:7 128:11,17 161:11 164:17 176:13 183:6,20 184:12 184:17 186:19 198:5 211:3,5 214:19 295:11 sidebar 227:19 228:7 Sidetalk 86:14 89:15 91:3,8 94:18 194:19 205:11 240:7 245:6 290:19 297:18 sideways 32:4 sifted 295:8 sign 289:9 signed 284:1 significant 136:20 175:22 176:4 188:8 231:17 236:7 243:9 264:13 278:21 292:18 significantly 112:15 197:18 signs 226:8 similar 69:12 128:6 128:8 simple 23:2 102:21 102:21 248:3 simplification 129:11,12 simplified 162:19 simplify 275:7 295:13 simply 31:4,20 130:3,6 237:19 simulation 188:9,19 229:12 245:9 257:22 258:1 267:12 simulations 188:5 246:8 257:2 258:9	274:1 single 115:12 128:20 129:10,18 130:7,13 132:1,20 133:4,9,14,22 134:19 135:6,12 135:21,22 137:8 137:11,16 138:8 142:12,22 143:4,9 149:9 150:7,10 153:8 194:6 196:5 206:16 231:19 236:6,20 287:13 single-stage 131:7 131:11 137:22 139:19 140:14 141:5,13 236:10 single-story 149:11 single-zone 153:6 sit 137:4 173:19 221:7 site 90:5 95:10 sitting 116:2 178:15 situation 44:1,20 45:8,9,10 170:12 236:12 263:13 six 22:20 206:22 241:15 six-story 149:15 sixth 29:12 size 146:6 154:1 158:4 159:17 166:8,11,14 171:9 171:11 180:18 193:12 195:8 196:15 200:20 201:3 206:16 207:11,18 208:1,2 222:22 229:16 230:13 278:3 279:16 sized 181:18 sizes 153:13 158:4 165:13 186:17 195:2,18 207:9,13 215:4 224:13 sizing 158:20 179:9 229:11 skip 32:22 skipped 87:10 123:4 slide 15:12,20 16:7 16:21 17:8,19 18:4,14 19:3,14 24:18,19 25:14 80:10 95:17 96:6 96:11 98:15 107:1
see 6:1 11:15 14:1 15:16 17:3,9 21:20 22:13 25:14 30:16 33:3,12 39:15 41:2 50:2 59:1,1 61:9 64:5 66:13 84:15 87:12 94:6,8 96:8,22 99:2 102:3 105:6 106:6 118:13 121:17 135:18 140:20 160:16,18 161:20 162:8 169:11 172:18,19 172:20,20 176:9 183:11 206:22 207:1,22 221:15 226:7 227:14,15 228:15 234:21 236:6 252:22,22 255:4,7 258:8,9 266:2,20 267:14 269:12 272:6 275:18 281:9 287:5,15 289:17 292:13 293:17 297:7	sensor 257:10 sent 35:7 43:21 230:1 232:3 239:20 240:2 separate 84:18 101:20 161:21 164:14 225:13 256:13 separately 201:16 September 95:21 series 254:22 serious 28:7 181:5 serve 16:11 229:22 230:12,18 232:14 served 64:11 232:20 serves 38:22 Service 5:2 servicemen 172:10 serving 225:13 233:11 sessions 227:3 set 26:13 40:10,22 42:2 64:1 72:14 90:5 95:10 108:14 108:18 112:20 157:9 162:4,10 175:19 189:19	ship 182:6 183:3,4 251:2 shipment 135:18 140:3,10 shipments 148:4 154:17 294:12,13 shipped 250:14,16 251:11,14 259:8 shipping 186:10 251:15 shop 10:14 shot 89:14 115:11 show 10:1 58:22 59:13 63:15 64:2 73:12 78:18 86:16 86:17 116:7 119:20 124:22 125:20 127:19 156:9 160:20 182:1 217:15 227:17 250:1 264:22 267:9 270:2 279:15 294:22 showed 132:18 253:7	showing 35:10 51:4 98:22 109:17 202:9 shows 7:7,7 18:15 37:13,13 55:22 58:11,11,17,21 79:4,4,7 84:12,13 87:5 88:10 132:19 137:3 247:14,20 259:6,6 shut 260:20 side 17:3 55:6 58:7 128:11,17 161:11 164:17 176:13 183:6,20 184:12 184:17 186:19 198:5 211:3,5 214:19 295:11 sidebar 227:19 228:7 Sidetalk 86:14 89:15 91:3,8 94:18 194:19 205:11 240:7 245:6 290:19 297:18 sideways 32:4 sifted 295:8 sign 289:9 signed 284:1 significant 136:20 175:22 176:4 188:8 231:17 236:7 243:9 264:13 278:21 292:18 significantly 112:15 197:18 signs 226:8 similar 69:12 128:6 128:8 simple 23:2 102:21 102:21 248:3 simplification 129:11,12 simplified 162:19 simplify 275:7 295:13 simply 31:4,20 130:3,6 237:19 simulation 188:9,19 229:12 245:9 257:22 258:1 267:12 simulations 188:5 246:8 257:2 258:9	

157:8,10 201:12 221:16 229:8 244:15 245:15 246:19 275:10,11 slides 11:15 14:13 14:15 95:15 106:2 112:3 246:21 273:15 297:16 slightly 243:7 slippery 47:16 slope 47:16 SMAKDA 55:5 small 131:2 148:9 150:21 154:21 155:9 159:15,15 164:7 168:19 207:19 211:12,13 225:10 262:15 271:10 279:18 smaller 19:11 55:7 55:16 134:9,10,11 142:17 146:20 148:6 154:12 193:9,13 233:4 278:19,20,21 smallest 207:18 smart 173:7 198:18 smartest 6:12 smooth 187:21 so-and-so 62:22 soccer 5:5 software 187:20 sold 122:9,10,11 131:6,8 133:21 134:9 253:19 solely 12:18 solution 30:21 31:4 31:17 52:13 solutions 73:10 173:18 solve 196:5,6,15 197:2 solvent 85:7 solves 265:10 somebody 28:8 62:11 73:17 95:2 122:13 123:4 161:5 somebody's 17:11 someone's 34:2 someplace 82:22 somewhat 107:6 207:7 soon 35:9 81:1 157:4,6 275:22,22 sophisticated	170:11 sore 227:11 sorry 38:8 53:3 57:15 79:5 83:11 90:19 117:9 118:11 143:6 166:12 171:17 217:7,18 sort 18:11,15 55:4 55:14,14 68:16 71:8,22 72:10 80:13 95:15 99:21 102:5 103:11 110:13 130:3 134:1 135:15 145:4 147:2 154:14 161:14 172:22 194:10 197:1 200:10,19 205:7 208:22 210:20 223:19 233:10,16 250:10 261:12 265:21 273:5 275:11 284:22 287:18 sound 72:15 205:20 218:12 sounded 46:9 sounds 37:8 89:13 93:3 107:18 119:2 131:11 137:14 155:20,22 193:9 206:2 218:17 224:2 267:1 295:10 southern 7:19,20 136:1 SPA 220:12,19 space 95:5 150:3 152:2 153:21 171:5 203:5,22 204:1,9,13 233:10 233:17 237:8,11 240:9 spaced 32:6 spaces 170:22 216:13 235:11 spacing 169:21 speak 11:21 16:18 25:11 33:17 62:11 62:12 67:21 82:13 200:1 221:6 SPEAKER 60:20 speaking 39:20 71:5 83:7 99:11 136:3 136:6 139:12	special 27:7,21 28:22 47:22 48:18 48:22 63:3,7 specific 42:11,12 79:14 107:11 109:2 112:15 211:20 264:4 specifically 28:8 45:5 82:5 280:13 specified 243:1 speculate 134:8 speed 143:9 190:19 202:13 237:7,10 238:12 239:2 241:8 242:4 243:1 244:6 282:2,3,17 spend 66:7,7 141:1 282:15 spending 141:1 291:9 split 57:16 132:20 133:3 142:3,13 145:9 146:3 152:13 153:19 225:12 267:7 280:18 284:16 splits 280:4 splitting 167:21 spoke 18:9 213:5 spot 81:2 150:4 216:5,11 270:9 293:17 spreadsheet 220:21 240:20 spreadsheets 224:11 spurred 73:18 SPY 220:17 square 10:7,8 145:21 146:11,13 146:14 149:11 178:20 245:11,21 246:5,6,10 250:1 251:2 258:18 261:10 267:17 270:4 271:5 278:16 squarely 103:13 squeeze 215:21 stable 250:18 staff 18:9 91:22 97:11 256:14 stage 18:8 19:6 130:7 134:19 135:7 137:16 140:14 143:8	144:16 152:8,10 152:17 231:12,15 231:19,19,22 236:6,6,11,11 237:19 238:2,22 239:1 274:20,20 282:4,4 283:3 staged 123:19 124:1 143:20 144:4 147:6 151:15 225:11,15 226:12 239:7,9 276:16 278:13 280:9,19 280:21 281:3,22 283:18 stages 29:10 32:2 128:21 138:3 142:21 151:15 152:17 231:11 274:18 282:2 staging 110:2 123:8 125:5 151:20 stairs 10:11 stairways 172:9 stake 18:1 stakeholders 11:18 12:13 18:19 19:2 271:20 stand 8:18 95:15 96:10 standard 67:22 68:12,14 69:4,4,5 69:21 70:1 96:5 101:4,10,15,18 102:18,19 103:1 104:19 105:7 158:3 165:4 168:3 172:16,17,21 177:7,21 184:20 196:18 223:18 263:15 275:5 279:9 standards 2:9,10 6:10 10:20 12:6 20:11 23:20 27:6 56:11 57:10 96:3 98:16 101:10 103:20 104:15 157:14,16 214:17 255:6 standing 18:10 41:18 Starr 7:5,5 53:7,12 82:8 85:12,15 88:4,19 89:5 92:14,17 93:8	116:18,18 117:1,9 118:2 119:2,9,12 120:19 126:14 130:10 131:3,19 132:7 134:13 135:14 137:10 140:19 149:17 150:8,12 151:1,13 152:12,19 153:17 158:15,15 159:6 159:20 160:16 163:5 164:11,15 167:12 168:16 178:7 179:18 180:8 181:7,21 182:8,12 183:12 183:17 186:15 193:7,21 194:8,13 195:19 200:19 201:2 210:4 213:1 233:7 235:1 238:4 239:4,11 240:10 241:9 242:5 248:7 251:18 256:18 258:4 263:6,21 264:15,19 266:18 267:21 271:22 278:1 281:20 282:18,21 283:3 285:4,8,15,18,21 286:11 293:19 start 6:8 13:19 33:19 51:4 59:9 59:12 78:20 84:1 84:11 90:17 130:10 135:2 171:12 179:11 196:22 201:4 210:6 229:2 256:20 258:17 259:4 278:14 286:15 started 66:18 71:22 157:1 202:9 starting 91:16 213:18 257:14 starts 171:11 190:13 251:2 Stas 6:15,15 100:13 100:13 101:1 102:17 103:10 104:4 105:1 156:21,21 stat 274:19 state 8:18 85:16 188:17,20,22
---	---	--	--	--

189:8	street 13:7	successful 12:7,10	137:14 141:2	tab 179:19
stated 112:16	stretch 90:11	50:3	180:1 185:13	table 4:15 23:21
statement 67:16	strikes 72:8 134:1	successfully 5:11	188:6 191:19	100:15 105:22
72:3 240:17	137:1 183:21	55:10	196:12 205:9	116:2 121:16
static 159:17 160:11	184:9 199:5	sudden 158:21	206:13 208:7,10	147:3 210:2
160:21 161:8,10	stringency 101:16	197:17	209:5 213:7 227:3	216:13 245:21
161:13,20 162:3	101:16	sufficient 71:16	227:10 239:20	tables 98:2 107:3
163:14 164:7	strive 36:19	111:4	240:2 241:21	127:5 275:8
168:9,13,15,17,20	strong 16:3 31:19	suggest 124:9	259:11 267:3	tackle 298:17
169:2 177:2,2,7,9	32:10 44:5 66:12	138:11,19 175:1	283:1 288:19	take 13:19 14:4,14
177:11,14,20	78:19 88:15 93:3	250:17 270:13	292:14 296:19	14:15 17:18 44:18
178:11,12 179:9	strongly 66:2	286:12	297:3,7	53:1 66:10 67:1
179:21 181:11,15	102:13	suggested 64:8	surface 100:4,5	67:11 68:15 69:2
181:16 182:3,5	structure 40:22	112:7 128:22	125:13 226:18	69:20 81:19 92:11
183:8 185:11	structured 173:1	213:2	surprise 179:15	95:14 98:7 104:1
187:1 273:20	struggled 287:6	suggesting 47:7	surprised 118:13	114:17 129:13
274:17,21 275:6	stuck 44:20 104:20	114:1 121:21	151:9	135:10 150:3
284:18 285:2,12	studies 253:8	241:7 271:7	surprising 152:6	160:7 179:14,22
statics 274:2	study 253:7,7,10	285:18 288:3	survey 153:13	190:13,18 195:9
statistically 265:8	254:14,16,17	suggestion 49:7	surveyed 253:8	199:2 216:18
statute's 105:3	260:19	57:22 58:1 92:7	surveys 158:9	221:11 238:6
statutory 16:9 20:8	stuff 4:11 13:14	161:2	Susan 26:6	245:2 246:3
24:8 32:22	24:11 73:15	suggestions 42:3	suspect 44:12	247:18 249:14
stay 5:19 86:13	118:14 139:14	49:10 60:10	202:15 248:10,12	252:14,18 255:20
139:18	180:2,2 182:22	suggests 175:7	262:15	256:3 258:13,16
steer 124:14	183:1 221:8	summarize 37:7	Suzanne 268:10	261:16 267:15,18
step 71:9 97:4 123:7	253:18 258:5	48:17	SW 1:9	270:18 274:12
163:22 164:2,10	291:1,2	summer 95:5	swap 214:8	281:9 287:11
194:10 206:10	stump 100:16	246:13 253:7	sweet 216:5,10	taken 63:17 64:3
213:21 214:3,7	sub-cooling 191:1,3	254:17	switch 151:19,20	66:16 68:8 69:16
215:22 219:6	191:4,7	summertime 242:8	switches 221:20	73:14 77:20
242:16 287:3,5	subcommittee	Sunday 88:20 90:20	switching 175:6	156:14 191:14
steps 207:7 215:3	27:12	sunsetting 105:9	234:15	195:15 226:13,20
Steve 9:6,8 22:14	subgroup 74:8,15	sunshine 26:19	sync 250:10 251:2	226:22 228:17
252:3 296:22	74:20 75:2,4,7	supplemental 71:12	synergies 23:12	230:6 290:20
Steven 2:20 296:18	76:6,8,12 77:13	supply 169:12,13,22	synonymous 139:6	takes 221:6,9
stick 6:14 154:15	228:1,2 239:20	170:6,19	system 57:17	talk 17:2 19:8 26:11
220:9 266:17	286:21 288:2,5,14	support 20:14 55:12	123:19,20 150:15	97:1 197:11 198:8
sticking 199:2	subgroups 73:22	55:15 68:22 74:9	150:17 151:7	249:16 267:21
sticks 227:11	74:2,7,9,18 76:2	91:12 92:14	153:1 156:5 161:9	273:16 286:3
stilts 172:3	78:3 288:17	213:20,22	161:14 162:6,8	293:21 294:2
stock 250:17,18	298:15	supporting 170:4	178:2,9 179:22	talked 67:3 189:5
255:22 256:5	subject 27:22	supportive 55:11	181:3,10,18,19	192:12 230:4
262:2 265:20,22	submit 173:4,22	216:7	229:11,15 230:13	279:11 291:2
stop 56:5,6 89:19	submitted 68:11	supposed 28:2,3	235:2 259:11	294:10
106:17 228:11	298:6	29:2 58:8	276:17 277:8	talking 18:22 32:17
263:4	submitting 36:19	supposition 137:18	282:13	47:21 61:11 98:18
store 251:12	subsequent 19:8	sure 16:19 21:7	systematic 117:6	104:14 143:3
story 251:11	82:18	23:1 28:20 29:10	systems 145:5 149:7	153:17 159:4
straight 154:5	substance 17:16,16	32:4 39:6 41:10	163:12 180:4,17	160:12,15 163:12
207:8 249:4	68:1 69:6 70:2	41:21 45:18 46:5	182:9 189:22	166:12 168:18
straightforward	104:7	64:13 67:9 92:15	236:2 277:2	170:13 177:4
216:18	substantial 207:21	93:9 99:4,5,7,8	278:20 279:11	180:3 186:9
strange 72:8	substitution 259:1	105:13 108:22	280:9	193:10,17 207:10
strategies 211:10	Subway 10:14	115:6 118:20		207:15 218:8,13
straw 80:17	success 62:15	126:16 135:16	T	224:12 226:5
			t 68:4	

<p>234:11 244:9 246:22 257:6,17 259:10,10 263:2 270:19 286:12 287:22 296:18 talks 19:4 248:17,19 target 93:16 107:11 116:16 216:19 task 13:21 taw 246:9 Taylor 252:3 team 80:17 84:19 96:22 106:8 153:11 158:5 168:12 186:12,14 202:10 212:18 228:11 289:3 team's 85:4 tech 202:12,19,20 203:1 204:2,11 technical 18:17 21:20 22:1 74:9 75:5 76:3 96:22 97:4 114:4 266:12 268:2 289:3 291:8 295:17 technically 71:2 technologically 20:12 technologies 2:12 3:3 6:20 8:5 123:2 195:18 technology 104:19 104:22 112:18,18 112:19 194:14 195:14 196:2 199:17 202:14 Ted 2:5 4:22 5:14 24:22 telephone 63:10 tell 100:18 101:3 147:14 183:3,4 197:20 238:18 272:16 telling 44:2 291:9 temp 230:14 231:3 247:12,13,21 287:14 temperature 32:13 86:15 190:14 191:5,6 229:11,18 229:20 230:21 237:14 239:6 temperatures 190:11,15 264:10 ten 92:19</p>	<p>ten-year 199:16 tendency 178:18 tension 172:22 tenth 91:1,6 92:10 92:13,15 93:15 term 31:11 63:7 67:4,5,8,11 68:1 68:15 69:6,11 70:3,13,18 102:4 terminology 216:15 terms 68:2 99:9 102:3 133:17 171:22 204:12 216:11 227:13 283:14,17 286:2 Terzignini 9:19 test 23:22 24:3 31:22 71:22 107:8 107:19,21 109:6,7 118:18,20 159:21 162:14 186:18 188:5 189:2,16 190:1,2 210:17 tested 189:22 211:2 testing 109:2 162:4 162:6,9 tests 107:4 108:3,4 108:12,15 162:17 162:19 Texas 246:14 thank 4:20 6:4 8:8 10:21 18:13 23:4 34:19 49:4 53:4 59:12 64:19 66:8 82:19 90:3 108:21 109:21 143:6,14 149:16 171:20 172:6 228:16 230:22 240:3 298:5,10,21 thanks 5:5 30:11 103:10 Tharp 3:1 7:1,1 73:20 86:3,9 104:12,12 112:11 112:11 113:19 188:3,3,16 189:21 190:4 194:20 199:5 208:15 226:10,10 227:22 228:7 274:17 that'd 187:15 theme 191:11 themes 125:4 theory 214:22 thermostat 233:15</p>	<p>they'd 274:22 thing 45:15 51:18 58:7 66:6 68:4 73:22 94:4 110:13 124:9 125:19 131:3 134:13,21 135:18 137:21,22 139:18 140:12,19 149:18 155:7 158:1 159:6 160:8 167:12 168:8 172:2 173:16 179:4 180:15 183:12 185:5,16 186:15 188:4 193:8 194:20 198:4 226:12,13 234:7 241:17 243:16 251:22 252:12,16 260:18 264:16 271:6 274:13 282:16 283:15,19 284:8 291:12 297:21 things 13:20 16:13 17:1 21:10 24:22 26:6 41:5 44:15 46:11 55:6 64:17 80:14,19 84:20 95:15 96:9 97:3 103:8 104:8 111:14 112:12 125:11 138:2 147:20 153:9 158:16 163:11 164:18 169:20 178:16 186:21 193:14 194:11 231:13,14 233:22 242:14 245:7 248:17 251:20 252:2,12 255:22 256:1 257:13 263:3 275:19 282:12 289:16 294:8 think 11:12 12:7,10 15:7 19:22 21:15 22:9,10 23:12,18 23:22 24:5 29:14 30:5 32:2 34:10 35:15,19 36:3,16 37:14,17 38:5,13 39:10,18 41:4,14 41:16 43:10 44:4 44:5,10,18 45:1</p>	<p>46:13 47:9,20 50:4,17 51:6 52:16 53:7 54:17 55:8,9,11,15,16 55:17,19,20 56:11 56:13,14,18,21 57:20 58:4,5,7 62:14,19,20 65:21 71:8 72:18 73:4 73:16 74:3,19 75:4,5,6,18 76:1,4 77:1 78:5 79:2 80:7,14,20 81:1,1 81:2 82:20 83:12 85:5 86:1,12 88:6 91:5,14 92:6 94:1 95:7,11 96:14,17 96:18 99:21 100:1 100:14 102:8 104:2,7 105:16 106:1,3,6,9,15,22 108:1,18 109:17 110:22 111:11,14 111:16,18 112:12 114:21 115:2 116:12 119:9 120:5,9,20 121:2 122:4,10 123:3 124:16 125:16,21 126:18 127:15,19 127:20,22 129:7,8 129:16,21 130:7 132:8,13 134:13 135:7,8 136:5 138:13 140:1,12 140:16 141:6 143:16 145:1,8 147:1,3 149:10 151:3 153:9 157:7 157:19 158:16 159:22 160:2 161:7 162:2 163:13 164:5 169:9 176:1,3,3 179:1,4,9 180:8 181:7 184:3,4,10 185:21 186:16 187:7,13 189:7,8 190:5,22 193:3 195:21 199:18 202:20,22 203:1 204:3,10,12 205:8 208:20 210:7 211:21 213:1,6,13 213:13,15,20,20 214:3,9,10,12</p>	<p>215:7,20 216:2,5 216:16 218:11 219:1,8,19,20 221:10 222:4 224:10 225:19 227:22 228:5,9 229:7,9 230:5 231:3 234:3 237:2 237:9,20 240:8 242:5 243:8,11 244:3 245:10,14 246:3,5 248:16,19 249:2,5 251:18 253:5,12 255:5,8 255:12 256:14 257:12 260:1,10 260:15 263:17 264:11 265:10 266:12,22 267:1 268:8,9 269:13,14 269:15 271:11 272:21,22 273:3 273:18 274:6,8,12 275:15 276:1 279:15,17 283:8 284:13,17,18,21 285:1,22 288:22 289:12 290:4 291:9,18 292:9,11 292:17 293:17 294:6 297:6 298:10,11,13,15 thinking 33:13 56:20,22 57:2,9 57:10,14 76:15 100:7 103:12 121:15 133:12 139:6,22 160:7 163:6 166:1 171:21 177:10 205:22 209:1 220:5 229:2 232:16 233:9 234:5 241:20 252:7 258:4 264:15 272:5 278:4 281:21 293:19 thinks 13:9 80:17 106:8 third 35:11 89:8 96:13 114:2,2,3 115:8,9,9 169:14 202:7 282:5 Thirty 250:7 thorough 180:13</p>
--	--	---	--	--

187:11 thought 39:4 99:13 105:19 127:1 128:3 158:20 165:1 196:10,10 200:7 232:15 249:11 256:18 258:13 259:2 261:9,13 262:5 277:18 279:2,3 280:8 281:12 296:9 thoughts 33:16 39:12 40:9,16 51:19 52:2 53:20 58:1 69:15 73:18 75:8 77:8 92:5 165:2 248:8 268:7 thousand 176:5 205:4 240:13 241:21 293:1 three 24:16 30:15 32:3 51:21 53:9 53:12,18,19 54:16 55:11,12,15 57:22 57:22 58:2,5,8,12 58:14 59:3,4 60:9 91:11 92:4 94:20 124:20 142:21 153:18 169:11 171:16,17 172:5 173:13 196:19 197:15 200:2 209:6 213:14 216:20 217:1 218:4,14,14 224:22 240:12 241:21 242:14 290:2 three-quarter 185:17 three-quarters 186:17 three-stage 231:15 three-story 149:22 three-year 199:15 threes 119:18 threw 163:11 throw 31:12 50:6 68:5 137:2 181:16 209:3 throwing 142:5 thrown 49:6 thumb 227:11,13,19 thumb's 32:8 thumbs 32:3,3,7	59:14,16 Thursday 85:19 262:20 Thursday/Friday 86:8 tick 204:8 tilt 181:9 time 5:20 7:22 10:15 11:9,14,20 12:12 14:20 15:17 18:12 20:3 22:7 24:14 26:1 35:7 36:7 38:6,14 40:10 41:1,16 42:12 43:8,11,13 45:2 51:4 62:10 66:5,7 74:3 81:2 82:17 84:4,11 93:9 95:12 100:11 100:17 104:17 114:17,18 115:2 128:1 139:16,20 141:1,1,8 143:17 147:8 149:5 179:16 182:1 187:2 191:22 194:10 198:19 202:1 209:5 212:8 212:20 213:11 215:17 228:14 232:9,11 234:2 238:16 241:8 252:11,14,15 254:22 255:3,9 260:17 266:7 275:21 279:1 282:15 288:15,16 288:18 292:4 293:11 295:21 296:2,2,8,8 297:10 298:8 timeframe 34:12 72:12,19 139:10 208:18,19 timeframes 73:11 times 24:21 41:18 178:11,17 223:16 232:7 251:19 timing 103:18 title 254:15 today 4:8 7:21 9:15 16:13 25:1,5 26:9 27:14 28:14 36:11 52:18 82:12 96:10 96:21 100:5,11 120:7 123:4 137:5	145:3 157:3 166:6 166:19,19 167:7 172:18,19,20 173:3,19 184:4 222:17 223:17 250:14,16 286:8 291:2 293:4 296:9 298:7,10,13 today's 10:22 196:16 told 44:16 48:9 179:21 296:16 tomorrow 167:7 286:6 ton 128:22 130:21 132:19 139:19,20 140:14,15 142:11 142:19 149:6 154:22 155:6,6,7 155:9 172:4 177:11 182:2 194:22 204:5 206:2,2,5,6,17,18 206:21 212:1 217:14,20 219:1 231:18 279:2,20 279:22 281:17 tonnage 204:14,19 278:3 tons 134:5 136:22 138:8 147:12 149:21 156:8 172:12 204:7 212:2 217:9,19,20 278:22 281:16 tool 195:2 tools 127:9 210:16 top 98:14 112:6 121:13 157:11 232:2 251:14 286:20 288:1 topic 78:6 164:14 185:22 221:19 222:5 topics 105:14 187:17 tossed 250:12,15 total 52:1 77:11 159:19,20 169:14 177:11 182:5 244:6 247:22 285:6 288:20 totally 16:4 touched 276:13 tough 93:4 town 83:6	track 62:6 trade 125:6 tradeoffs 125:15 traditional 151:10 Trane 2:13 8:3 42:19 70:11 110:14 117:22 118:11 136:7 139:16 143:2 171:17 174:7 283:7 transfer 112:18,22 113:2 transferring 79:7 transformers 76:1 transition 26:2 98:19 99:6 193:4 197:5 199:16,17 travel 79:18 86:10 86:11 88:21 93:4 travel-related 40:1 traveling 88:20 89:1 90:20 travels 83:19 Travis 3:10 8:22 treated 185:1 treatment 163:21 tremendous 173:17 trend 197:6 223:12 trending 138:11 trends 191:10 tried 96:16 124:14 221:18 223:6 trivial 259:5 trouble 181:6 269:21 true 123:12 147:10 147:12 193:3 truly 115:16 trust 44:3 try 16:13 17:11,12 17:15 24:1 56:3 59:1,2 79:20 103:12 110:10 115:3 121:20 150:1,3 157:3 162:16 170:15 174:14 194:22 204:20 213:16 219:10,12 223:11 224:19 228:10,12 244:15 245:2 246:19 271:4 273:9 274:9,10,13 276:3 284:8 287:6 291:8	trying 9:17 26:22 29:10 30:21 48:10 48:20 62:14 78:5 80:8 87:5 103:17 118:17 135:20 143:7 153:19 161:1 171:2 174:13 182:15,18 182:21 197:2 200:21 206:13 215:21 216:8 222:11 235:7 236:3 239:12 245:22 250:10 255:2,14 258:22 261:21 273:6 TSD 189:21 tube 187:21 188:1 192:6,17,21 195:13,17 199:4 tubes 192:9 Tuesday 79:19 89:2 turn 4:12 15:22 95:12 96:21 97:3 228:19 238:9 240:14 247:1 276:6 turned 48:4 turning 238:10 turns 62:19 151:4 231:7 Twelve 51:15 twice 54:20 90:19 101:14 two 22:7 23:13,17 29:9 32:11 35:11 48:3 51:2 53:18 54:17 55:6,10 56:1,6,11 58:6 72:15 80:7,22 84:17 87:6,14,19 88:3 90:13 91:10 92:8 101:6,10 104:15 117:13 123:18 124:17 125:10 128:21 131:2 132:22 133:3 135:12 138:3 139:5 140:14 141:18 142:9,14,18,20 143:1,8,9 149:6,8 149:21 151:15 152:16 155:6 161:20,22 163:15 167:21 171:10
---	---	---	--	--

175:12 197:15 208:21 209:2,21 215:9,10,11,17 218:13 225:13 227:2 231:19 232:2 236:6,11,11 239:19 240:12 241:21 244:12 247:10 248:17 249:10 265:1 272:11,15 278:7 279:3 282:2,2 283:3 285:9 292:3 292:4 two-circuit 133:1,6 two-dimensional/t... 154:8 two-speed 138:15 two-stage 130:13 131:7 138:19 139:20 142:17,21 151:2,5 231:15 236:9 two-stage/modula... 142:19 two-tenths 285:14 two-thirds 151:10 246:6 250:1,5,8 two-weeks 81:2 two-year 73:7 type 64:10 114:9,14 124:5 149:1 154:2 156:5 234:21 283:15,19 284:10 types 32:12 125:3 168:19 267:7 277:14 298:1 typical 116:1 117:11,16,16 128:11 159:12 typically 13:2 132:10 142:18 202:14 257:11,13 282:1	54:10 unauthorized 26:16 unclear 289:12 underestimating 243:4 underestimation 227:8 underlying 161:7 172:22 underneath 144:19 undersize 182:22 understand 11:16 21:13 32:16 33:22 39:6 56:16 70:12 83:22 89:7 108:21 109:1 114:21 121:21 134:6 149:13 160:14 161:16 162:13 169:17 214:5 230:19 234:4 245:10,13 261:3 295:6 297:11 understandable 202:3 understanding 32:15 63:7 99:18 107:13 151:16 164:18 210:8 222:12 223:2 230:5 280:15 undue 26:17 uneasy 240:9 unfortunately 89:4 173:18 UNIDENTIFIED 60:20 unit 23:15 108:7 113:5,17 114:20 115:13,16 116:16 117:22 118:1,18 121:18 122:9,10 122:15,20 123:17 123:21 124:3 127:6 133:14 141:13 144:11 150:1 157:12 158:20 165:14 170:4,7 172:2 173:11 176:21,22 177:6 178:1,12 180:9,10 184:18 186:21 188:18 191:20 195:22 196:16 197:9 198:12 204:5,15	205:1,3,4,6 206:20 207:1 209:12 210:18,19 210:21 211:2,20 220:1 231:7,7,14 231:15,16,22 232:7 236:9,10,20 237:7 251:12,13 251:15 259:8 281:21 282:2 unit's 232:20 unitary 96:1 United 3:3 8:4 units 98:15,17 107:10 108:7 109:2 112:8,9 113:18 117:17,19 118:2,4,21,22 122:14 124:20 125:22 127:3,15 129:9 130:21 133:21 136:1,1 142:11,17 148:6,9 149:14 157:13 158:5 162:15 164:19,20,21 165:12 166:6 172:10 192:7,8,14 203:11,15,20 205:1 210:17 211:5,6,16 212:1 212:1,3,4 220:20 224:16 229:22 230:12,18 231:18 232:6,10,12,14,16 232:17,19,20 233:5,11 234:1 236:19,21 250:14 University 210:16 unresolved 245:1 unusual 163:7 updated 81:7 187:22 updates 24:3 upgrade 110:3 178:2 upgraded 144:15 upgrading 150:17 150:21 151:6 upper 118:9 119:11 119:18 231:12 244:7 ups 206:10 upsides 193:10 urged 33:2 157:4 usage 235:17	use 30:14 31:11 33:2 97:2 99:10 109:9 110:20 114:11 119:4 122:14 136:2 144:6 145:19 148:6,15 153:11 156:6,6 163:20 164:19 168:15,16 182:7 183:9 186:20 189:11 192:9,11 193:12 194:8 196:2 201:18 203:11 204:13 206:7 229:13 230:16 237:22 243:4 244:7 249:17 257:8 273:21 274:5,18,20,22 275:5,17 277:2 282:1,7 292:3 useful 41:7 220:4,10 uses 202:13 usually 70:22 163:8 197:21 298:8 Utilities 7:18 53:1 162:16 utilization 99:16 utilizing 163:2	171:13 188:20 203:19 204:4 246:12 varying 153:6 VAV 131:18 153:3 153:6,15,19,22 154:13 155:1 156:7 225:15 235:3 277:1 278:20 280:6 282:13 283:9 ventilating 151:18 152:1 242:8 ventilation 151:16 238:16 239:13 240:22 242:6 243:5 244:5 248:19 260:10,12 260:12,16 281:6,7 282:6,15,18 verify 224:10 269:19,22 271:4 version 270:18 272:12 275:1 280:22 versus 48:7 98:22 123:22 125:5,12 125:13,14 128:20 128:21 135:12 153:22 191:10 192:5 199:4 201:20 211:10 212:9 223:10 226:16 261:11 265:12 287:14 vertical 170:22 171:22 VFD 183:14 282:22 283:4,9,10 viable 23:18 view 21:19 34:1 36:9 43:18 52:15 218:8 viewpoint 28:9 viewpoints 26:22 27:1 28:4 29:7 vis 96:9 vis- 96:9 visit 61:7 visualize 209:17 voices 250:13 volt 287:14 volume 121:19 123:19,20,22 125:5 129:22 131:10,18 132:6
U				
U.S 1:1,7 ugly 99:5 UL 3:10 7:7 8:22 37:13 58:11 79:4 84:13 259:6 ultimately 100:9 104:2 124:16,18 205:9 unable 65:17 227:2 unanimity 53:2 unanimous 25:15				

134:11,11 144:12 144:13 145:10 146:21 147:6,7,15 147:17,18 148:9 148:16,19 149:1 152:20,22 153:6 153:18 154:22 156:5 172:17 173:10 226:18 276:16,16,16,20 277:8,14 278:8,9 278:9,10,13,13 279:5,10,17,19 280:9,19,19,22 281:2,3,22 283:11	walking 99:22 wall 103:15 Waltner 3:2 7:3,3 40:19 43:7 72:6,6 72:17 81:5,12 86:12 88:8 108:22 109:21 120:4,11 120:15 145:4 147:19 148:1 161:7 164:16 166:17 167:1,5 204:18 213:18 222:8,10 223:13 224:2,7 239:18 240:2 253:3 260:18 261:20 262:9,13 want 6:5 10:17 14:1 14:14 16:3,4,18 20:13,16,20 21:14 28:20 34:3,5,6 36:9,22 40:10,22 42:6 43:14 44:14 44:17 46:4,6 48:16 49:15 51:10 56:5 60:12 62:11 64:13 66:7 73:5 74:1,4,12 75:11 77:7 78:22 79:13 83:11 87:10,22 105:6,13 106:17 106:22 111:15 113:20 114:13 116:15 125:8,10 135:17 136:9 141:11 148:10 157:18 161:18 172:14 180:4 181:6 184:11 200:17,17 201:20 208:20 209:14 213:7,12,19 216:21,22 224:8 227:14,15,19 235:13 240:12 242:7 246:5 255:19 260:8 268:11 270:10 273:9 279:12 284:3,10 286:21 288:18 289:18 292:14 296:4 297:7 wanted 39:5 62:8 96:18 98:5 110:11 111:10 123:16	168:8 201:7 211:19 221:15 230:20 261:3 276:11 wanting 61:7 wants 35:8 36:18 109:20 222:6 253:15 296:19 297:1 warehouses 168:19 WARM 1:4 washers 101:13 Washington 1:10 38:7,15 61:8 85:15 wasn't 21:9 35:13 44:13 47:3 51:3 57:6,7 62:9 129:3 141:7,12 200:3 217:19 261:20 262:20 268:5 watch 17:10 wattage 107:9,12 109:1,13,15 110:18 113:13 116:9,21 120:6,18 126:5,21 237:17 wattages 107:14 wavy 211:8 way 5:19 13:4 21:16 22:12 24:15 28:2 30:6 35:19 43:2 43:10 46:19 52:5 54:18 58:7 60:8 63:8 66:7 73:9 75:22 76:1 77:1 88:2 101:3 103:9 107:20 112:14 113:3,7 114:2,3 115:7 117:11 118:5 125:17 130:15 146:7 149:15 151:1 162:19 173:1,8 174:4,6 182:20 185:20 192:18 195:5 199:9 207:18 209:16 212:22 214:17 216:14,22 221:21 222:12 227:6 228:10 232:13 233:1 236:7 237:21 241:10 254:21 258:2 259:3,22 263:10	272:6,14 281:8 282:6,12 285:13 287:4,4 289:21 Wayne 26:4 30:1 ways 31:10 117:13 119:16 120:14,21 133:19 139:6 143:17 174:15 188:19 195:16 273:22 281:9 we'll 4:5,14,17,18 5:19 6:7 12:1 13:13,14 14:16 17:4 18:11 19:8 19:11,21 24:4 25:16 26:1 37:4,8 41:20 60:2 63:4 66:13 67:9 68:15 77:19 78:4 80:4 81:6 84:10,10 89:18 90:1,7 91:19,21 94:6,11 95:8,9,10,11 97:1 119:20 127:19 141:4,17 143:18 156:6,12,20 157:3 186:8 212:10 217:15 220:2,4,9 220:20,21 221:14 228:15 237:22 274:7,15 276:4,8 277:2,4,14 278:22 284:14 289:15 292:5 297:2,7,10 297:12 298:2,3,3 298:18,20 we're 4:8,9,10 5:1 5:18 6:13 10:6,9 10:10,11 11:1,2,4 11:7,12 13:10 14:19 15:3,21 16:2,3,10,13 17:1 17:21 18:2,16,19 19:6,6,7,22 20:3 20:10 28:6,19 29:5 30:21 31:7 32:14,17 33:5,14 36:15 38:19 39:1 41:14 42:14 45:3 45:7 46:16,19,20 46:21 47:10,11,15 47:21 48:1,10 54:8,11 56:7 57:20 60:3 61:3 61:11 62:14,19 66:4,9 67:6,7,14	68:18,20,21 73:16 82:5,10 85:7 86:1 89:13 90:4,11,20 93:16 96:20 103:3 105:14 109:5,15 109:16 110:22 112:6 113:21 114:10 117:4 118:17 124:1 125:2 128:7 131:13 141:14 143:3 144:3 155:18 156:3,6,8 157:15 159:4 161:8,10,13 165:11 168:11 170:9,13,13 187:20 188:11,11 188:14 191:16 192:8,20 193:17 197:2,8 198:4,15 199:6,8 202:22 205:14 206:13,13 207:9,15 208:22 209:3 213:8 215:10,15,17 216:8 218:8,13 220:6 221:2,11 223:15 224:4 225:6,10,21 227:18,21 232:4,7 232:16,18 233:2 234:18 236:17,22 237:18 238:21,22 239:3,16 240:15 240:15 243:3 244:19 245:1 255:2 256:21 257:17 259:9,10 265:20 271:5 273:2,18,20 275:16 276:17 284:19 285:1,11 286:1,5 289:6,10 290:14 297:4 298:16 we've 12:6,7 14:18 14:21 15:16 16:17 20:6 21:6 23:5 29:17 51:6,20 52:5,21 64:16 67:1 78:1,3 90:19 95:7 103:16 109:17 124:12,13 124:14,16 125:6 127:13 189:4
<hr/> W <hr/> w 277:18 Wade 9:4 wait 43:15 293:15 waiting 286:16 wake 97:16 walk 20:13				

192:22 194:6,7 202:2 204:16 220:8 223:6 232:5 237:10 238:15 240:18,19 255:5 265:21 270:19 275:16 290:8 291:2,17 292:4 293:4 297:7 298:16 weather 39:22 48:4 99:15 webcast 61:14 webinar 9:14,20 35:22 37:16 38:6 38:13 39:10,13,14 39:17 40:4 49:19 50:14 51:15 87:7 88:12 93:1,13 94:2 97:20 286:14 288:13 291:17 298:20 wedded 73:8 Wednesday 85:19 89:2 Wednesday/Thur... 86:8,10 week 36:20 37:10 45:5 61:17 79:15 81:1,4,9,10 82:2,3 84:14,16 87:6,8 88:11 91:1,7,10 91:14 92:4 98:4 105:20 126:5,14 128:15 129:3,8 132:18 141:22 151:9 158:7 164:19 202:10 203:9 250:11 251:4,7,10 257:6 268:5 281:12 286:6 Weekend 86:9 weeks 22:21 29:18 213:15 215:17 221:9 270:14 279:4 291:9 weigh 197:11,12 weighing 132:10 140:10 weighs 197:21 weight 104:5 130:4 140:2 170:4 weighted 115:9,10 131:10 204:6 welcome 4:3 186:7	went 73:16 98:3 113:22 179:18,20 203:13 237:9 298:9,11 weren't 11:22 18:8 35:12 212:19 262:7 West 91:15 247:17 Western 254:14 WESTPALEN 108:1 220:14,17 253:15 Westphalen 2:8 8:15,15 97:6,9 98:20 105:18 106:15 107:2 109:4 110:9,21 112:1,3 113:15 115:18 116:22 117:4,18 118:17 121:20 122:6,12 124:8 126:3,18 128:5 130:19 133:10 134:3 135:11,17 137:6 138:18 139:21 140:16 141:8,14 142:7,11 143:15 150:20 151:8 153:9,20 155:12 155:22 157:7,11 158:1 159:5 160:14 161:3,16 164:9,12 165:6 166:1,8,14 168:2 169:4 170:3 176:19 177:15,22 178:4 183:5,16,18 184:15,22 185:21 187:16 188:10 189:1,10 190:2,5 191:2 192:4 193:16 199:3,11 201:7,11 202:7 204:22 205:18 206:9 207:3,12 208:3 210:14 212:7 214:12 215:1 216:16 217:3,17 218:12 219:8,12,16 220:2 220:22 221:13 222:6,19 223:21 224:4,17 225:5,9 226:2 227:12 228:5,9 275:3,4	279:14 280:16 281:17 284:13 what'd 118:1 white 22:5 Whitwell 3:3 8:4,4 74:22,22 76:7,11 76:14,19,21 108:10,10 111:19 111:19 112:2 129:14 132:16,17 152:10,15 153:4 171:6,18,18 175:21,21 199:19 207:6,14 208:9 217:11 257:17 268:3,3,18 269:3 269:11 270:5 who've 298:6 whoever's 120:20 wholesale 77:5 wildly 188:21 Williams 3:4 8:11 8:11 111:9 willing 33:8 win 198:18 winds 212:10 Winningham 3:6 8:20,20 189:3 198:3,10,14 wintertime 242:6 wisdom 212:20 wished 292:18 wishes 15:16 withdraw 13:21 Wolf 139:16 wonder 292:2 wonderful 7:22 wondering 22:18 252:16 259:13 282:10 word 94:7 99:8 words 4:22 10:2 62:9 117:13,16 131:6 134:17 152:1 160:2 164:4 181:9,14 182:13 185:9 252:20 278:3 work 4:8 14:10,13 15:14 16:5,12,14 17:16,17 20:20 23:11 26:4 31:10 38:4 39:21 44:21 53:10 58:8 75:21 76:11 77:2 79:21 84:11,19 85:4,16	88:8 94:11,16 98:11 103:4 107:20 135:21 141:15 179:7 180:12,17 198:21 225:3 228:20 234:3 248:21 251:22 255:14 257:16 264:20,21 265:5,6 270:6,22 272:4,19 284:2 288:18 290:12,12 291:1,15,20 292:1 297:10 298:12,16 worked 11:20 13:2 16:1 18:18 35:19 51:20 76:1 92:2 97:10,11 248:14 253:19 working 1:2 4:4,6 4:18 5:7,9 11:10 12:4,19,22 13:3 14:11 19:11 20:22 21:18,22 22:4 23:7 25:1,10 27:5 27:10,11,14 28:2 28:11,17 29:11,15 29:16 30:2 33:3,6 33:22 34:22 37:21 40:8,10,15 42:1 49:7,10 53:6 58:19 62:5 65:3 66:20 74:19 75:3 76:3,5,8 94:21 97:17 98:11 113:20 141:18 147:2 155:10 168:14 230:2 232:3,6 244:10 249:13 252:14,15 265:20 269:9,19 269:22 270:1,9 275:14,15 286:15 288:7 workload 291:16 works 26:11 30:10 41:11 58:5 148:14 148:20 151:2,3 worried 28:19 29:5 worry 243:20 worst 252:5 296:15 worth 51:3 71:8 140:22 262:7 would've 47:14 258:2 wouldn't 44:14	120:19,22 126:8 130:15 140:22 144:18,18 157:17 179:1 181:13 206:19 227:22 233:1 235:13 242:6 279:6 280:13 281:13,18 282:8 writing 94:17 160:8 written 97:15 108:2 202:18 203:5,8 204:2 277:17 wrong 252:12 <hr/> X <hr/> X 62:12 101:11 213:10,11 <hr/> Y <hr/> Y 101:12 213:10,12 yeah 57:12 72:18 76:14 145:22 294:14 year 5:11,16 70:3 70:14 101:11,12 101:16,19 197:7 199:12 247:5 248:1,2 253:7 259:21 years 29:9 72:16 101:17 138:7,8 147:13,14 173:13 196:19 200:2 yields 243:7 263:20 Yorker 66:3 You' 282:9 <hr/> Z <hr/> Z 213:10,12 zero 155:8,16,16 156:7 264:10 zone 153:7,8 241:12 zoned 233:16 zones 234:7 <hr/> 0 <hr/> 04 257:2 <hr/> 1 <hr/> 1 78:11 93:12 117:2 117:7 230:9 244:1 248:2 1-inch 181:14 182:3 182:5 1.2 181:17 182:3 1.25 169:2,6 274:2
--	---	--	---	--

274:19,19 1.4 248:1 1.5 163:20 181:18 1/10 163:10,13,13 163:16 10 11:11 93:13 137:1 138:1,8 139:20 140:14 155:9 160:5,9 194:22 203:19 204:4 205:12,21 207:17 211:22 219:17 232:17,19 232:21 233:12,13 234:2 235:19 272:8 289:8 298:19 10-ton 131:1 132:22 133:2 10,033 235:12 10/11 91:17 10:11 66:16 10:30 66:11,12,14 66:15 100 21:2 56:3 61:20 125:8 133:3 151:3 225:21 252:14 253:10 1000 1:9 1033 113:22 256:4 265:18 10th 91:16 92:1 94:10 10th/11th 92:8 11 78:11,21 79:15 80:4 93:11 113:7 270:16 286:16,17 286:18 292:2 297:3 298:17,22 11:00 240:14 11th 80:21 82:6,8 83:17 88:11 89:19 91:7 92:1 271:13 272:22 275:21 284:4 286:1 291:20 298:19 12 42:2 49:8 50:18 50:19 51:11,13 58:13 59:12 64:1 78:11,18,21 89:17 93:11 113:5,8 172:1 206:18 232:21 12.2 113:8 12:00 240:15 12:26 156:15	12th 80:4,21 82:6,8 82:20 83:6,17 91:7 270:16 271:13 272:22 275:22 284:4 286:1 297:3 298:22 13 50:13,15 51:11 113:8 206:17 264:5 13.5 217:19,20 13.7 204:7 217:19 217:21 135,000 129:16 145:12 146:11 13th 82:22 14.8 217:10 15 22:6,17 24:5 41:18 42:1 49:8 56:1 66:15 74:8 77:12 78:12 93:13 113:8 154:22 155:5,6 164:6 172:4 204:7,7 206:5,17 207:17 217:13,14 218:6 218:15,22 220:1 224:22 225:1 228:14 278:3,5,22 280:20 281:16,17 15-person 77:6 15-ton 123:17 126:3 127:15,17 172:2 212:3 15.0 212:4 15.5 204:6 212:2 217:10,10 15th 92:22 94:1 111:2 16 267:2 163 264:5 17 49:9 51:6 58:13 77:9,10 164:4,6 174 217:14 174,000 212:4 18 9:16 19 156:13 229:6 1980s 147:16 1983 14:20 <hr/> 2 2 56:1 78:12 93:12 159:17 160:3,4 163:20 164:6,8 175:9,10 177:12 181:17 184:20 244:1 284:22	285:9 2-inch 183:7 2.3 275:1 2.5 168:17 187:8 216:7,16 221:22 2.75 213:14 2/10 163:10,16 179:1 2:00 263:5 20 66:15 93:12 175:9 232:20 233:11 235:19 279:20,21 20,000 146:13,14 20/21 86:16,21 2003 145:8 154:11 257:2 276:18 2012 12:5 2013 95:20 187:21 2015 1:16 2020 197:7 2021 197:7 20585 1:10 20th 85:22 86:2,4 229:7 21 78:11 93:12 94:15 21st 85:1,11 86:2 22 78:11 22nd 85:1,11,12,17 24 172:1 25 177:12 232:12 283:5 25-ton 205:1,2,4 25th 84:14 27 206:2 28 1:16 <hr/> 3 3 89:4 144:1 159:21 160:9,19 164:7 171:12 264:22 277:19 285:9 3.0 216:3 3.05 213:13 216:3 224:9 3.1 216:3 217:1 281:19 3:15 225:1 3:16 228:17 3:30 228:15,16 30 145:10 147:12 149:6 155:1 172:11 204:7 206:1,21 217:18 217:20,20 250:5 252:18,21 259:15	259:16,20 264:7 272:17 278:4 279:2,20,21,22 30-ton 147:4 205:6 279:11,16 30/70 156:6 300,000 188:18,19 34360 275:5 35 147:13 245:10 248:5 264:7 350 287:12 369 261:6 262:17 <hr/> 4 4 241:12 281:19 4:00 84:7,8,10 4:30 297:15 4:45 297:16 40 282:19 40-ton 149:14 43 253:9 4s 159:2 <hr/> 5 5 11:12 160:18 289:7 5/18 87:7 5/7 81:6 5:00 83:18,21 299:1 5:45 297:17 50 14:18,22 236:21 247:9 253:13 50/50 132:20 133:3 142:3 56 98:15 <hr/> 6 6 172:1 264:5 60 70:10,13,16 144:16 149:21 150:13,14,16 167:11,18 238:8 280:12 281:15 62 260:16 622 187:7 63 279:20 65 190:14,15,16,18 191:21 253:12 66 151:4,19,21 152:4,15,17 282:3 282:19 66/100 152:12 664 262:10,16 67 250:16 <hr/> 7 7 127:16,20 128:22	130:20,21 132:19 133:1 134:5 136:22 138:1 139:19 140:14 141:19 142:11,19 155:7,9,15 156:7 177:10 182:2 204:5 206:6 212:1 212:2 217:9 218:6 218:15,22 231:18 232:18 246:14 264:5,5 278:5 280:20 70 145:9,9 245:12 252:11,15 253:16 70/30 146:3 155:3 700 135:9 75 49:16 50:7,8,10 169:1,6 238:8 239:6 247:8 274:2 75/80 42:2 <hr/> 8 8 78:12 82:17 90:9 90:12 232:17 8,760 247:5 8:00 84:6 80 49:16 167:18 245:12 250:13,15 81 295:14 82 295:14 8760 247:4,4 8E-089 1:8 <hr/> 9 9 90:12 93:13 232:18 9.1 151:14 9:00 59:11 83:18,21 9:03 1:12 9:30 4:17 90 230:15 90,000 212:2 90.1 9:9 102:11 103:1,19 152:16 159:13 168:17 252:4 271:8 272:1 95 121:14 229:17 230:9,16,17,21 231:4 256:5 96,000 212:2 217:11 98 19:17
--	--	--	--	---

TRANSCRIPTION CERTIFICATE

As a professional transcriber, I certify that the attached document(s) are, to the best of my abilities, an accurate transcription of audio recordings provided to the company, given the quality of the provided audio recording(s), and that I have no financial or other interest in the proceedings to which they pertain.

Gloria Hooker

TRANSCRIBER