

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION

STAKEHOLDERS

REVIEW OF ELECTRIC RATE ISSUES
IN ANTICIPATION OF 2015
RATE DESIGN REVIEW

DOCKET NO. 4545

-----/

MARCH 26, 2015
10:00 A.M.

89 JEFFERSON BOULEVARD
WARWICK, RHODE ISLAND

IN ATTENDANCE:

HERBERT J. DeSIMONE, COMMISSIONER
CYNTHIA WILSON-FRIAS, LEGAL COUNSEL
TODD BIANCO, POLICY ASSOCIATE
ALAN NAULT, RATE ANALYST

CHARITY PENNOCK JERRY ELMER, ESQ.
DANIEL MUSER MARION GOLD
SETH HANDY, ESQ. CHRISTOPHER KEARNS
CELIA O'BRIEN, ESQ. PETER ZSCHOKKE
TIMOTHY ROUGHAN KAREN LYONS, ESQ.
STEPHEN SCIALABBA MARK LeBEL, ESQ.
LESLIE MALONE

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

(COMMENCED AT 10:07 A.M.)

MS. WILSON-FRIAS: Good morning, everybody. Thank you all for coming. I know it was a little bit dictorial in here's the dates, but I'm glad that you were able to come.

Because of that, because the schedule was kind of set for everybody, we are taking everything down through a transcript, so if we can just remember that each person can only speak one at a time, and that way anybody who can't come has access to the full discussion, and so if there are questions that come up after, they look at it, people can certainly filter them through me and I'll make sure that we get some answers.

So what I thought would be helpful is it's not usual that we have just a pure rate design case, we usually get the revenue requirement and by the time we get to rate design everybody is exhausted and the rates get allocated the way they're going to be.

1 This is really going to be a good policy
2 discussion, what are rates supposed to do,
3 what do we want rates to do, that sort of
4 thing. So I thought this would be a good
5 way to start this, and National Grid kindly
6 offered to talk about what's in their
7 current rates and -- how their current rates
8 are designed, rather, and what -- sort of
9 what the rate design is supposed to do and
10 what sorts of behaviors the current rates
11 may incentivize and what different kind of
12 rates do. For example, if you have
13 everything be a volumetric charge like it
14 has been, then, you know, we all know we got
15 to shut the lights off when we leave a room
16 in order to reduce costs whereas if you had
17 -- you just always get a monthly bill of
18 \$10, you would have no incentive to turn the
19 lights off as a really extreme example.

20 The other thing that at some point,
21 and maybe not today, that we will need to
22 talk about is that there's the -- the docket
23 will be opening. The law that applies to
24 that talks about minimum monthly charges and

1 those sorts of things whereas the Decoupling
2 Act talks about moving away from fixed
3 charges and more towards volumetric charges.
4 So we're going to need to figure out how to
5 resolve any potential conflict there. We
6 don't need to figure it out today. I just
7 wanted to raise it as I had noticed that
8 recently.

9 So I'm Cindy Wilson-Frias,
10 Commission legal counsel, and we have
11 Commissioner DeSimone here with us today,
12 Todd Bianco, our policy associate, Alan
13 Nault, one of our rate analysts, and Karen,
14 if you want to just start.

15 MS. LYONS: Karen Lyons with the
16 Attorney General's office for the Division.

17 MR. SCIALABBA: Stephen Scialabba
18 with the Division.

19 MS. PENNOCK: Charity Pennock with
20 the New England Clean Energy Council.

21 MS. O'BRIEN: Celia O'Brien, legal
22 counsel for National Grid.

23 MR. ZSCHOKKE: Peter Zschokke,
24 Director of Regulatory Strategy for National

1 Grid.

2 MR. ROUGHAN: Tim Roughan of the
3 Regulatory Group, National Grid.

4 MR. ELMER: Jerry Elmer,
5 Conservation Law Foundation.

6 MR. HANDY: Seth Handy from Handy
7 Law.

8 MR. MUSHER: Danny Musher, Office
9 of Energy Resources.

10 MS. GOLD: Marion Gold,
11 Commissioner of the Office of Energy
12 Resources.

13 MR. LeBEL: Mark LeBel, Arcadia
14 Center.

15 MS. MALONE: Leslie Malone, Arcadia
16 Center.

17 MS. WILSON-FRIAS: So Celia?

18 MS. O'BRIEN: Thank you very much,
19 Cindy. Good morning, everyone, Commissioner
20 DeSimone and everybody, Commissioner Gold.
21 Thank you for coming today and giving us the
22 opportunity to lead off the discussion with
23 some basics of rate design and allocated
24 cost of service. We did prepare, as Cindy

1 mentioned, an outline that's a little more
2 detailed than the notice of memorandum that
3 Cindy prepared, but I think it's a helpful
4 way for the discussion that we'll be having
5 as well as some handouts that we will --
6 some slides that Peter will take us through.
7 So again, thank you for this opportunity and
8 I'll now turn it over to Peter.

9 MR. ZSCHOKKE: Good morning. Thank
10 you, everyone. First, let me apologize.
11 I'm having my annual winter cough that lasts
12 a couple weeks, so feel free to interrupt me
13 because it will give my voice a break and --
14 but if I do cough, I will turn my head.

15 My cheat sheet is I have taken the
16 outline off and gone straight to the
17 presentation. So the outline -- the
18 presentation kind of walks through the
19 outline with some examples. The outline is
20 kind of a cheat sheet to keep everybody on
21 track and for you to use, what are the
22 different ideas we talk about here.

23 So the first slide, from generation
24 to your doorstep, this is how our rates have

1 been designed. It's been designed assuming
2 generation flows through transmission, comes
3 down through distribution to the customers'
4 premises.

5 The world is changing. It's going
6 to be a different world in the future with
7 more and more distributed generation, but
8 it's important to note at the beginning that
9 the way we have been designing rates for
10 decades has been under this general premise
11 of the need that everyone is connected,
12 everyone needs service, everyone takes
13 service and the amount of distributed
14 generation has been minimal on the system.
15 So this is a -- you need to reflect on that
16 as we're moving forward to a more
17 distributed world and thinking about what is
18 needed for the distribution utility to serve
19 that distributed world which will be
20 different than what is needed in this world.

21 Right now the engineers assume --
22 worry about voltage as it goes down the
23 line. Now they -- in a distributed world
24 they need to worry about voltage that may

1 come back from the line. So there's two
2 different concerns that they have now as
3 opposed to simply worrying about whether or
4 not the person at the end of the line has
5 enough voltage to serve their needs. And I
6 use the term voltage because even though we
7 do a lot of billing in kilowatts and
8 kilowatt hours, if an engineers talks or if
9 an engineer writes a paper, what they talk
10 about is voltage and amps. They don't
11 really talk about watts which is always a
12 revealing fact when you think about how our
13 engineers do things and what they need to
14 think about. And feel free at any time to
15 interrupt.

16 So I want to start first with a
17 very old text but one that everybody uses,
18 NARUC uses, NRRI. I would love to get the
19 1962 version of the Principles of Public
20 Utility Rates by James Bonbright, the
21 original version, but unfortunately I can't
22 find it; I can only get to the 1988 version
23 and further that were edited by Danielson
24 and some other guy.

1 However, Bonbright set out his
2 principles for rate design which people have
3 used forever in the industry since that text
4 to understand what we should be considering
5 when we're doing it. We've only really, I
6 won't say violated, but when we went to
7 restructuring we really didn't pay attention
8 to some of these because restructuring was a
9 complete change in the industry. However,
10 these attributes are something that people
11 have always considered in rate cases or rate
12 changes when you're trying to design rates
13 for service to customers.

14 So these eight attributes are
15 simplicity, understandability, public
16 acceptability, feasibility of application
17 and interpretation. So if nobody can
18 understand it, and some of the California
19 utilities, if you look at some of their
20 tariffs, I mean, I was trying to see how
21 they did decoupling in California and I
22 found a decoupling provider and I was
23 stunned at the equation they put in there.
24 I was, like -- it would take me a half an

1 hour to figure out what's in that equation,
2 never mind a customer, and I do rates for a
3 living. But these rate attributes are
4 important and I think we followed it well in
5 Rhode Island trying to keep things simple
6 for customers, easy to understand and yet at
7 the same time allowing the utility to cover
8 enough revenues to deliver service to
9 customers.

10 And then, of course, is the second
11 attribute which is its effectiveness. The
12 rates have to be effective in yielding the
13 revenue requirements that the Commission
14 allows the utility to recover. And part of
15 that issue with the revenue requirement is
16 obviously the stability of cash flow. We
17 don't -- there's no spike, right, so
18 whenever there's strong economic growth,
19 utilities don't overinvest in that period of
20 time. Utilities maintain a level -- kind of
21 a level standard. They'll invest to meet
22 new customer needs and stuff, but really,
23 they're maintaining a level cash flow, of
24 expenditures and investments and so we're

1 flat like this while the economy dips and
2 swoons like that because the revenue is
3 stable over time, the rates are very stable.
4 They only change when approved by the
5 Commission.

6 So the stability of rates. This is
7 very important, actually, because although
8 not as -- it didn't affect Rhode Island as
9 much when it came to restructuring, in
10 Massachusetts it did because we really
11 changed the demand charge for a lot of
12 customers in Massachusetts. Customers want
13 to be able to make investment decisions
14 today based upon rates they will see in the
15 future. So they want to be -- so stability
16 is an important consideration. You want to
17 establish a rate you can be confident will
18 actually be useful in the future for
19 customers, that you won't be changing it
20 dramatically. So part of that goes into how
21 you consider rates, that they need to
22 recover the cost to serve based upon how the
23 costs are incurred by the utility to deliver
24 that service to customers.

1 And then, of course, there's
2 fairness, right? Customer A shouldn't have
3 to pay for Customer B's cost. It's unfair
4 for Customer A to do so. Customer A should
5 be able to pay for the cost they need to be
6 served. Customer B should be able to pay
7 for their costs that they need to be serve.
8 It's only fair to all customers.

9 The next to the last principle is
10 the avoidance of undue discrimination, and
11 that is that similarly -- let me say that,
12 similarly situated customers should be
13 treated similarly. So that's why we have a
14 residential class and commercial/industrial
15 classes because we -- if you look at the
16 load shapes of those customers, they tend to
17 be similar. Commercial load shapes can be
18 much more various, but we take care of that
19 through, factors such as demand charges,
20 things like that. Commercial/industrial
21 customers can also be served at different
22 levels of the system, and we take care of
23 that through for example, credits for high
24 voltage metering and things like that where

1 customers are actually at a higher voltage
2 level than the average customer on that rate
3 class.

4 And finally, you want to use rates
5 for efficiency. You want to delivery an
6 efficient system, you want to make the
7 system efficient, you want to make the
8 customers consider their own efficiency as
9 it allows them to save money on their bill
10 which, hopefully, if designed appropriately,
11 will allow the system to save money to pay
12 for those savings that the customer is
13 getting on the bill. You've probably heard
14 a lot about people talking about time
15 varying rates and that whole idea of driving
16 efficiency in the system by telling
17 customers when the expensive periods are on
18 the system so that they can decide not to
19 consume or pay the cost of that consumption
20 and use it when it's cheap like over night.
21 And that will improve the efficiency because
22 in the end -- I did pull out another
23 presentation. It's not in this presentation
24 because I was trying to minimize the number

1 of slides we were using. I do have a load
2 duration curve if anybody wants to see it.

3 But usually the issue with New
4 England, the issue with utilities that has
5 been ongoing has never changed, it has
6 gotten worse in New England, is that the
7 ratio of average load to peak load is very
8 important because we're a fixed cost system,
9 and the lower that ratio is, the higher the
10 average usage cost is for customers because
11 the more we have -- we have very heavily
12 fixed costs with capital investments and,
13 therefore, that fixed cost is spread over
14 fewer and fewer kilowatt hours if you're
15 recovering costs on a kilowatt hour basis.
16 Very important consideration when you're
17 talking about rates.

18 And I always -- I was at a
19 conference -- where's Abigail. There you
20 are. So they wanted -- at the end,
21 Abigail -- Arcadia Center was holding this
22 conference, you know, well, what do we need
23 to do for next steps for promoting this
24 stuff. I said you have to get the national

1 discussion away from cost per kilowatt hour
2 and towards average bills because the
3 average bill in New England is actually a
4 lot less in Texas because we don't have any
5 air conditioning like they have in Texas.
6 So for residential customers, they actually
7 pay a lot less for electricity, and I know
8 because my neighbors are from Texas and they
9 jumped with joy when they realized their
10 bill would be \$1,000 less than what it was
11 in Texas. But it's because we don't have
12 the air conditioning. So they may have low
13 average costs per kilowatt hour in Texas but
14 that's because they can spread those unit
15 costs over a whole lot more hours of air
16 conditioning than we have in New England
17 because we have four seasons. So it's --
18 but if you talk about average bills, the New
19 England states always sit in the middle of
20 the pack. We're not at the top of the peak.
21 Now, your southern states, you love to talk
22 about cost of kilowatt hours but not average
23 bills. So it's an important consideration.
24 Any questions? No?

1 MS. GOLD: Is that true for
2 industrial customers as well or not so much?

3 MR. ZSCHOKKE: Well, outside of New
4 England, other regions have -- you know,
5 Texas. What's in Texas? Petro chemical
6 firms, huge, huge 50 megawatt, 1,600
7 megawatt plants. So when you look at
8 industrial rates and try to do the average,
9 you've got a 100 megawatt petro chemical
10 plant averaged with a two megawatt store.
11 So they're getting a really good deal and
12 the two megawatt may be paying a whole lot
13 more so you can't really tell.

14 Same thing with large automotive
15 factories. I remember in the mid '90s,
16 people -- so the Detroit Edison and
17 Consumers' Power in Michigan, they had
18 offered a discount to the auto manufacturers
19 in their service territory. So the first
20 year discount was a five percent discount.
21 The first year discount was \$36 million, or
22 was it ten percent? No I think it was ten
23 percent because there was \$360 million of
24 annual revenue just from the automotive

1 manufacturers alone.

2 Our largest customer in
3 Massachusetts, even if I aggregated all of
4 their facilities in the State of
5 Massachusetts was \$12 million in annual
6 revenue. So outside of New England the
7 industrial base is considerably different.
8 The auto manufacturers left New England,
9 went to wide open spaces and built massive
10 plants for efficiencies. So we don't have
11 those large industrial loads, and I think
12 probably one of largest is here in Rhode
13 Island, Quonset Point.

14 MR. ROUGHAN: Yes.

15 MR. ZSCHOKKE: So you can't really
16 compare commercial/industrial here to there.

17 MS. GOLD: I figured that. It's
18 interesting.

19 MR. ZSCHOKKE: Most people don't
20 understand that. Like air separation
21 plants. I think most of them have moved out
22 of New England because of other reasons
23 because it's kilowatt hour based; they want
24 to go to a demand base. Air separation

1 plants are very high load factor, like 95
2 percent, and they deliver the products to
3 hospitals and things like that. But they
4 want a demand charge, not an energy charge.
5 So if you move things to energy charge,
6 they'll actually leave a region and go
7 somewhere else.

8 Moving to Slide 3, I have talked to
9 a lot of customers in my career. The whole
10 concept of the rate case, and as Cindy
11 mentioned, by the time you get to rate
12 design, you are fatigued because you've
13 battled over the revenue requirement. The
14 important thing in a rate case is obviously
15 how much revenue does the company need to
16 provide service to customers. But the whole
17 process through which you determine that
18 revenue requirement, you then determine who
19 pays for it, how they pay for it is very
20 important, and those are the three big
21 steps, right? How much is needed? What's
22 in the bucket to recover? What classes are
23 responsible for it? And then once you get
24 to a class, what tools do you have available

1 to you to reflect the right decisions you
2 want the customers to make while at the same
3 time trying to meet Bonbright's principle of
4 creating stability of revenues and the
5 ability to recover the revenue requirement.

6 So as you see here if you start at
7 the top left side, determine the cost of
8 service which we call total revenue
9 requirement and we should actually have the
10 word approved because, obviously, it's not
11 what we file. We file something that looks
12 just like this, but then the Commission
13 approves something, and that is what's
14 actually billed to customers. We go through
15 a cost allocation process which determines
16 what type of costs are they, how should they
17 be allocated and then by determining those
18 two things you will then determine what
19 classes will pick up what portion of those
20 costs and then it gets allocated
21 residential, commercial/industrial and, of
22 course, we don't have streetlights here, but
23 streetlights will get a portion and then you
24 design rates and that's where the -- you

1 know, does the rates yield the revenue
2 requirement necessary to serve -- to deliver
3 the revenues that's necessary to serve the
4 customers.

5 And this obviously is, like I said,
6 based upon the tools. The meters in place.
7 And the meters we have in place have been
8 traditionally -- we have put them in place
9 because many years ago we did a
10 determination on a cost benefit study that
11 if you put a certain type of meter in,
12 customers would generate enough savings to
13 justify the cost of the meter. Demand
14 meters, time varying rate meters are more
15 expensive than kilowatt hour meters. So you
16 see our larger customers have those kinds of
17 meters whereas residential, smaller
18 customers have just kilowatt hour meters.
19 That does not mean that you can't use other
20 types of meters. Arizona, for example,
21 although the solar industry doesn't like
22 Arizona as an example, they've been doing
23 demand rates for years because of the air
24 conditioning load and obviously Arizona is a

1 hot state. They really want customers to
2 manage their demand because as people who
3 know the area, it can be very hot during the
4 day and then very cool at night. So how you
5 actually manage your air conditioning load
6 through different forms of air conditioning
7 types can be very important in the
8 decision -- in the rate design to drive that
9 decision for customers.

10 MS. WILSON-FRIAS: So what sort of
11 -- do we have a similar sort of challenge in
12 Rhode Island? You mentioned that we're a
13 four season state so we don't have the Texas
14 or Arizona situation. Do we have any
15 situations or examples where that would be
16 something for the Commission to consider?

17 MR. ZSCHOKKE: Well, New England
18 actually has a particularly difficult
19 challenge which is it's load factor has been
20 falling for decades in the ISO New England
21 which means that the average load is falling
22 relative to the peak load and, again, higher
23 fixed costs. That means your average costs
24 are increasing to serve customers. So --

1 and that's being driven I think because
2 we've become tremendously summer peaking.

3 When I started in the industry in
4 New England a few decades ago, New England
5 would bounce; some years would be a winter
6 peak, some years would be a summer peak.
7 It's gone. I mean, summer is 4,000
8 megawatts higher than winter peak demand on
9 a really cold day. And people -- we're
10 doing a critical peak pricing pilot and
11 smart grid in Worcester and people are,
12 like, should we call something in the
13 winter? I'm, like, no, because all of the
14 days are in the summer. And we have been --
15 we're moving to a central AC world, and we
16 have been over the last 30 years. I think
17 that's a particular problem because it's
18 driving capacity costs in the summertime
19 that are not compensated throughout the year
20 whereas in the '80s we had a bit of a
21 balance, winter/summer. Now summer is
22 really our -- if you want to think about
23 efficiency, we really need to drive
24 efficiency in the summer with air

1 conditioning load and whatever else is
2 happening in the summertime because that's
3 what's driving the costs in the system and
4 that's what is driving the need for
5 capacity.

6 MR. SCIALABBA: Has there been a
7 reduction over the past couple of decades of
8 demand response programs that have
9 contributed?

10 MR. ZSCHOKKE: Yes. Obviously with
11 restructuring we moved -- the utilities
12 moved out of the demand response business
13 because the suppliers would provide, right?
14 So we stepped away from that. So it was up
15 to the market to provide demand response
16 products and some like EnerNOC came forward
17 and designed products. For whatever reason
18 we're not getting the demand response that
19 we need at the time of peak or the load is
20 growing so fast relative to the demand
21 response we're getting -- that those
22 marketers are getting that we're not seeing
23 the results in the summertime that we need.

24 MR. SCIALABBA: I remember the days

1 when multiple utilities did have robust
2 demand response programs.

3 MR. ROUGHAN: There was a place
4 where, as Peter said, prior to restructuring
5 we ran our own interruptible type rates, and
6 then restructuring came along. The ISO New
7 England had both economic and emergency
8 programs which we would administer on their
9 behalf if customers wanted us to, but the
10 third-party suppliers could as well and so
11 we ran those programs for a long time.

12 When the forward capacity market
13 began in 2010 all that went away and now
14 they actually procure demand response
15 resources through those capacity auctions
16 they hold every year. So it's become much
17 more complicated for the regular day-to-day
18 customer to participate versus when the ISO
19 -- pre-1998 we had our own interruptible
20 rates and post-98 the ISO ran programs and
21 those were relatively successful, frankly.
22 We could get people into the economic
23 programs when there was no penalty and we
24 felt the training wheels in demand response

1 and they could migrate to emergency
2 programs. But when the forward capacity
3 market came along, those all went away and
4 it's just much more complicated and we are
5 working on localized -- we've had localized
6 programs in Rhode Island, believe it or not,
7 in the 2000s in this footprint actually
8 here, a localized demand response program to
9 manage load in the area because we were
10 having some construction delays at a major
11 substation projet and we were nervous about
12 that following summer's peak load.
13 Fortunately, everything worked out and the
14 substation was completed on time. We never
15 had to call it.

16 So that's the type of program that
17 we piloted in various states over the last
18 ten years or so. But those are separate
19 from the market in the forward capacity
20 market, how they administer those programs.

21 MR. ZSCHOKKE: Tim, nobody has come
22 forward with a replacement like a controlled
23 water heater program, controlled pool pumps.

24 MR. ROUGHAN: They tried to market

1 things like direct load control on air
2 conditioning and put in tens of megawatts of
3 control and unfortunately lost all their
4 financial insurance because they couldn't
5 deliver those programs. Because at the time
6 the value was relatively -- was very low
7 compared to today.

8 The Southeast Mass. zone just
9 recently -- Rhode Island zone just jumped in
10 capacity value in this past auction in
11 February. So now that the value which is to
12 be delivered in power year 2017 and 2018 has
13 gone up, now potentially you could have some
14 opportunities for those entities to try this
15 again.

16 MR. BIANCO: We'll see how long it
17 lasts.

18 MR. ROUGHAN: Yes.

19 MS. WILSON-FRIAS: Mark, did you
20 have a question?

21 MR. LeBEL: I know we're definitely
22 seeing the changing ratio of peak kilowatts
23 versus the number of kilowatts across the
24 region. For transmission and capacity you

1 definitely see that. Do you see that
2 phenomenon playing out the same way at the
3 distribution level? Maybe it's a lot
4 different across circuits or how do you see
5 it at the more local distribution level.

6 MR. ZSCHOKKE: Well, I mean, it's
7 certainly in the newer neighborhood where
8 all the houses are central AC you're going
9 to see summer peaks. I don't know if
10 there's any -- my guess is that most of the
11 distribution, although don't quote me, it's
12 going to flow downhill, right? Look at the
13 first slide. It flows downhill. The
14 customers are using the stuff from a demand
15 perspective in the summertime.

16 MR. ROUGHAN: I think our challenge
17 is a latency -- the latent air conditioning
18 load that pops up day three and four of a
19 heat wave where people pull out the old
20 dusty air conditioners from their garage
21 that they haven't put in their windows for a
22 while because they don't have to pay the
23 higher electric bill or higher electric
24 bill, and all of a sudden it's that home

1 that may have had one window unit now has
2 three or five. You go to Home Depot and buy
3 them for \$79 each. You see homes with air
4 conditioners in every bedroom now and so now
5 that customer that was maybe a three
6 kilowatt peak load on a hot summer afternoon
7 or actually summer evening, now is an eight
8 kilowatt load and that's very prevalent at
9 the distribution level.

10 Residential neighborhoods
11 throughout New England, their peaks really
12 do extend into the 9:00 p.m. timeframe
13 because none of us like to sleep in a hot
14 humid bedroom. That's what happens. So the
15 peaks have actually -- besides the peak load
16 going up over average, the time of peak is
17 moving later in the day, and that can be
18 seen clearly through the ISO peak loads and
19 even what we've seen on our system.

20 MR. ZSCHOKKE: But if I look at my
21 house as an example, builders are finding
22 that putting more cheap central AC units in
23 a house is cheaper than running a lot of
24 sheet metal in the house. I have two

1 systems in my house, both of which can serve
2 my house because the builder when they built
3 the house said, "I don't want to hire
4 somebody to put sheet metal everywhere.
5 I'll just put in this \$5,000 unit and run
6 sheet metal in a very small area in the
7 attic." And yes, I did have ice dams
8 because, obviously, having a unit that heats
9 my house in the attic is a dumb place for it
10 to be. But I don't have the sheet metal to
11 send the heat all the way throughout the
12 house upstairs and downstairs to the
13 basement. But that was the builder's choice
14 to do that because it was his low cost. So
15 new construction energy efficiency, if we
16 can get that taken care of, and they didn't
17 put in the most efficient system. Trust me.
18 But also having a unit -- so now think about
19 a hot summer day. If both of those units
20 are cranking at the same time, that's two
21 units of -- I don't know. What's the
22 kilowatt rating of a central AC per house?
23 MR. ROUGHAN: Four-and-a-half
24 kilowatts.

1 MR. ZSCHOKKE: So there's eight,
2 nine kilowatts of electricity that I could
3 be consuming instantaneously if I crank on
4 at the same time. So that's an unfortunate
5 situation based upon the builder's choice,
6 and for me to rip out all the walls and put
7 in sheet metal would be very expensive. But
8 that's what's been happening. And I think
9 you have to add to that the loss of
10 manufacturing. So we're moving to
11 healthcare, innovation, economy, less
12 manufacturing, more new economy stuff and we
13 don't have the automotive plants. We don't
14 have the big manufacturers. We used to have
15 much higher load factors. They've left the
16 region. So that's really impacting the load
17 factor in the region.

18 The other thing I want to point out
19 is when I first started doing this work, in
20 the summertime, as Tim mentioned, the peak
21 was very spiky and it would be, like, four
22 hours in the summertime. You would be,
23 okay, I see that happening. But when I
24 first -- when we first started talking about

1 doing the smart grid pilot in Worcester we
2 were doing an analysis on the load. The
3 first time they delivered me the ISO New
4 England loads, I looked at them. I was,
5 like, holy smoley. It's a completely
6 different world. It's a hump. The whole
7 day it's a hump. It's a 12-hour hump. And
8 it's no longer the clearly defined spike
9 that I used to see back in the '80s and
10 '90s. It is a hump. The load shape has
11 completely changed in the summer primarily
12 because people have put in central air or
13 these more service oriented firms, the
14 offices, are turning things on and leaving
15 it on throughout the day for whatever
16 reason, lack of demand response programs,
17 running of AC, whatever, and there's no
18 spike that -- you know, short period of time
19 that you're trying to actually get a peak in
20 the summertime. So it's a much more
21 difficult situation to figure out how I do
22 demand response for that 12-hour period over
23 a period of customers because nobody wants
24 to take 12-hours. You can't do it. All

1 have tried. It was a bad idea. Anyway,
2 that was a fun conversation.

3 So let's pick up the pace. On
4 Slide 4, this just takes you through a
5 little bit more about what an allocated cost
6 of service study does. I mean, the inputs
7 really are the rate base return and utility
8 expense, the cost of service and revenue
9 requirements. We functionalized that,
10 quote, unquote, put it into it's functions
11 of production, transmission, distribution or
12 general, like human resources would be
13 general. But our inputs are what are the
14 load and class -- customer class
15 characteristics. That's how many customers
16 do we have? How many bills do we send? How
17 many meters do we have? How many kilowatt
18 hours do we deliver? How much load is there
19 from the customer classes on the system? So
20 we use the load and customer class
21 characteristics as we go down and classify
22 our costs into demand, energy, customer or
23 direct assignment to do the allocations to
24 the different rate classes using demand,

1 energy or numbers of customers as an
2 allocator. So for example, meter costs and
3 billing costs would be allocated by -- you
4 know, the number of customers you have. So
5 it's very simple. Service drops allocated
6 by the number of customers. Whereas your
7 primary and secondary distribution
8 investment and operating expenses are
9 allocated by non-coincident peak demands of
10 the classes.

11 So we determine what the individual
12 non-coincident peak is of each customer, add
13 it all up and then we use it as a -- by rate
14 class and then we use it as an allocator
15 across the rate classes to allocate the
16 distribution investment and operation costs.
17 And that ends up obviously determining how
18 much revenue we need to recover from each
19 customer class.

20 MS. WILSON-FRIAS: What would be an
21 example of a direct assignment?

22 MR. ZSCHOKKE: A direct assignment.
23 Streetlights. Street lighting is -- that's
24 the easiest one.

1 MS. WILSON-FRIAS: So like a
2 Walmart with its own parking lot with
3 streetlights?

4 MR. ZSCHOKKE: Yeah. They would be
5 on a street lighting rate. All the
6 streetlights would be bundled together and
7 directly assigned to the street lighting
8 class.

9 MS. O'BRIEN: Could you explain
10 what non-coincident peak demand is?

11 MR. ZSCHOKKE: Okay. There's a
12 number of ways of calculating demand.

13 MS. O'BRIEN: Is this a complicated
14 one?

15 MR. ZSCHOKKE: Well, some people
16 refer to non-coincident peak differently
17 than others. So I look at -- there's three
18 types of demand measures. One is coincident
19 peak. Usually coincident peak means you
20 measure the customer's load at the time of
21 some determined system peak, right? So
22 you're coincident with a sytem peak. It
23 could be at the distribution level. It
24 could be at the system level. Then there's

1 what I call the class maximum demand which
2 is you look at each class and their hourly
3 loads as a sum and then you determine what
4 is the individual peak of the class and that
5 takes into consideration the diversity of
6 the customers within the class and how they
7 used the energy, the kilowatts.

8 And then there's non-coincident
9 peak which does not consider -- well, it
10 considers diversity of customers a little
11 bit differently, but what it does is it adds
12 the individual peak of each individual
13 customer across all customers to determine
14 what is -- so it doesn't regard what it
15 looks like when it's summed up. It just
16 uses every individual peak to determine what
17 the responsibility is for that class.

18 Now, I have to be careful because
19 some people will say non-coincident peak and
20 really mean class maximum. So whenever
21 somebody says it, make sure you have them
22 define the term because sometimes they are
23 loosely thrown about and they seem something
24 different.

1 MR. ELMER: But is it fair to say
2 that non-coincident peak could be -- could
3 also be the coincident peak time?

4 MR. ZSCHOKKE: It could. Probably
5 not because you would assume -- if there is
6 diversity of load among customers, my air
7 conditioner kicks on at two o'clock and
8 Tim's kicks on at three o'clock, you're
9 going to see non-coincident peak being much
10 greater than the coincident peak.

11 MR. ELMER: Okay.

12 MR. ZSCHOKKE: Okay? And just as a
13 general point, as you go from the system in
14 ISO New England and travel down the system,
15 the diversity capability of the system is --
16 reduces, so on a given feeder, my feeders
17 are serving primarily residential or
18 commercial/industrial. You go down this
19 street. The feeders serving this street are
20 serving primarily commercial/industrial. Go
21 to your home. The feeder on that street is
22 serving homes. And most classes have --
23 everybody has a similar pattern. Think
24 about residential getting up in the morning,

1 getting ready for work, leaving for work,
2 coming home at night and so the feeder, the
3 customer will be very consistent. The
4 diversity on the feeder will be much less on
5 the distribution level. However, when you
6 look at it as New England, diversity will be
7 much greater because obviously they have
8 what's happening in Maine versus what's
9 happening in Connecticut, et cetera.

10 MS. WILSON-FRIAS: So what happens
11 in one of those mixed use places where you
12 might have commercial all on the bottom and
13 then residences on top? You know, some of
14 those newer developments that are sort of
15 planned for those conveniences? Does that
16 change the analysis?

17 MR. ZSCHOKKE: That's an
18 interesting question. I have not seen a
19 load curve for those buildings, although I'd
20 love to, because I would assume the load
21 factor would go up for them, but I haven't
22 -- everybody's individually metered so --
23 but that's down to a very specific example.
24 I could use that specific example

1 everywhere. It's a question of how do you
2 want to design rates.

3 Now we use postage stamp rates,
4 very general classes. Part of rate design
5 is do we determine different classes based
6 upon characteristics such as that. If you
7 build a commercial/residential mixed use and
8 we determine the load factor to be
9 different, how would you design a rate for
10 that building and all its uses to get a
11 benefit, or do we maintain different rates?
12 But then you come into questions like that
13 where who's paying the bill among all those
14 customers and what are they charging the
15 customers in the building. So that's a --
16 and are they regulated by the Public Utility
17 Commission as a for sale for resale.

18 MS. WILSON-FRIAS: I guess what I
19 was thinking about more was your feeder
20 example. I was being way more basic than
21 you assumed. But I guess I was still
22 assuming they were all individually metered
23 and everybody was still receiving their
24 distribution service from National Grid.

1 But in terms of something where you might
2 have a grocery store and several restaurants
3 or some retail shops which would probably be
4 open from, say, 7:00 to 10:00 or 11:00 and
5 then above them have condo units, for
6 example, that would be residential.

7 MR. ZSCHOKKE: Right.

8 MS. WILSON-FRIAS: And so that was
9 sort of where I was coming from. I wasn't
10 getting quite as deep as you did.

11 MR. ZSCHOKKE: Sorry.

12 MS. WILSON-FRIAS: But it raises a
13 good point because you could theoretically
14 rate design down to every individual
15 customer. We don't. And so one of the
16 things probably open for discussion in this
17 docket will be where is that happy medium.

18 MR. ZSCHOKKE: It will be one of
19 things we do discuss, right. So some
20 jurisdictions, for example, you may have
21 seen that Solar City is suing Salt River
22 Project which is actually a cooperative.
23 It's a muni/regional cooperative in Utah, I
24 believe.

1 MR. ROUGHAN: Arizona.

2 MS. ZSCHOKKE: Because they just
3 came out, the Board said \$50 customer
4 charges for everybody who has PV and so
5 Solar City is upset and they're suing them
6 for antitrust violations. So it will be
7 interesting to see where that suit goes.

8 But part of it was they've chosen
9 to charge a specific charge to a specific
10 class of customers. Should we have a rate
11 class for those customers with PV alone or
12 is that undue discrimination? Should they
13 be considered differently? How do we design
14 that? So that will be something to consider
15 as we go forward.

16 MS. WILSON-FRIAS: I think that's
17 particularly true in light of the fact that
18 the legislation specifically refers to net
19 metering customers in terms of one of the
20 things that the Commission is supposed to be
21 looking at.

22 MR. ROUGHAN: And I think the issue
23 with Salt River Project is they were driving
24 their electric bill to zero so they weren't

1 contributing to the system cost and then the
2 allocation that that class had originally
3 so, therefore, a new class was invented to
4 provide the proper allocation.

5 MR. ZSCHOKKE: And part of that, I
6 do encourage everyone, anybody who has it,
7 and everywhere I go, and I probably have
8 said this, to read the EPA integrated grid
9 paper. It's on their website. It's free.
10 I can provide a copy to anybody who wants
11 it. It's a very good description of what's
12 the value that the grid provides to solar,
13 anybody with DG. It's easy to put solar on
14 your roof when you have a strong backbone
15 with the system, and there's five different
16 characteristics that the system provides. I
17 won't go into it here. But it also talks
18 about Germany and what happened there, a lot
19 of issues that happened with solar
20 penetration without a plan around it. They
21 just drove it in. And it then talks about
22 what are the products that could be provided
23 to the grid from distributed generation. So
24 it's a really balanced approach that I think

1 really helps people frame the discussion
2 when you're talking about the value of the
3 grid. And one of the things we will talk
4 about over the next 10, 20 years, maybe not
5 me, but one of the things that will be
6 talked about is what is required of the grid
7 in a distributed world? But that's far more
8 than what we need for today. Sorry. It
9 will be a fascinating discussion, though.

10 MS. O'BRIEN: You mentioned PV.
11 Could you just explain what PV is?

12 MR. ZSCHOKKE: Photovoltaic
13 electric. I have to confess in 1978 in the
14 geography class in college, yes, I am that
15 old, I did write a paper named Dreaming of
16 Solar on Every Rooftop.

17 MR. ROUGHAN: Now it comes out.

18 MR. ZSCHOKKE: Now it comes out.
19 So I'm not as bad as Abigail thinks I am.
20 So unit charges. So we already talked about
21 this. Customer demand and kilowatt hours.
22 These three charges are obviously the
23 standard. There are -- the demand can be
24 per kilowatt, it can be per kVa. Like I

1 said earlier, the engineers talk about
2 kilovolt amperes, they don't talk about
3 kilowatt hours.

4 MS. WILSON-FRIAS: So Peter, I get
5 what the concept of demand charges are, but
6 struggle with how they're set, what they do.
7 I mean, I understand their purpose, but kind
8 of -- how does it work? If I'm a customer
9 who has a demand charge, how do you explain
10 that to me?

11 MR. ZSCHOKKE: I explain that we
12 build a system outside your door to serve
13 you. If you're five megawatts, I know I
14 need to have five megawatts when you need
15 it. I have to have five megawatts when
16 everybody else is using power, assuming some
17 level of diversity and that's how I design
18 the system.

19 MS. WILSON-FRIAS: So what are you
20 designing? Are you designing five or are
21 you designing ten?

22 MR. ZSCHOKKE: Well, a 13 kV line
23 will hold what? Ten megawatts?

24 MR. ROUGHAN: About ten.

1 MR. ZSCHOKKE: Ten megawatts. So,
2 like, I once was talking to a car crusher in
3 Lawrence, Mass. about their demand which is
4 five megawatts. They didn't use it a whole
5 lot because they're a car crusher. He turns
6 on the machine, crushes a car. They're
7 done. And it's a massive unit, obviously,
8 five megawatts, but they're taking up half
9 the load on that line. Five megawatts.
10 Now, depending upon how they use it, you
11 could obviously schedule other things in and
12 get them to use it when load is light, but
13 that's a question of whether or not the
14 customer wants to make that agreement. But
15 when you're talking about cost of service
16 and I have to recover that five megawatts
17 from this customer because they need it,
18 then obviously you'd want them to be paying
19 five megawatts every month for -- whether or
20 not they use it because they're half the
21 load on the line potentially. So that's a
22 real world case.

23 If I've got fixed assets out there,
24 they have to be ready when you flip that

1 switch and that motor runs and it spikes and
2 then it levels off at five megawatts. So I
3 have to have capacity there to serve you.
4 And so that's the real question. It doesn't
5 change if you don't use it on Saturday.
6 It's still there. It doesn't change if you
7 don't use it six days out of the week. If
8 you use it one day, it's got to be there for
9 you along with serving all the other
10 customers on this line.

11 So that's what you need to -- it's
12 not like, you know, you choose to buy
13 capacity from Amazon so you'll pay the
14 charge for the capacity that day and it gets
15 delivered to your house. It's going to be
16 there all the time as you are connected to
17 the grid. Does that help?

18 MS. WILSON-FRIAS: It does. Is
19 there any reason why you couldn't charge
20 residential customers on a demand basis?

21 MR. ZSCHOKKE: No. It's really
22 just a cost of the meter. Do we justify the
23 cost of the meter through the efficiencies
24 we could gain by having demand meters and

1 having customers think about it. And if
2 there's a large take up in PVs, I would
3 recommend it. I think you'd find some
4 interesting things. Because you'd want
5 customers to manage the whole load in their
6 house.

7 Right now my water pump, water
8 conditioning systems, my AC works overnight
9 in the wintertime, that's probably my peak
10 load right there even though that's --
11 excuse me -- in the summertime. Summertime.
12 That's probably my peak load right there
13 because everything is running all the time
14 and it runs from midnight to 5:00. But I
15 don't know because I don't have a demand
16 rate so I can't I don't have a time -- I
17 want to have one of those smart meters so I
18 can see my load.

19 MR. BIANCO: Would you need a smart
20 meter to do it, though? I mean, smart
21 meter, that's an IP address, right? You
22 just need something that collects the data
23 and logs it.

24 MR. ZSCHOKKE: You could have the

1 old load research meters that you get --

2 MR. BIANCO: How often does the
3 meter read?

4 MR. ROUGHAN: What you need is an
5 interval meter. That's an hourly, whatever
6 interval it is, whether it's an hour
7 interval. Is it a five-minute interval? So
8 you need that. And then typically in order
9 to provide useful data you want to be able
10 to deliver it quickly to a customer so you
11 need a meter reading system that then can
12 then take the data and do something.

13 MR. BIANCO: If you wanted to have,
14 like, time of use or behavioral type rates,
15 but if you just wanted to have a demand
16 charge like you do now, it's just an
17 interval meter, right?

18 MR. ZSCHOKKE: It's two registers.
19 One will register the maximum demand, one
20 will --

21 MR. ROUGHAN: Well, there's two
22 different ways. An interval meter can give
23 you the hourly, daily data. A demand meter
24 can be a meter that doesn't necessarily read

1 at intervals. So you can have a maximum
2 demand with another lower cost meter but you
3 won't know when that occurs. You just know
4 it occurred. I set the number to zero today
5 and now when I looked at it 30 days later it
6 was at six. So my peak was six, but I don't
7 know when. You need the interval meter to
8 tell you when that six happened.

9 MR. LeBEL: So if you have just a
10 demand meter that tells you the maximum,
11 you're only getting that customer's maximum
12 demand. You're not necessarily getting a
13 system peak or a local peak which could be
14 what's driving the costs. So the interval
15 meter gets you more information and you can
16 do it based on different peaks, a number of
17 which Peter discussed earlier.

18 MR. ROUGHAN: Well, we have that --
19 we have interval metering at our feeders, at
20 our substations so we know what the feeder
21 does as well. So we know when it peaks.

22 MR. BIANCO: You have to do that.
23 ISO requires that.

24 MR. ROUGHAN: For our planning

1 groups to understand it, to design the
2 system, yes, we have that, but we don't have
3 the granularity in the system except for the
4 customers over 200 kilowatts you get an
5 interval meter because it's a demand energy
6 rate and it's also got a time of use
7 component so you need to know when you're
8 using power. So any customer that's on this
9 street that's over 200 kilowatts will have
10 an interval meter and they can know when
11 they hit their peak and how long it
12 occurred.

13 MR. BIANCO: How often do the
14 current AMRs that are out there, how often
15 do they output data?

16 MR. ROUGHAN: They're always
17 outputting.

18 MR. ZSCHOKKE: They're always
19 communicating.

20 MR. ROUGHAN: When the van drives
21 by, it captures the data.

22 MR. BIANCO: Why can't that be
23 read, like, it's a radio transmitted? Why
24 can't my phone just read that, collect that

1 data?

2 MR. ROUGHAN: There are some
3 vendors out there selling licensed itron
4 radio technology and developed what they
5 call ERT readers. So those are some of the
6 wifi thermostats that we're doing pilots in
7 Rhode Island right now in the Tiverton area,
8 actually have an ERT reader built in and it
9 can provide that data to the customer. But
10 again, the challenge with that is you don't
11 have -- the only path back to the system is
12 the customer's broadband. The challenge
13 there is the, A, the cyber security of that
14 connection, right, the accuracy of the data.
15 Can someone hack in and change the data?
16 Plus customers change wifi providers or
17 their router pickups. So now you lose some
18 -- if you want to use that for us to bill
19 on, it becomes very problematic. But for a
20 single customer to see what they're doing,
21 we've done pilots around that and tested it
22 and we see they work. There's really no
23 vendors really making those commercially.

24 MR. BIANCO: So nothing that you

1 could own that's just a data logger that
2 just sits right next to the EMR, just logs
3 that data?

4 MR. ROUGHAN: We won't be able to
5 capture it with a van driving by. That
6 communication system couldn't capture all
7 those data points. It can only capture a
8 single meter reading it sees when it drives
9 by. It doesn't have the capacity to capture
10 720 data points -- 720 hours a month data
11 points and download those to the system.

12 MR. ZSCHOKKE: And what the meter
13 is communicating out right now is the total
14 use from the last time it was read. So it's
15 -- well, actually, it's actually the total
16 use on the meter and then what happens is --
17 it tracks when it comes into the building.
18 So you'd have to do the subtraction also.

19 MR. SCIALABBA: Could you just
20 spend a minute and talk about minimum demand
21 ratchets and what they are and why you
22 include those in the rates?

23 MR. ZSCHOKKE: Why don't we go to
24 the next slide. So this is a slide we

1 wanted to set up an example of a similar
2 customer of a similar size or customers with
3 different load profiles. The easiest way,
4 let's go back to my five megawatt example.

5 Let's assume I have two customers
6 on the line, both five megawatts. One uses
7 it 25 percent of the time. One uses it 100
8 percent of the time. Air separation plant,
9 car crusher -- actually, a car crusher would
10 probably be ten percent of the time. The --
11 so I've got two loads, same megawatts, line
12 is full. So when I go and do a design on a
13 demand, if I'm not using a ratchet, I'm
14 going to charge the car crusher when they
15 use it. Let's say they use it only in the
16 summertime. And I'll charge the other
17 customer for five megawatts every month.
18 Well, obviously, if I'm -- if my total cost
19 of service is based upon that one line, the
20 customer who's using it every month is going
21 to pay a lot more when I design the rate
22 than the customer who only uses it in the
23 summertime. Or you can think about, for
24 example, ski areas in the wintertime.

1 So the reality is now we go back to
2 the fairness. Is it fair for the customer
3 using it all the time to pay a majority of
4 cost or should we actually have a
5 customer -- the other customer because they
6 are 50 percent of the line, that's why we
7 built it there. So what's the fairness for
8 the other customer? So a demand ratchet
9 actually tries to address that fairness
10 issue of customers who use it all the time
11 with a consistency as opposed to customers
12 who are much more sporadic with their usage
13 in terms of when they use it and how much
14 they use it so that it doesn't burden the
15 customer who's using it all the time with
16 all the costs but it actually fairly
17 allocates the cost of the distribution
18 system or anything else as appropriate to
19 those customers who are incurring -- who are
20 causing us to incur the cost when necessary.
21 Is that a healthy explanation?

22 MR. SCIALABBA: Right. So if I
23 have a car crusher, or in Rhode Island we
24 call them body disposal units, I run it for

1 15 minutes and I -- you know, I create my
2 peak demand, right? If I don't run it
3 again, that's going to set my demand for the
4 year basically, isn't it?

5 MR. ROUGHAN: A percentage.

6 MR. ZSCHOKKE: I think the rate is
7 75 percent of the maximum demand, yep. But
8 that's to reflect the fact that that
9 capacity has to be reserved there for you in
10 some sense. We have to factor that in when
11 we look at the customers on the line when
12 we're doing -- when we're doing our designs
13 of the system.

14 Now I compare that, for example, to
15 second feeder service rates which we have.
16 We have since the late '90s had customers
17 say I want a main service and then I want to
18 have a dedicated second service that
19 automatically comes on when the first
20 service goes out. They're paying a full
21 distribution charge on that, demand charge
22 on that based upon the amount that they've
23 asked to reserve. And what we do in
24 planning is we assume four megawatts -- we

1 assume that four megawatts is committed to
2 that customer on that other line. So when
3 we're doing our planning we say okay, do we
4 need capacity in an area? Well, if that
5 four megawatts is committed, even though
6 it's not being used all the time, we don't
7 consider that as available capacity for
8 system planning.

9 MR. BIANCO: Are utilities the only
10 industry that still look at this balance?
11 It seems like every other industry has moved
12 to subscription based rates for, like, car
13 taxes, cable, telephone, exercise clubs. I
14 mean it's all -- nobody pays or people don't
15 seem to prefer to pay for how much they use.
16 Is this the last industry that really
17 worries about usage variance?

18 MR. ZSCHOKKE: Well, I think even
19 the phone industry worries about my usage.
20 They just don't tell you about it.

21 MR. BIANCO: That's what I mean,
22 right? They find a way that they can
23 convince customers it is an equitable rate,
24 and I don't watch most of the channels I get

1 on cable, but I pay a certain rate because
2 to get IFC, I have to get that package and I
3 live with it.

4 MR. ZSCHOKKE: But you asked a
5 great question because in my mind, having
6 done rates for all these years, I think
7 that's the future. So the future to me is
8 more of an insurance. What do you want from
9 the system? How much capacity do you want?
10 That's what I'm going to give you and -- but
11 you need to be mindful, I'm not going to
12 give you any more than that.

13 MR. BIANCO: But we can always
14 create more services for you to subscribe
15 to.

16 MR. ZSCHOKKE: I can obviously
17 charge you a buck 50 a minute when you
18 overuse the amount you agreed to. I could
19 have some higher -- a much higher charge
20 that will make you think twice about using
21 it. Mark?

22 MR. LeBEL: I think you find that
23 the vast majority of things you buy every
24 day are not on a subscription basis. Buy a

1 can of coke. You could buy bigger bulk, but
2 you pay for your lunch, you pay for all
3 sorts of things on a per unit basis. I
4 mean, I think you just defined the universe
5 in an overly narrow way.

6 MR. BIANCO: I guess in a services
7 industry, right.

8 MR. LeBEL: Lots of things you buy
9 on a per unit basis.

10 Ms. ANTHONY: I think I was reading
11 an article, but it might have been somebody
12 else who was saying what they're finding is
13 these subscription services, the health club
14 is there, but people kind of hate it and
15 when given the option to switch, like a
16 punch card where you pay per visit, they
17 would prefer to use that unless they are a
18 heavy user. So --

19 COMMISSIONER DeSIMONE: That
20 depends how much the monthly fee is.

21 MS. ANTHONY: Right. If it makes
22 economic sense for you.

23 Commissioner DeSIMONE: And Planet
24 Fitness is \$10 a month.

1 MS. ANTHONY: That's a good deal.

2 COMMISSIONER DeSIMONE: To bring up
3 today's point, I mean, Cox, anyone who has
4 Cox is paying for a landline which they're
5 probably not even using.

6 MR. BIANCO: I don't have a phone.

7 COMMISSIONER DeSIMONE: Every
8 month.

9 MR. ZSCHOKKE: So as you see, we
10 can have a healthy debate as we debate what
11 the distribution company will be required to
12 do in the future and how we recover the cost
13 of that and in what format. I think it's
14 going to be a portion of on demand, it's
15 going to be a portion of subscription based.
16 I look at it as insurance. What do you need
17 out there for us to serve you? That way it
18 will be much clearer to us what we need to
19 reserve for you and we need to design.

20 MR. ROUGHAN: But it really boils
21 down on the allocation, right? Once you've
22 set the revenue requirement number, now
23 you've got to decide the allocation. Is it
24 a fixed fee by customer size just like

1 cable? Pay \$135 a month whether you watch
2 one second of it or whether you watch 120
3 hours. Do we go that dramatic in allocating
4 costs or do we continue -- I mean, that's
5 really the debate here is the allocation of
6 those costs just like the ratchet. If you
7 get rid of the ratchet on demand charge,
8 what does that really mean? It means that
9 you'll have an incrementally higher demand
10 charge to recover those costs that you
11 already recovered. So that's the balance
12 really.

13 MR. ZSCHOKKE: And it's a perfect
14 -- the subscription model and what Netflix
15 is doing with House of Cards and other
16 things, will people continue with the
17 subscription or will they go direct to a
18 provider and avoid all the other stuff and
19 just pay for the cable which will be a
20 subscription -- or the internet, I should
21 say, which will be a subscription.

22 Again, it's a heavy fixed cost
23 business so they have a lot of investment
24 and they want to sort of guarantee their

1 revenue stream to pay off that investment.
2 So they look at these subscription models as
3 a way of recovering the cost in a
4 competitive industry, and that should
5 certainly be considered here for either one
6 class or many classes.

7 MR. LeBEL: Netflix and gyms are
8 not considered a public service that impacts
9 a whole range of other policy areas. You
10 have to think about if you go to a
11 subscription model, we lose a major part of
12 our incentive for energy efficiency and
13 things like that. The regulated utility
14 industry has a much different consideration
15 than a Planet Fitness or Netflix.

16 MS. WILSON-FRIAS: I think, too,
17 though, there's a debate whether the
18 internet is a necessary service right now,
19 and there's questions about whether or not
20 people should be able to pay more for faster
21 service and somebody else gets slowed down.
22 And so there's the debate of which services
23 are actually becoming necessary services in
24 order to get a job. Cellphones. Several

1 years ago cellphones were a luxury and now
2 they're subsidized through the lifeline
3 program for certain classes of customers.
4 And those are packaged services and
5 subscription services. And so I think that
6 the debate is not inappropriate,
7 particularly where, as I mentioned earlier,
8 we've got two laws that have two ways of
9 getting to presumably kind of the same
10 thing.

11 MR. ZSCHOKKE: I think, Mark,
12 you're assuming that if it's a subscription
13 service with a fixed fee, there's no
14 incentive for energy efficiency, but in
15 reality it depends how you design it and it
16 depends on the requirements to ensure that
17 the value of energy efficiency completed is
18 shown in the customer's bill. Anything can
19 be designed and figured out. The billing
20 people will hate me for this, but I've never
21 allowed billing get in the way of doing the
22 right things for customers.

23 So I think we shouldn't step away
24 from it, thinking it will end energy

1 efficiency as we know it because one of the
2 things I considered in doing this is how
3 does it incent continual energy efficiency.
4 But I also want to point out that New
5 England's problem is I think we're really
6 good at energy efficiency but we now have to
7 get a little bit better at demand management
8 because that's what's driving the heavy
9 costs in the system.

10 MS. WILSON-FRIAS: Have you ever
11 seen, like, block rates? Like on the gas
12 side we've got a certain rate for a certain
13 amount of usage and then it changes as you
14 go to a different amount of usage. Have you
15 seen that on the electric side?

16 MR. ZSCHOKKE: Oh, my favorite
17 clause when I came to NEES in the old days
18 was, "Notwithstanding, the following shall
19 apply." It took me, like, six months. What
20 the hell does this mean? Everything is
21 before the tariff. This is what you have to
22 charge.

23 Yeah. California has inclining
24 block rates and they're now having a debate

1 about it because they've had legislation
2 that actually said all the adjustments for
3 decoupling have to be applied on the tail
4 block of the rate which meant that as people
5 put solar on their roofs, they avoided the
6 tail block; they weren't getting the revenue
7 from the adjustments. So now they have
8 legislation that says we'll reconsider that
9 and allow recovery of revenues over much
10 more. But -- so that's basically charging
11 customers for more usage the higher the
12 usage.

13 The problem with that rate is what
14 if I put in an electric vehicle? And I buy
15 an electric vehicle and my usage goes sky
16 high and I go into the tail block rates.
17 I'm paying \$.30 a kilowatt hour. Well, I'm
18 not going to buy an electric vehicle.
19 There's other reasons why I won't buy an
20 electric vehicle. But the reality is you
21 want to design a rate that reflects the cost
22 in the system. It doesn't reflect the cost
23 in the system.

24 Block rates came about because as

1 the industry grew in the '20s, '30s, '40s,
2 '50s, '60s, the more people used, the next
3 generation plant was cheaper, the next
4 transmission line was cheaper. So the
5 average costs were following with innovation
6 in the industry and so you were reflecting
7 that in the declining block rate. Now that
8 we don't have that decline in costs anymore,
9 you really want to reflect the time varying
10 element, if you're going to reflect
11 anything, so that customers will use it at
12 different times. Of course, understanding
13 that if you actually come to a flat load
14 profile policy, the cost will be the same
15 24/7.

16 MR. ROUGHAN: The important fact in
17 Massachusetts, both the residential and the
18 small commercial/industrial rates are
19 inclining blocks. So a certain bunch of
20 them, the first 600 kilowatt hours, the
21 residential rate costs you \$.05 a kilowatt
22 hour; everything over that costs you \$.07.
23 And the same with the C&I.

24 MR. ZSCHOKKE: We're trying to get

1 rid of that.

2 MR. ROUGHAN: Exactly, but to
3 Peter's point about the net metering, it's
4 actually causing people to get paid more the
5 more they actually self generate, so it's a
6 perverse -- it was put in place to promote
7 efficiency, but in point of fact it's been
8 perverted by the net metering structure in
9 Massachusetts that actually pays people when
10 they generate much more than they would
11 normally, so that would be a challenge for
12 block rates in general.

13 MR. MUSHER: Peter, you may be
14 trying to prove a different point, but
15 earlier you mentioned that the peak is -- it
16 used to be peak year and now it's more hump
17 year. You just talked about we're trying
18 to -- the big problem is demand management.
19 We're able to make a flatter line that's
20 better. I mean, aren't there some benefits
21 to make it a hump year than less spiky?

22 MR. SCIALABBA: I think you were
23 saying it's more peak for a longer period.

24 MR. ZSCHOKKE: The problem is a few

1 years ago Baltimore Gas & Electric offered a
2 demand management program to customers for
3 their air conditioning and they paid
4 customers 250 bucks to set up this program
5 which allowed Baltimore Gas & Electric to
6 control their air conditioner up to 12 hours
7 a day. And then it went to 100 degrees a
8 couple summers ago for many days and they
9 did and it was a bad idea.

10 MR. BIANCO: Pete, can I ask, but
11 in this case -- because I have an
12 interesting point. Was the control just on
13 or off or could they control the
14 temperature?

15 MR. ZSCHOKKE: The control was on
16 or off.

17 MR. BIANCO: So that's good for
18 handling a peak, but if you have a hump,
19 perhaps a better demand response opportunity
20 is to just deal with a couple of degrees of
21 temperature from a wide range of people
22 rather than an on/off situation.

23 MR. ZSCHOKKE: If you have a hump,
24 what you need to do is dispatch. So you're

1 dispatching X amount of air conditioners
2 this period of time and then another same
3 amount so you flatten the load. So you need
4 a whole bunch of air conditioners so they
5 can control their usage when they come on
6 the system. That's the way I would see it.

7 COMMISSIONER DeSIMONE: What
8 happened in Baltimore?

9 MR. ZSCHOKKE: If you would like to
10 see the curve, I have it here. This is the
11 hump. It starts growing at about eight
12 o'clock, ten o'clock in the morning and it
13 goes all the way out to ten o'clock at
14 night. So if anybody wants to see the
15 curve, it's a -- the hump exists. This is
16 from '08 through '10.

17 MR. ROUGHAN: I think what Dan is
18 talking about is the peakiness versus the
19 hump is still on those hottest days. It's
20 not every day of the year. Today is a
21 perfect day where there's no -- the loads
22 are probably --

23 MR. SCIALABBA: I think the
24 question was why haven't you portrayed the

1 hump as a negative, and Danny said well, why
2 isn't that beneficial, then, because I think
3 you're saying the peak has been reduced,
4 right?

5 MR. MUSHER: The spikiness.

6 (BRIEF PAUSE)

7 MR. MUSHER: I mean, I know that
8 you're talking about -- there's many
9 different things that drive costs and many
10 different types of costs, but if it's a --
11 having a very spiky peak drive costs, then I
12 would assume we're trying to level that
13 peak, and even if it's higher -- the overall
14 level.

15 MR. ZSCHOKKE: So I have another
16 curve right before this curve on the same
17 slide presentation that actually shows the
18 load duration curve for the same years. So
19 I have a hump for the days that are peak,
20 but when I look at the load duration curve
21 which sorts loads from highest to lowest, I
22 still am only looking at 100 to 300 hours a
23 year of load of 5,000 megawatts of
24 requirements in New England. So I'm using

1 5,000 megawatts out of a 26, 27,000 megawatt
2 peak system for 300 hours a year, a really
3 hot summer. That's it. That's -- when I
4 talk about reducing the peak, that's what
5 I'm talking about.

6 Now, to do so I have to take the
7 hump and lower the whole thing. Because if
8 I only get six hours of the hump, I still
9 have -- I've got to worry about recovery for
10 customers during the period. I have to
11 worry about -- you have to worry about --
12 and are you going to create a new peak
13 because of that. You have to worry about do
14 you actually get it. So I have this running
15 debate with Ahmad Faruqui of Brattle Group,
16 and anybody who knows him, he's like the TVR
17 angel. He'll sell it left and right.

18 I say, "Ahmad, I understand that
19 customers will save money on a time varying
20 rate. Has anybody done the study to say
21 that when they do that we actually save
22 money in the system?" And I thought he
23 would say yes but he said no. I'm, like,
24 "Well, wait a minute. So did it work?" And

1 I had this debate in the smart grid pilot
2 because my fellow utilities were like,
3 "Well, we're just going to calculate the
4 savings to customers." How do you monetize
5 it to the back end of the envelope? Did you
6 reduce the capacity requirements? Did you
7 reduce the high cost of energy during those
8 times? Did you save any money? Because
9 that's what's going to pay for the meters,
10 pay for the infrastructure to actually do
11 this stuff. You save money on the system.
12 But that was a bit stunning to me. He said
13 Baltimore Gas & Electric is the only utility
14 because they have a requirement by the
15 Maryland Commission to calculate the actual
16 savings before they'll get cost recovery for
17 their metering system. And I haven't seen a
18 finished study yet. That was a bit stunning
19 to me that nobody has done the after
20 forecast to say did we actually get what we
21 thought we were going to get in terms of
22 savings.

23 But when I look at it, I want to
24 see the savings. I'm not going to do it

1 just for giggles to give customers a new
2 product. You're doing it so when the
3 customer saves, the system saves and you
4 create greater efficiency in the system. If
5 I just reduce some of the hours in the peak
6 but I still have a peak at the same level,
7 well, I'm just going to make the load factor
8 worse. So that's the challenge that we face
9 in this industry given that it's a hump, but
10 we're still only talking -- we were talking
11 300 hours in 1986. Now we're just talking
12 about 300 hours a year in 30 days in the
13 summertime. So that's the difficulty that
14 we have. That's a lot of history.

15 MR. BIANCO: It's very interesting.
16 So was the problem in Baltimore that some
17 air conditioners were dispatched for 12
18 hours and your peak dispatch would have been
19 the same if you had a narrow hop-in of usage
20 but, in fact, it was this hump so some folks
21 ended up being dispatched for longer than
22 they could tolerate?

23 MR. ZSCHOKKE: Right, and they
24 didn't go to the mall. I think it impacted

1 the elderly more than anyone else because
2 they didn't have the mobility. But it was
3 not a pleasant summer for them.

4 MR. BIANCO: So we've had in Rhode
5 Island programs with the NEST thermostat
6 already offered by Grid and there are other
7 smart, I guess if you want to call them,
8 thermostats where the control of the
9 temperature would not be on/off but would --
10 what I was getting at was a few degrees.
11 Are you aware of another place where that
12 type of dispatch has been a little more
13 successful for dealing with the hump rather
14 than -- because the on/off dispatch, I mean,
15 while it can work, it's obviously -- you
16 need a fewer number of people to subscribe
17 for you reach a tolerance more quickly.

18 MR. ZSCHOKKE: I haven't, and
19 nobody has done the studies. Did you save
20 anything on the supply side? So I've seen
21 no studies with respect to anything that is
22 more effective at it or whether or not
23 they've actually done it. So we hope to do
24 it as part of this -- we won't be doing the

1 dispatch. And I asked about that. And
2 everybody involved in establishing a pilot
3 told me they would shoot me if I said we
4 would dispatch customers. So we won't do it
5 as part of the smart grid, but we'll at
6 least have a lot of information about how it
7 affects how long we call the price, the high
8 prices, what customers do and then what
9 happens when we stop calling the high prices
10 and the customer returns. And so we'll have
11 some good data after this summer and then
12 the following summer from that study.

13 MR. ROUGHAN: The Little Compton
14 pilot does cycle their energy. We have a
15 central AC and window control and this
16 summer is the summer we expect to really
17 call events. Last summer we tested it a
18 couple times, but we really didn't call
19 events, if you will. But it is a cycling
20 thing. The customer fatigue -- because the
21 other problem is when Peter talks dispatch
22 he means you need a group of customers that
23 are your noon to 2:00 p.m. customers that
24 you're going to dispatch and you need a

1 separate group that's 2:00 to 4:00 in order
2 to reduce that customer fatigue piece. And
3 it has to cycle. You're talking about
4 raising temperatures a couple of degrees.

5 But you run into conditions, and
6 Southern Cal. Edison ran into the same
7 problem. They had emergencies, lost a major
8 substation transformer. They had no choice
9 but to actually shut people off to keep the
10 lights on in the area, otherwise, there
11 would have been a huge outage. And shortly
12 thereafter everyone canceled their
13 subscription to be part of the program
14 because they said that was unacceptable.
15 They still had lights. They could still get
16 the internet. They were just sitting in
17 their underwear in their house it was so
18 hot. But the point was so even when you use
19 the control for an emergency to keep the
20 lights on for people, you still lost the
21 ability, the future ability to use it
22 because of customer fatigue. So that's
23 another piece that has to be sorted out with
24 the pilots. What are customers -- what's

1 acceptable and where -- you can't propose a
2 program that no one will sign up for. And
3 that's the other challenge. We'll get into
4 that at a future meeting. I just wanted to
5 make clear that in here Rhode Island that's
6 the plan.

7 MR. ZSCHOKKE: Having a large
8 enough customer base to have diversity of
9 demand response is very important to us.
10 Some customers will do it some days and
11 other customers won't do it other days. So
12 it's always the fatigue issue.

13 MS. WILSON-FRIAS: Before we get
14 into some examples, why don't we take a
15 ten-minute break and come back at 11:30?

16 MR. ZSCHOKKE: Sure.

17 (RECESS)

18 MS. WILSON-FRIAS: I think our goal
19 is to try to be done by one o'clock, and I
20 really want us to try to get to sort of the
21 discussion -- I really want to get to the
22 part of the discussion on the goals that can
23 be encouraged through different rate
24 designs, customer behavior, that sort of

1 thing. So as you're working through the
2 examples, if we could talk about sort of
3 what behaviors and the examples might
4 incentivize or what goals could be met
5 through the different rates or different
6 rate designs and that would give the
7 opportunity for the other participants to
8 sort of talk about things they might be
9 thinking of in terms of the goals and
10 behaviors. Okay?

11 MR. ZSCHOKKE: And everybody, as
12 before, feel free to chime in whenever you
13 so wish. So first off, we wanted to talk
14 about different rates for commercial,
15 industrial and residential. Very simple.
16 The two load profiles we have here, Customer
17 1, Customer 2. This is for a demand based
18 rate and we wanted to show the difference of
19 charging them kilowatt hours versus demand
20 charges.

21 Using the prior thought, you know,
22 obviously, there's a large customer with
23 spikier peak and there's another customer
24 with a high load factor that has a very low

1 peak but they use a lot of energy. And the
2 amount of energy, if you turn to Slide 7,
3 20,000 kilowatt hours. You have one
4 customer that has a 46 -- I don't know how
5 Jeanne came up with .1 kilowatt demand, but
6 she did. And another customer who has a
7 demand that's almost three times the size of
8 that but uses the same amount of kilowatt
9 hours. So again, their load factor is much
10 lower than the other customer's so -- and
11 keep in mind we build to serve the capacity
12 needs on this grid. We don't -- the energy
13 gets delivered as it gets delivered through
14 the system. The variable cost there is the
15 amount you need to run the generator, what
16 it costs to run the generator. It's not
17 like solar. Once you build it, you get the
18 free kilowatt hours after you put it in
19 there. So the variable cost there is zero.
20 Coal would be different, nuclear would be
21 different, et cetera, and the market prices
22 will be different based upon natural gas
23 prices.

24 So when you look at these two

1 customers, we did a kilowatt charge of \$5
2 and we said so your total revenue
3 requirement is \$4,000. So we said okay,
4 well, how will we recover the costs from
5 these customers. They both use 20,000
6 kilowatt hours. So the smaller customer
7 pays 1,760 a month for their bill. The
8 larger customer pays \$2,200. I mean, the
9 larger customer is paying more. Certainly
10 it's not more relative to their size. If
11 you do the ratio of 147 to 46, you obviously
12 would not get a -- there's not a three to
13 one bill, however, they are paying more on a
14 demand charge but they still have to pay a
15 bit on energy.

16 So if you're talking about -- in
17 this situation if you're talking about
18 trying to incent the customer to lower that
19 demand, you want to have more -- and
20 increase their load factor, spread that load
21 out, you would want to have a higher -- a
22 demand charge that would actually flatten
23 that demand out so they would actually think
24 about that.

1 Demand charges do work. I mean,
2 back when we had demand charges much higher
3 than they are today in Massachusetts, we had
4 customers -- they would actually start at
5 6:00 in the morning because it was a
6 non-peak demand charge and the on peak
7 period started at an 8:00 a.m. So they
8 would turn all their machines on at 6:00,
9 incur a spike in demand so now their load
10 would be flat because all the machines were
11 on for their industrial processes and they
12 brought all their staff in to do that at
13 that hour of the day and that way they saved
14 money to stay in business in Massachusetts
15 by converting how they did that. You go
16 back to Bonbright's principles. They wanted
17 to have that rate in effect all the time
18 because they had changed -- they had made an
19 investment in their systems to do that.
20 When restructuring came along and that
21 demand charge became much lower, they were
22 not as happy with the results.

23 MR. ROUGHAN: Just a point to
24 mention. We saw a dramatic change in

1 customer behavior upon restructuring when
2 demand charges went from the 10 to \$12
3 numbers we had in Mass. and Rhode Island
4 down to 3, 4, \$5 we have now. There was a
5 significant change in customer behavior due
6 to that significant decrease in demand
7 charges.

8 MS. WILSON-FRIAS: So do you think
9 the demand charge was sending an appropriate
10 price signal to those customers?

11 MR. ZSCHOKKE: Yes, I do.

12 MR. LeBEL: Was that because the
13 demand charge also included transmission or
14 capacity charges, or was that just
15 distribution?

16 MR. ROUGHAN: Just distribution.

17 MR. ZSCHOKKE: Before restructuring
18 it was designed based upon a combination of
19 the three, yes. However, it doesn't mean
20 that generation couldn't still be charged on
21 demand. It's just not how the wholesale
22 market works.

23 But yes, when you think about the
24 system efficiency and the fact that, as I

1 stated earlier, that load factor in the New
2 England system has been falling for over a
3 decade since restructuring and therefore the
4 unit costs are going up, the amount
5 generators have to charge goes up to get --
6 recover their fixed costs for their plants.
7 Then you really want customers to think hard
8 about how much demand they put on the system
9 that needs to be served as opposed to how
10 many kilowatt hours. You really want to
11 have the high -- and that's always been a
12 concern of the industry. If you want high
13 capacity utilization on the assets so that
14 you can have fewer assets in service to
15 serve the system, then you really want
16 customers to think hard about how they
17 manage their demand to lower it as much as
18 possible while being as efficient as
19 possible every other hour. So yes, I think
20 it's -- for this industry it definitely is a
21 perfect price signal that is appropriate.

22 MS. WILSON-FRIAS: Now, are there
23 other customers who maybe couldn't manage
24 their demand as well? For example -- or a

1 time of use rate wouldn't necessarily work
2 for them? I'm thinking -- Dunkin Donuts may
3 not be the best because I don't know where
4 the peaks are, but they're selling coffee
5 between probably mostly between 6:00 and
6 10:00 and then they probably have --

7 MR. ZSCHOKKE: The car crusher. So
8 the car crusher is a real example. It was
9 an Italian family, owned a car crusher in
10 Lawrence, Mass., and they would run the
11 crusher on the weekends because they didn't
12 want to pay the \$10 demand charge because it
13 was five megawatts. It was a \$50,000 bill.
14 I don't know what was special about this,
15 but a group of Japanese came to see it and
16 actually agreed with the Italian family to
17 pay the demand charge because they wanted to
18 see it run. So I don't know what was so
19 special about this, but I did park far away.

20 MR. BIANCO: Where did you say it
21 was?

22 MR. ZSCHOKKE: Lawrence, Mass.
23 Tamburello Salvage. They're a really nice
24 family. So we went in there. They're,

1 like, "We want to do something." And we had
2 just gotten the realtime pricing rate
3 approved and it was four price structures.
4 All the demand was energy based and it was
5 really focussed on two price periods. You
6 know, price went up to \$.84, hourly prices.

7 We go to talk them and they're,
8 like, "Oh, all these numbers. All these
9 numbers. I don't know if we can do this."
10 And I'm, like, "Look. It's very simple.
11 For 32 days in the summer we're going to
12 call price time one and two, the highest
13 prices. Don't use it. For all the other
14 days we'll call three and four and on those
15 days you use as much as you want." "Oh,
16 okay." So they actually increased their
17 usage by a factor of ten because we moved
18 their load to the lower load days and so
19 therefore we made room in the system. They
20 could use their five megawatts on those
21 days. When we set the high prices, they
22 weren't thinking about the \$.84. They would
23 be, like, Type 1 and Type 2 days. They just
24 didn't run their system. Told everybody do

1 something else. And you think they didn't
2 pay attention. Well, they increased their
3 usage by about ten times. And when we --
4 sometimes when we called Type 1 or 2 days,
5 they actually called up and said, "You sure
6 you can't make it a Type 3."

7 COMMISSIONER DeSIMONE: They must
8 have had an urgent customer request.

9 MR. ZSCHOKKE: Body disposal unit
10 needed to be operated quickly. So -- but
11 they're really nice people and it was really
12 an example of a complex rate being explained
13 simply for the customer to take advantage
14 of. And they got it. They used it and then
15 we went to restructuring and it went away.
16 So they weren't really happy about that.

17 But the reality is, I say this a
18 lot, but we all think customers are big
19 blobs in these groups of residential,
20 commercial, industrial. The reality is we
21 all drive different cars. We're all wearing
22 different colored shirts. We all live
23 different lives. And we need to consider
24 that when we're designing rates and when

1 we're talking to customers about rates, what
2 can work for a customer and yet does recover
3 the cost for the system? But that was a
4 perfect example of somebody on a demand
5 charge who wouldn't use it and was paying
6 attention to it and would actually benefit
7 from being on something like a realtime
8 pricing rate.

9 Now, the opposite example is, you
10 know, a firm, high tech military contractor
11 firm who -- the facility manager doesn't run
12 the shop but actually the engineers do with
13 a 15 megawatt heater to test components, and
14 they looked at me with those \$.84 and said,
15 "No way. I need a flat cost per kilowatt
16 hour. I'm not doing this because I don't
17 control anything in this building." Or an
18 extrusion plant, plastic extrusion or water
19 cleaner -- water purifier plant continual
20 running processes. They can't shut them in
21 the middle. Our friends down at Quonset
22 Point, continually running processes. They
23 can't shut. They all said no.

24 So the type and design you can use

1 for a customer, those customers want a
2 demand charge because they want to manage
3 their demand and then let their high load
4 factor run through because if you give them
5 a kilowatt hour charge, they're moving out
6 of state because it's too expensive for them
7 to stay at such a high load factor unless
8 their delivery cost is so expensive that it
9 outweighs where they're located. So you
10 have to balance the mix of design with the
11 types of customers you have.

12 MR. ROUGHAN: But there are
13 customers who are purely demand charge, are
14 more weighted to demand charges. This
15 building here, right? You can't really move
16 the air conditioning load on a hot summer
17 day any other time. However, if you work a
18 series of programs that are available in the
19 state through efficiencies and all the rest
20 of it and move toward more to a peak load
21 management, as Peter talked about, thought
22 process and you did some work in the
23 building like this, so you could at least
24 level out your air conditioning load, then

1 you could then -- because you would turn
2 yourself into a higher load factor customer
3 than you otherwise would be. A customer --
4 whatever the AC is, it is. And at the end
5 of the month they go, "Oh, my God. They've
6 gone crazy." Whereas if they actively
7 worked with efficiency programs and actively
8 worked to manage their demands, which only a
9 high demand charge will do, that's when you
10 can get those customers to change their
11 behavior.

12 MS. WILSON-FRIAS: This could be a
13 really crazy question. Could you create a
14 rate that itself would incent customers to
15 do energy efficiency? So what I mean is if
16 you had some sort of rate structure where if
17 a customer did a -- spent a certain amount
18 on energy efficiency over here or entered
19 into certain programs, they could actually
20 see a financial benefit on the bill, not
21 just this assumed life savings type --

22 MR. SCIALABBA: They're already
23 getting the benefit through the results of
24 the program.

1 MS. WILSON-FRIAS: I know, but --

2 MR. SCIALABBA: It would be double.

3 MS. WILSON-FRIAS: I was trying to
4 think -- something you just said, and I
5 can't pinpoint the word you just said. What
6 you just said that made that come into my
7 head.

8 MR. ROUGHAN: Demand manager. And
9 we did have a number of years ago I think,
10 Peter, in your days down here the ice
11 storage rate.

12 MR. ZSCHOKKE: IES.

13 MR. ROUGHAN: Where we had thermal
14 storage rates that would charge people at
15 night to make ice, and in theory, it was
16 really, really interesting. It really
17 works. In practice it was always difficult
18 to make happen because you never got enough
19 of a footprint for the massive amounts of
20 ice storage you really needed. There was
21 always an argument with the architect
22 engineering firm, because I ran a bunch of
23 these programs myself over the late '80s.
24 They'd always fight you over the last tank

1 you needed. And the worse part about it,
2 that day you needed that last tank, all your
3 savings evaporated because now your air
4 conditioning came on during the peak that
5 the ice storage was designed to prevent. So
6 that was our challenge with those. So we
7 did pilots down here. We did them in Mass.
8 at the time. And unfortunately, in
9 virtually every case we didn't have enough
10 storage at the end of the day because the
11 end use customer wouldn't give you the room
12 in the building. It didn't work.

13 Now better engineered systems are
14 available today for that type of allocation.
15 I mean, for example, they make a ten ton
16 unit that will take up two parking spaces
17 outside this building here that could air
18 condition probably a small part of this
19 building, probably use all 50 tons in this
20 building. But what I'm saying is that it
21 would be -- that higher demand charge would
22 incent people to look at those
23 opportunities. And if we had an opportunity
24 where the efficiency programs actually had a

1 much higher value stream toward peak load
2 reduction or management and still value the
3 energy savings over time, the combination of
4 the rate and those programs would really
5 work well with a concerted effort to get
6 customers to move to that over time.

7 MR. BIANCO: In the previous
8 example and in this example you had said
9 that some of these plants, for example, need
10 to run at a steady load for a certain amount
11 of time, and the idea is I don't control
12 anything in that plant.

13 MR. ZSCHOKKE: That's --

14 MR. BIANCO: That's a certain kind
15 of customer and this is sort of the same
16 thing to me where actually they might not be
17 able to -- it's not interruptible but there
18 could be an investment opportunity to put in
19 more efficient equipment that would have
20 lower demand. What they're trying to tell
21 you is I see better places to spend my
22 money. And even if you could work it out, I
23 always worry that it's hard to get those
24 dollars in there anyway. We have it in

1 every single thing we're doing in this
2 industry. It's like the last dollar people
3 want to invest goes to this industry.

4 MR. ZSCHOKKE: We have to recognize
5 customers make their own decisions. Abigail
6 hosted a wonderful event in the first two
7 days and I was -- it was hilarious because
8 the toaster was -- not only was the
9 conversation the highlight, but also the
10 toaster was the highlight because I never
11 realized I needed to have an elevator in my
12 toaster, but there it was. Instead of a
13 mechanical lever, somebody put an electric
14 motor in there so the toaster would just go
15 down and come back up when it was done. I
16 was, like, seriously? But it's a real world
17 example of even though the foundation is
18 concerned about sustainability and, you
19 know, the environment, things like that,
20 here we had a new electrical toy using more
21 electricity. Disgust. Did we need this? I
22 needed it at that time because it was the
23 only toaster available. But the reality is
24 we do have to keep in mind that customers

1 will make decisions on their own. That
2 somehow what we do -- we may have the best
3 of intentions. I talked to a lot of
4 customers. Many said no, some said yes on
5 interruptible credits and realtime pricing
6 and things like that. It makes it
7 difficult. We never had 100 percent takeup
8 of anything on that stuff.

9 MR. BIANCO: But I'm saying so it's
10 not just designing rates that incents
11 something, but that incents it in a way that
12 it's more attractive than other places to
13 invest your money.

14 MR. ZSCHOKKE: As technology
15 changes and we can make it more invisible
16 for the customer, like we talk about the air
17 conditioners --

18 MR. MUSHER: Make more what? What
19 invisible?

20 MR. ZSCHOKKE: Demand impact,
21 whatever control happens at their facility,
22 whether it's commercial/industrial so that
23 they can continue going about their business
24 in the comfort and convenience that they

1 want, then you will be able to spread it to
2 more and more customers. Because then it's
3 no longer a question of shut everything off.
4 It's a question of how do we manage this all
5 the way through in a way that you maintain
6 your services that you want and we get what
7 we want which is more management of the load
8 across the whole system or across the
9 feeder. So my dream is that we do contracts
10 with customers and we then use the control
11 mechanisms to dispatch what they do in their
12 house and their business to flatten out the
13 load as much as possible. But that's a
14 dream.

15 MS. GOLD: What was that?

16 MR. ZSCHOKKE: Imagine. So what
17 would be a convenience to customers?
18 Customers want to know what their bill is
19 every month. They want the same bill.
20 Every commercial/industrial customer, give
21 me a budget. Residentials all want a
22 budget. They only come and complain to us
23 when the budget -- costs go really high. So
24 you sit there and say it's 200 bucks a month

1 every month, or 100 bucks a month, whatever
2 it is based on the customer's usage,
3 residential. But you have to agree that I
4 will put in a control in your HVAC and I'll
5 agree that it won't go any higher than three
6 degrees above your favorite temperature and
7 it won't go any lower than three degrees
8 cooler than your favorite temperature
9 summer/winter and I manage that demand all
10 the way throughout the year and you agree
11 that we will do that.

12 But what do I need? I need a risk
13 arbitrage mechanism in the back office. I
14 need -- to manage market risks, to manage
15 what's happening on a daily basis and I need
16 a whole lot of customers to make this --
17 give it the volume that will allow me to
18 manage all these customers across a
19 footprint. That's my dream.

20 MS. GOLD: It's good to know.

21 MR. ZSCHOKKE: When you buy bread,
22 that's what happens. The bread
23 manufacturers, they think about the
24 wholesale price of wheat and oats and they

1 figure out what they need to buy -- to make
2 bread. You never talk about the short-term
3 price for wheat, oats in the Chicago trade.

4 MS. GOLD: Sometimes I do.

5 MR. ZSCHOKKE: You buy bread.

6 MR. BIANCO: So is your dream
7 model, then, a little bit different than,
8 like, I have a smart refrigerator that's
9 earning me money while I'm out at work? Are
10 you trading power and energy for me on the
11 system?

12 MR. ZSCHOKKE: It's consistent with
13 it. It's a question of whether or not the
14 customer does it or whether a third party
15 does it for the customer. It's all
16 invisible. The customer will get whatever
17 value that is in a lower bill or some fixed
18 price or whatever. But I always question
19 whether or not there's enough margin in the
20 business for somebody to build all that
21 infrastructure to do that. So that's a
22 different issue. Sorry. I digress.

23 MR. ELMER: It seems to me, though,
24 that this issue of visibility to the

1 customer versus invisibility may come up
2 later in this rate design docket, and I'm
3 quite curious about your goal or idea of
4 making it more invisible to the customer
5 rather than more transparent to the
6 customer. Can you say more about that? It
7 sounds counterintuitive to me.

8 MR. ZSCHOKKE: Well, it becomes
9 transparent to the customer in terms of
10 here's what I'm going to charge you. Now
11 that you've said okay, here's the keys to my
12 electric usage. Here's my services and
13 convenience. Because think about it. When
14 we talk about -- we don't open the
15 refrigerator and when it kicks on we -- the
16 circuit closes -- a circuit opens and you're
17 using more electricity. No. You just get a
18 beer, right? You get a glass of water. You
19 get a glass of milk. You don't even think
20 about the fact that it's a refrigerator.
21 And same thing with air conditioning. I
22 want to be cooler. I want to be warmer. I
23 want to watch the TV. Nobody is thinking
24 about the circuits and how they work.

1 They're thinking about the services.

2 So if you write a contract for
3 services which is what customers want and
4 you say these are the services I'll
5 guarantee. The more services you want, the
6 higher you pay. But they say -- but -- if
7 they're willing to do more, they get a lower
8 price and it's fixed.

9 Now, I, the seller, have the risk.
10 I've got the risk that if you use 100 watt
11 incandescent bulbs everywhere, I'm going to
12 be paying a huge cost and I'm not going to
13 make my money. So I want to put in the
14 energy efficiency. I want them to agree
15 that they'll use energy efficient bulbs.
16 I'll go to their house and I'll replace
17 their energy efficiency bulbs with new ones
18 because I want to make sure I can make as
19 much as possible on this hundred bucks or
20 two hundred bucks a month. The hilarity is
21 that's what we did at the beginning of the
22 business. It was \$.10 a light. We charged
23 by the usage. We didn't have meters.

24 MR. ROUGHAN: There's another part

1 of the transparency and that's -- my mother
2 is in a smart grid footprint in Worcester
3 and I said, "Oh, cool, ma. You got a cool
4 new meter. You can do this, dah, dah, dah."
5 She just looked at me and said, "Timothy, I
6 want nothing to do with that." I said,
7 "Well, what if we manage your use for you,
8 your services for you and you never saw it
9 and you stayed cool and warm and all the
10 rest? And at the end of the month you saw
11 some notation that said because I did this,
12 I'm this or I'm that." She said, "Oh,
13 that's great." So when you talk
14 transparency, it's also for those customers
15 who would prefer a passive approach who
16 aren't interested in playing with their
17 smart phone all day long, because in order
18 for all these savings Peter is talking about
19 to happen we can't just have a handful of
20 customers participate in this sort of thing.
21 We need 50, 60, 70 percent of the customer
22 base to be doing something on those peak
23 days. Whether they know they're doing it or
24 not is separate. But in order to really

1 drive the savings that have yet to be
2 identified in these future costs of
3 electricity, the commodity side, you need
4 massive chunks of load. You need the 1,900
5 megawatt hour peak load in Rhode Island to
6 be 1,650, 1,400, not to go from 1,900 to
7 1,892. You're not going to see any change
8 in pricing with this small incremental
9 change. You have to see a 3- or 400
10 megawatt drop on those days. That's
11 potentially where the savings are much more
12 realizable.

13 MR. ZSCHOKKE: I go back to my
14 salvage company example. You weren't
15 talking to people who had Bachelor's,
16 Master's or PhD's. They were salvage
17 people. We take cars and we crush them and
18 we sell the stuff off. So it's very -- but
19 they were crafty enough that if you gave
20 them a simple example, they would understand
21 what to do. And we took something which
22 most -- we would claim as more sophisticated
23 customers, people with the Bachelor's,
24 Master's and PhD's said no to and said think

1 about it differently and they took it and
2 they ran with it. So it's a -- when I think
3 about that example, I think about how do you
4 get to each and every customer in a way that
5 will make them provide the opportunity that
6 we're trying to get? And that's really what
7 it's about.

8 MS. PENNOCK: So you kind of
9 mentioned your ice storage example, that
10 technology now is different than it was in
11 the '80s, and so perhaps this is a --
12 whether this particular technology or
13 others, so how as we look at rate design,
14 how could you/does it impact what
15 technologies are available or could be
16 available to make these things work in terms
17 of transparency, in terms of customer choice
18 and all of those types of things? Does that
19 factor into your thinking, or is it mostly
20 that we talked about before peak load
21 management process is one lens to look at
22 rate design?

23 MR. ZSCHOKKE: It depends on your
24 goals. You want to design rates to make the

1 system more efficient so that the costs are
2 lower for customers than they would
3 otherwise have been. So in our case that
4 means you want to lower the per unit cost.
5 You want to lower the capital costs
6 necessary in the future to serve customers.
7 So you'd want to focus on demand management.
8 You'd want to focus on, you know, those
9 elements that are creating the spike, that
10 300 hours that we have, the capacity
11 requirements in a year and lower that down.

12 It doesn't mean that you don't want
13 to focus on energy efficiency and other
14 hours, but it's a balance. So you've got to
15 balance in the equation of how to lower the
16 demand at the peak time and then how to
17 continue to get people to change light bulbs
18 at night and be more efficient in the
19 wintertime so that you can use those hours
20 for other things.

21 MR. MUSHER: So if you said -- I'm
22 just trying to figure out how this
23 example -- and it sounded to me like a
24 subscription model example to me that you

1 said -- if National Grid came to me and
2 said, "We will guarantee that you will pay
3 \$100 on your bill every month. That will be
4 your plan. We have to put in the necessary
5 controls and you have a -- you can choose a
6 two degree maximum above or below or five
7 degree maximum above or below and that will
8 give you a cheaper plan or more expensive
9 plan. And as part of this you have to
10 change -- you have to do all this direct
11 install stuff like putting in high
12 efficiency light bulbs." That makes sense
13 to me, and maybe that would be compelling.
14 Maybe I want to sign up.

15 But how does it work -- I can see
16 how it would apply to the distribution part
17 of the bill, but would that relate -- how
18 does it relate to the competitive -- if I'm
19 going to a third-party supplier? Maybe I'm
20 getting into too many details right now, but
21 I'm trying to sort out how that would work.

22 MR. ZSCHOKKE: Well, you asked the
23 question who should do it, the distribution
24 utility or the supplier and that's -- that

1 question I don't have an answer for right
2 now because we are in a competitive market
3 so no supplier has stepped up to do that,
4 but they could.

5 MR. MUSER: But there's not a
6 competitive market for the distribution part
7 of the bill.

8 MR. ZSCHOKKE: Right, but -- be
9 that as it may, no one stepped up to even --
10 no one has called us to say, "Hey, can I
11 make a deal with you guys to do something?"

12 MR. ROUGHAN: You also have to
13 remember that the bill is -- right now it's,
14 obviously, 60 percent commodity. And so you
15 still have that variable. You still use
16 that. So there could be -- the rate could
17 be changed where you still need the meter
18 data. So you can have a commodity, if you
19 will, but have components of the bill be
20 fixed components potentially like 100 a
21 meter. Remember, when you talk about the
22 wires and the stuff that's outside the door
23 here? You're really only talking about 20
24 percent of the bill because even on the

1 distribution side of the bill you've got a
2 lot of other programs that are paid for
3 through that, right?

4 MR. MUSHER: That answered my
5 question. The example wouldn't pertain to
6 the distribution part of the bill.

7 MR. ZSCHOKKE: The problem is
8 there's not enough margin in most parts of
9 bill for somebody to bill what is necessary
10 in the back office to run this.

11 Think about oil trading. You're
12 talking about something like that that needs
13 technical expertise and some -- and lots of
14 computing power, lots of meters and stuff,
15 lots of information to be able to manage
16 these risks and to understand what you need
17 when you need it. All realtime
18 capabilities. My dream doesn't happen
19 because we don't have the infrastructure, it
20 could be considered too expensive, and you
21 don't have the back office created to
22 actually drive this forward.

23 So it's -- I told this story at a
24 conference I was at earlier. I went to a

1 pricing conference many years ago that was
2 not a utility pricing conference and I
3 didn't hear cost of service at all through
4 the three days. It was all about value,
5 what your competitors are doing, how you
6 want your customers to value a product. If
7 you want them to value a luxury item, you're
8 not going to charge a buck for it. There
9 was everything about cost of service. They
10 didn't talk about cost of service.

11 So the world works that way, but
12 they build these models in the back of
13 their -- they're charging a value and
14 competition, but they build these models to
15 manage their risks and their business in the
16 back office and I -- the reason why it
17 hasn't come to this industry I think is
18 because really there's very little margin.
19 If you talk to a retailer, a supply company,
20 they'll tell you that there's not a whole
21 lot of margin in their business to serve
22 customers. What they're making, two to
23 three percent at most. So they can't
24 necessarily invest in greater infrastructure

1 to do something like this because it will
2 take a lot of infrastructure.

3 MR. HANDY: We haven't really
4 talked about streetlights much in this
5 context, but streetlights have been managed
6 that way since they started basically, that
7 there's a flat fee on a streetlight
8 basically. Isn't that right? So how does
9 that match? We were concerned about the
10 fact that LED lights were never allowed to
11 be under the tariff to be integrated in
12 streetlights. So there was never the
13 structure provided in that management system
14 to provide better management of demand and
15 the flexibility in the tariff to dark night.
16 I guess the question is why weren't those
17 more progressively implemented? What was
18 the -- why wasn't the incentive structure
19 more -- better aligned?

20 MR. ZSCHOKKE: Well, LEDs are
21 relatively new and I haven't given a lot of
22 thought to streetlights, but you can
23 certainly think of different things, a lot
24 of questions that go into that. But

1 streetlights are certainly somewhat -- a
2 usage that you can see and, you know, what
3 the hours of usage are and there are other
4 factors that go into the equation of
5 streetlights, one of which is liability,
6 that determine the fact that it's kind of a
7 must run unit from our perspective through
8 the dark hours. So that the lights are on
9 in case somebody does get hurt or can avoid
10 being hurt. So no, we haven't thought of
11 that, but to do anything like that would
12 take infrastructure and that infrastructure
13 costs money. And the question is do
14 customers want to pay for that additional
15 infrastructure cost while maintaining the
16 service necessary and keeping in mind other
17 considerations.

18 MR. HANDY: I guess the question is
19 now we're trying to -- we're evolving toward
20 that being more of a customer decision
21 because they didn't allow you to make those
22 decisions under the previous tariff. They
23 didn't have the ability to implement LED
24 because they would still pay the same charge

1 for their lights because LED wasn't
2 integrated.

3 MR. ZSCHOKKE: The charge of the
4 light is really the cost of the light. So
5 if an LED costs X, that would be the charge.
6 LED lights tend to be more expensive than
7 the other lights. And then the next
8 question is how much usage. You get the
9 same as the energy.

10 MR. HANDY: That's right. And that
11 wasn't integrated in the tariff so there was
12 a disincentive to do that basically. There
13 wasn't a lower -- there wasn't the usage
14 profile for an LED light in the tariff. So
15 if they switched to an LED light, they would
16 still be charged on --

17 MR. ZSCHOKKE: Right. We weren't
18 offering LED lights. Okay.

19 MR. HANDY: And then the issue of
20 dimming and --

21 MR. ZSCHOKKE: There would be --
22 well, maybe if the light was not -- if the
23 light we were replacing was not fully
24 recovered, obviously, there could be some

1 additional cost that would need to be
2 recovered. But that's almost a -- the
3 advent of lighting technology is a very
4 interesting thought process of how we would
5 use that going forward and whether or not we
6 should be doing that or whether or not we
7 should just be delivering the kilowatt hours
8 based upon the infrastructure. But that's a
9 debate that's already in front of the
10 Commission and we're doing a pilot with the
11 municipalities.

12 MR. HANDY: I was just thinking
13 about it from a -- as part your dream and
14 the whole -- that flat cost structure.

15 MR. ZSCHOKKE: Again, my dream is
16 easier when everybody -- the average usage
17 is like Texas of 1,300 kilowatt hours a
18 month for customers, but it's a lot harder
19 in New England where it's 660 because,
20 obviously, more usage means more revenue and
21 I'm allocating the fixed costs over more --
22 spreading them over more units. And that,
23 of course, will be a lot of costs that will
24 have to be incurred. That's always the

1 challenge. What do you do based upon trying
2 to deliver services to customers as well at
3 low cost?

4 MS. WILSON-FRIAS: We have your
5 customer -- your smaller demand customers
6 pays a lower bill because of the demand
7 charge. So on the next page it looks like
8 you have no demand charge.

9 MR. ZSCHOKKE: We have no demand
10 charge.

11 MS. WILSON-FRIAS: And both
12 customers, despite the fact that they're two
13 different sizes --

14 MR. ZSCHOKKE: Pay the same amount.
15 So from a distribution perspective, a small
16 customer is paying for some of the large
17 customer's needs. And even in the prior
18 example, the small customer was paying for
19 some of it, but now they're paying an equal
20 amount even though I'm going to build the
21 system to reflect the large customer and the
22 smaller customer together.

23 MS. WILSON-FRIAS: So does this go
24 to the principle of fairness?

1 MR. ZSCHOKKE: This does go to the
2 principle of fairness. Obviously, I build
3 less -- if I add together -- what I need to
4 build is the sum of the two loads.
5 Obviously, the 46 kilowatts should pay their
6 46 kilowatt share and the 142 should pay
7 their 142 share, but the result in both of
8 these is that does not happen. This one is
9 more extreme than the other one. But that's
10 what a demand charge will get you. A demand
11 charge will get you something for more fair
12 for those customers based on their size.

13 MS. WILSON-FRIAS: So under this
14 example your car crusher would have had no
15 incentive to change their time of operation.

16 MR. ZSCHOKKE: It depends upon the
17 design. It doesn't preclude the idea -- a
18 demand charge doesn't preclude the idea that
19 you would actually consider a deal with the
20 car crusher or a rate where they could use
21 it when you knew you had capacity available.
22 So the demand charge in Massachusetts at the
23 time was actually only applied 8:00 a.m. to
24 8:00 p.m. weekdays, excluding week holidays,

1 8:00 to 9:00. So they used it outside that
2 period and it was primarily weekends. And
3 then I created an opportunity for them to
4 use it during the week when we had the
5 capacity available. And they used more so
6 they delivered more revenues. So you can do
7 different things to ensure that the customer
8 is not on when you don't want them on.

9 MS. WILSON-FRIAS: So in
10 Massachusetts did you have special contract
11 rates separate from your general tariff
12 rate?

13 MR. ZSCHOKKE: It was a general
14 tariff rate on realtime pricing. We did
15 have one special contract.

16 MR. ROUGHAN: Again, that's all
17 pre-restructuring.

18 MR. ZSCHOKKE: That's all
19 pre-restructuring, yes, but it is an example
20 of what you can do with customers to give
21 them an opportunity to save money on the
22 demand charge by moving their demand to
23 periods when you have capacity, when you're
24 more comfortable with them using the system.

1 MR. HANDY: I don't want to break
2 up the progression here, but in the
3 beginning page you showed us the
4 illustration and you said this is changing,
5 the distributed generation, the whole model
6 is changing. So if you had a more powerful
7 demand charge, would you -- could you
8 conceivably structure it in a way that when
9 there's a reduced demand because of
10 generation, on-site generation, would that
11 mean they would receive some benefit?

12 MR. ZSCHOKKE: Well, they would --
13 they would save the benefits as long as
14 their demand didn't occur during the periods
15 when we were applying the demand charge.

16 MR. ROUGHAN: But it comes back to
17 load management. Your loads are in the
18 building and you use your generation to try
19 to be coincident with your peak times. And
20 by default, if you can do that, you do
21 reduce your load. If you just let it run
22 willy nilly and just use your energy willy
23 nilly, you're going to get what you're going
24 to get. If you can actively manage energy

1 and demand, you can absolutely reduce --
2 even under today's rate structure, reduce
3 demand charges with on-site generation.
4 Unfortunately, very few people actually do
5 those two things. They just let them go.
6 They don't really have that. We did -- back
7 in the \$10 kilowatt demand days, a lot of
8 pre-energy efficiency days, we did lots of
9 load management projects with customers to
10 reduce their real demand. This is
11 pre-energy efficiency. That was the late
12 '80s, early '90s timeframe where customers
13 were really -- believe it or not, customers
14 in that period actively managed their load
15 much more aggressively than they do today.

16 MR. ZSCHOKKE: Well, the energy
17 efficiency programs were called conservation
18 load management programs back then.

19 MR. LeBEL: I think it's worth
20 emphasizing that the simpler versions of
21 demand charges don't have any incentive to
22 shift your time of use. Often it's just
23 customer based peak demand. It doesn't
24 matter whether it's at midnight or 6:00 p.m.

1 on the hottest day of the year. Simpler
2 versions of demand charges don't care about
3 that. You can get to more complex demand
4 charges that are based on local, regional or
5 system peaks depending on which part of that
6 you think is the cost driver and then you
7 could switch to more time of use rates that
8 have per kilowatt hour charges at those
9 higher times. So there's a progression of
10 demand charges depending on which level of
11 cost you really care about controlling.

12 MR. ROUGHAN: We have those in
13 Rhode Island. Our medium C&I rate is a
14 non-time of use, it's a demand energy rate,
15 and just as Mark said, whenever you hit that
16 demand in a 30-day billing period, that's
17 your peak demand. It's got a relatively low
18 cost electric meter there, too, and you
19 don't know when it happens. You just know
20 when it occurred.

21 When you get into the G-32 rate
22 which is time of use rate, that's where you
23 have to interval because we need to know
24 when the power was used. That's when

1 customers can sort out their -- their demand
2 charges are technically assigned on the
3 weekends and the off-peak. So that can
4 happen. Those structures are already out
5 there. It is only for the demand component.
6 The commodity market hasn't embraced this
7 world and they're, again, as you said, 60
8 percent of the bill here so that's a whole
9 separate challenge we have here. But you're
10 right, there's different types here. As we
11 go to additional or look at other metering
12 options, that's when you can get into more
13 of the time varying rates. That's where
14 folks can work this much more effectively.

15 MR. BIANCO: Can I just -- I mean,
16 it is the most simple and it doesn't incent
17 unless actually the -- depending on the
18 configuration a user has on-site generation
19 to set the point. If you have on-site
20 generation and you understand when you're
21 generating, you can lower your demand
22 charge. You can use the simple demand
23 charge and just cut your -- so you can have
24 a simple demand charge with something on

1 your roof and actually if you just
2 understand how your system works and your
3 usage, too, do it yourself and it is
4 incented. What I was wondering is are
5 systems configured? Are all the systems for
6 DG configured for that, for demand offsets?
7 Like, all net metering systems, for example,
8 are, right? You're using that on-site
9 generation, but even the ones that are net
10 metered.

11 MR. ZSCHOKKE: I do want to apply
12 these rates to the future. Again, we
13 started this by saying this is based upon
14 what the past was like. In a DG world --
15 and if you read the EPRI integrated grid
16 paper, you'll understand. When I talked to
17 the engineers, like, I said they talk about
18 volt amperes, they don't talk about
19 kilowatts. They talk about stability of the
20 system. They talk about frequency. And
21 that's what they're concerned about when
22 they're running the system. And so there's
23 other products that we sell that we don't --
24 we're living with the legacy of the sales

1 based metering structure because the meter
2 was come in to promote electricity usage way
3 back when. And now that we go to the
4 future, there's different products that
5 could be provided and measured and there's
6 different products that by us or to us and
7 when people have their own generation. So
8 it's a much more complex world of products
9 that people have to be considering.

10 Like I said at the beginning, one
11 of the things our distribution engineers
12 worry about now is voltage was one way,
13 right? It would fall as you went further
14 away from a substation, as you went further
15 down. So they had to worry about raising
16 voltage as you went down the line to
17 maintain it within the standards. Now they
18 have to worry about voltage coming back when
19 somebody is over-producing in their solar PV
20 system and they may have an over-voltage
21 system on the tail end of the line that may
22 be impacting other customers.

23 So those are things -- so how we
24 evolve pricing will be an interesting

1 discussion because of those issues, and at
2 the same time there's the PV folks the want
3 to be paid for services they provide to the
4 grid. We have to have that structure in
5 place for them to either recognize the
6 savings they can get by doing certain things
7 one way or what we would pay them if they
8 were actually designing themselves to
9 produce on a basis that we would -- when we
10 call and ask them to do something. So the
11 future, we will evolve into different
12 pricing mechanisms. We're talking about the
13 immediate, what we have today and what we're
14 accustomed to and what we can do today
15 affects customers, but let's not assume that
16 that is something that will sustain itself
17 over the long term.

18 MR. BIANCO: I just meant, though,
19 we do have today meters in parallel which
20 are designed to run certain programs and we
21 have bidirectional meters. The parallel
22 metering, I mean, is that real net metering
23 or is that virtual? Does the power that --
24 certainly the energy is simple to offset.

1 The power that gets generated on somebody's
2 roof in parallel configuration offsets the
3 power that they're --

4 MR. ROUGHAN: In terms of the
5 proposed renewable energy growth program or
6 the old net metering? Net metering is a
7 single meter. Which one were you --

8 MR. BIANCO: Like a parallel
9 metering where there's a meter and a wire
10 for --

11 MR. ROUGHAN: The generation only.

12 MR. BIANCO: For the generation and
13 there's a meter and a wire for the load. I
14 actually don't know how the system connects
15 to your distribution from there, if they
16 then join at a single spot and so --

17 MR. ROUGHAN: So what would happen
18 in that case, Todd, the customer gets the
19 net metering -- the residential. Let's
20 start with residential because that's
21 default net metering for that customer. So
22 they get the full effect and value of net
23 metering on their load side, right, as per
24 the net metering tariff. And then they'll

1 -- and whatever -- so if that value is worth
2 \$.15, we'll call it, but the performance
3 based incentive was worth \$.25, they would
4 then get the value of the \$.15 on their
5 electric bill, we'd apply the credit on
6 their electric bill and then cut them a
7 check for \$.10 extra for energy that they
8 produced that month. So they are getting --

9 MR. BIANCO: I'm more interested in
10 the physics.

11 MR. ROUGHAN: The physics are, yes,
12 you're reducing the on-site load, the
13 coincident -- hourly coincident generation
14 at that point in the system. So yes, you
15 are doing it. The challenge that I've been
16 talking about all along here is no one --
17 people don't appear from what we've seen to
18 be actively managing their electric loads
19 and/or actively managing their generation.
20 So when you combine the two, that's where
21 the savings really are. The challenge is
22 how do you incent customers to do that. And
23 one of the ways is I think with some sort of
24 rate design.

1 MR. HANDY: Let me just dig down on
2 that because in the net metering context,
3 there obviously is an incentive to match the
4 production to the load because if you go
5 over your load, you're going to be -- I just
6 wanted to drill down on that a little bit
7 because in net metering there is an
8 incentive generally to produce what you're
9 consuming because if you over-produce what
10 you're consuming, you get a lesser rate.

11 MR. BIANCO: You're talking about
12 energy now.

13 MR. ROUGHAN: You're talking about
14 annual perspective, yes.

15 MR. HANDY: So that this is a time
16 issue. You're talking about on a daily
17 basis or --

18 MR. ROUGHAN: Yes. This is
19 actually managing. There are building
20 management systems that customers use for
21 fire and life safety, but for some reason
22 don't use the parts of the system that are
23 available for managing their energy use.
24 That's the challenge we really have.

1 MR. HANDY: How fine do they have
2 to manage? Do they have to manage in
3 five-minute increments that their production
4 meets their consumption or in 24-hour
5 increments or in monthly increments? What's
6 required?

7 MR. ZSCHOKKE: It depends on the
8 rate structure and the metering that's
9 available. If they've got just energy
10 metering over a month and they don't have
11 hourly intervals, then they manage it over
12 that month. If they do have hourly
13 metering, then they have to manage on an
14 hourly basis.

15 MR. HANDY: We're going back and
16 forth between the monetary incentive and the
17 physics. Is the rate design to accommodate
18 some physics of the system or is it -- do
19 you understand what I'm saying?

20 MR. ZSCHOKKE: It will in the
21 future. If you want to really make the
22 system efficient, it will have to because --
23 so the systems are designed now to -- they
24 may be matching usage to the usage at the

1 home or the business or they may actually
2 just be putting as much as they can on it
3 and try to make as much money from net
4 metering as they can. Either way they
5 haven't done anything to manage the voltage
6 necessarily. They haven't turned it into a
7 direction where we may actually need it for
8 peak. So they're not reducing the peak
9 demand on the system by the full maximum
10 capacity, but they may be reducing it a
11 little bit but it's four, five o'clock in
12 the afternoon. It's obviously going to be
13 less than if it's noon. They may be
14 over-producing too much voltage because we
15 don't measure voltage particularly at the
16 residential level. They may be producing
17 too much so voltage has to be managed on the
18 system. So now we have the voltage
19 management charge which we have on the G-30
20 rate. We have a kVa charge for customers
21 who need more voltage than their kilowatt
22 usage. We will charge them a premium for
23 that extra service that they use. Now you
24 bring it down to people with production

1 facilities at the residential level. They
2 may actually be creating an issue because
3 that's something that we have to worry
4 about. Because if there's too much voltage
5 on the system, as someone described to me
6 that's happening in their home, a planning
7 engineer, light bulbs pop and -- or TVs pop
8 or things break. If there's too little,
9 things don't work. So those things have to
10 be managed. That's what the engineers are
11 worried about. They're worried about the
12 voltage, the amps and the frequency, make
13 sure the system remains stable and doesn't
14 do any damage or can provide the service
15 necessary to customers.

16 MR. HANDY: It seems like the
17 question is how do we provide that kind of
18 transparency to the customer to know what
19 they need to do, and also how do we make the
20 physics match the rate, basically. I mean,
21 how do we make the rates --

22 MR. ZSCHOKKE: That is the
23 long-term question. That's not something
24 we're going to solve today.

1 MR. ROUGHAN: When you net energy
2 over a month, you're not addressing the
3 physics of what's really happening. The
4 excess production going on the system
5 causing an increase of voltage at one
6 o'clock in the afternoon when the customer
7 has no minimal on-site usage at their house
8 versus -- so then the meter is turned
9 backwards. And then at nine o'clock at
10 night when they want to run their air
11 conditioner, their generator is obviously
12 running solar, so now their meter is going
13 to run forward. So that's the challenge,
14 the net metering construct throughout the
15 country. It doesn't really match the
16 physics of what the system needs in order to
17 be more efficient that Peter is talking
18 about.

19 MR. ZSCHOKKE: The EPRI paper is a
20 really good exposition of what a customer
21 would have to do to island themselves and
22 what the value would be connected to a
23 strong backbone is between instantaneous
24 power, the ability to sell your excess out

1 without any worry. So you don't have to
2 worry about over-generation in your own
3 facility, the ability to have power supplied
4 to you overnight.

5 There's five different project
6 goals. Managing the frequency, you don't
7 have to manage your frequency. You don't
8 have to manage your voltage. So when you
9 start to ask customers to do that -- I go
10 back to my Cumberland Farms example which is
11 the Mass. Clean Energy Center had a -- how
12 do we make gas stations resilient, day or
13 metering, and everybody was, like, let's put
14 solar PV everywhere and we'll carve out the
15 neighborhood and everybody will supply the
16 gas station. Well, they didn't discuss
17 whether or not the customers want to supply
18 themselves first. But the reality is the
19 guy from Cumberland Farm was there. It was
20 great that he was there because everybody
21 was looking at a bill that was of 40
22 kilowatts. We need 40 kilowatts of PV. The
23 guy, he said, "Well, actually I can kind of
24 survive on 100 kilowatts but I really want

1 175." And everybody in the room was, "Oh,
2 what do you mean 175? I don't understand."
3 Well, every pump, every air conditioner,
4 every motor that kicks on. So what happens
5 when a motor kicks on is it's called
6 instantaneous power. They need a lot of
7 voltage to get themselves started. So you
8 get this huge spike and then it falls and it
9 averages out. And it's instantaneous. It
10 only happens for whatever, you're more of an
11 engineer than I am.

12 MR. ROUGHAN: 10 to 30 cycles,
13 about a half a second.

14 MR. ZSCHOKKE: So if you had three
15 people at a gas pump and an air conditioner
16 kicks on, he has three motors that are going
17 to spike at the same time. He's got to have
18 the capability. So when they go and they
19 think about restoring power to a gas
20 station, they want four times the capability
21 built of their average demand because we
22 measure it over 15 minutes. So that's what
23 most people don't understand is that the
24 system is still providing that capability.

1 And what the EPRI paper goes through is for
2 residential, if you have central AC, more
3 than likely when your central AC kicks on or
4 my two units, my nine kilowatts, it could
5 very well overwhelm the output of your PV.
6 So you're going to take instantaneous demand
7 from the system while at the same time
8 you're generating PV into your home. So
9 even though you may look like you're going
10 to zero, you're still using the system while
11 your PV is actually operating based on the
12 requirements of your home. So it's an
13 interesting conundrum of how do we reflect
14 that value to customers who have PV. But
15 that's something that our engineers have to
16 be worried about and it's something that --
17 when they think about designing the right
18 kind of PV system that will help the system.
19 Does it make more efficient sense to design
20 on it the customer side or design it on the
21 distribution side? What does it mean?

22 MR. ROUGHAN: What would happen in
23 that same situation, if he wasn't connected
24 to the backbone of the utility system, the

1 air conditioner kicked on, the PV, being a
2 soft source, would actually trip offline.
3 It couldn't handle the required current that
4 an air conditioner compressor needed. It
5 would just say I'm done and trip. So that's
6 why whenever we run a new line extension,
7 people living off the grid for years, they
8 jump for joy because they don't have to
9 worry about all the batteries they used to
10 have to worry about with solar and all the
11 other stuff kind of goes away. That's a
12 reality. They love being connected so they
13 don't have to worry about that. Because
14 that's really a challenge. The PV in itself
15 is an inverter based system. It's a really
16 soft source. If you try to pull too much
17 from it, it will trip. It won't keep
18 running.

19 MR. BIANCO: My car has the same
20 problem when I start it up. I want to get
21 my fly wheel spinning, I don't build a crazy
22 sized engine. It's not like we have rates
23 that incent batteries for net metering or
24 DG.

1 MR. ZSCHOKKE: That's the question.
2 Is it more economic to buy the battery or is
3 it more economic to remain connected to the
4 grid, and usually the battery is too
5 expensive relative to --

6 MR. BIANCO: Even in that case
7 where this gas station is, like, yeah, I'm
8 going to need 175 kilowatts.

9 MR. ROUGHAN: I need a --

10 MR. BIANCO: What would be --
11 battery cost, as I understand it, is not
12 just the size of the battery but how long
13 you're going to need it. If you're only
14 going to need it for half a second, that
15 would be a lot cheaper.

16 MR. ROUGHAN: There's also
17 capacitors, there's fly wheels, there's
18 other devices that you can use instead of
19 that, but it is an engineered solution.
20 It's not just let's buy them at Home Depot
21 and plug them in.

22 MR. BIANCO: Not like my car
23 battery.

24 MR. ROUGHAN: Your car battery is.

1 You can buy it wherever you want because
2 it's so mature versus this relatively new
3 industry.

4 MS. WILSON-FRIAS: I think Todd's
5 point is a good one in the context of this
6 discussion because the question is what kind
7 of customer behavior are we trying to
8 incent. And does it make more sense to try
9 to incent behavior to put in a battery or to
10 have the distribution system be sized much
11 larger in order to support that distributed
12 generation.

13 So I think what I'd like to do,
14 because it sounds like we're starting to
15 finally head that way, is sort of go off of
16 the Power Point at this point because I
17 think the rest of the slides are fairly
18 self-explanatory and explore that a little
19 more and really give others an opportunity
20 to kind of talk about this provision of the
21 statute. A lot of people around this table
22 were involved in the development of this
23 statute and particularly this provision and
24 I'm kind of interested -- I'm really

1 interested in what the thoughts were from
2 those who were involved in the legislative
3 process, you know, what were you all looking
4 for? What were the -- what were the
5 thoughts? Obviously, National Grid wants to
6 recover its costs and there's also the
7 current situation, are net metering
8 customers potentially being subsidized by
9 other customers which is what I take from
10 this, but what were people thinking? What
11 were they thinking the scope of this was
12 going to be? What sort of customer behavior
13 were they looking to incent? What types of
14 rates maybe were they thinking about
15 because, clearly, we don't know. So --

16 MR. HANDY: Except to the extent
17 that it does state some actual --

18 MS. WILSON-FRIAS: To the extent it
19 does state some actual, but there's a lot of
20 room in here. There's a lot of stuff the
21 Commission can consider. The Commission
22 wasn't at the table. So what were people
23 thinking about when this provision was
24 negotiated? And I'm sure that there were --

1 as we heard from the first meeting, there
2 were a lot of different ideas, but I think
3 this is a really -- I think Todd's question
4 really gave us a good segue into that
5 discussion. So that's what I'd like to do
6 now, because we've only got about 25 minutes
7 left.

8 MR. ELMER: It may have been a
9 little bit less sophisticated and nuanced
10 than you're accounting for, Cindy. The
11 etiology of that section, I think it's 24 in
12 the statute, was Ron sitting in the room
13 representing the utility saying that it was
14 important to have a rate design proceeding
15 that accounted for what Peter is referring
16 to as the backbone, that backbone of the
17 distribution system even in the new world
18 where there is tremendous incentive for
19 distributed generation and net metering.

20 And the other people in the room
21 who did not work for the utility saying
22 yeah, but there was a very, very bad
23 exemplar in Arizona. We want to avoid that.
24 And when we do a rate design proceeding,

1 sure, Ron, it's fair to account for the
2 value and the benefit of the distribution
3 system even to those net metering people,
4 but don't forget the benefits to the
5 distribution system from the DG, don't
6 forget the environmental benefits, the
7 carbon emission benefits, the NOX and the
8 SOX, the reliability benefits. You need to
9 achieve something of a balance there. And
10 when Paul Roberti complains, as he often
11 does, that these statutes are getting very,
12 very prescriptive and more prescriptive and
13 taking away administrative discretion, he
14 is, in fact, largely correct, that that's
15 the etiology of that Section 24.

16 MS. WILSON-FRIAS: I'd like to add
17 another one and something we started talking
18 about in the electric ISR case which was do
19 we want to incentivize locational benefits
20 of distributed generation as well. So one
21 of the things we started talking about was
22 right now there's -- the policies that have
23 developed have kind of developed with the
24 idea that net metering and distributed

1 generation are good things, which they are,
2 but there was really no requirement that a
3 study or anything be done to say where's the
4 best place for these on the distribution
5 system. So I'm wondering if this is the
6 appropriate place to start having that
7 discussion as well in addition to the system
8 planning.

9 MR. ELMER: The answer to your
10 question is the calculation for the
11 locational benefits of distributed
12 generation was not contemplated by the
13 drafters in this Section 24 but was very
14 much contemplated by the drafters in the
15 other section that gives the --

16 MR. HANDY: Incentive.

17 MR. ELMER: -- one-way ratchet, the
18 incentives that the distribution company can
19 propose and the Commission needs to approve
20 to increase the compensation for DG and, of
21 course, what we all had in mind was Tiverton
22 and that's what was being thought of. So
23 you are correct that the locational benefits
24 were contemplated when the statute was being

1 drafted, but it wasn't foremost in our minds
2 when we were doing Section 24.

3 MR. BIANCO: What about the
4 temporal benefits? Because most of what we
5 talked about today, and when you talk about
6 the backbone system and the benefits, the
7 benefits are very small unless they're timed
8 right. So is that what we're considering
9 here that not in another part?

10 MR. ELMER: That can be considered
11 here. As Peter said earlier, I think
12 correctly, there is the hurdle to overcome
13 of the realtime meters, and I mean, I was
14 going to ask, and I can ask Peter later, but
15 under the standard rate design principles of
16 fairness, how do we allocate the incremental
17 additional cost of those realtime meters
18 when it seems that the benefit to be derived
19 from them goes partly to the ratepayer who
20 has the meter and has the DG on her home but
21 also partly inures to the benefit of the
22 entire system in terms of peak shaving and
23 saving some of those large infrastructure
24 build-out costs.

1 So I think that -- I think the
2 answer to your question, Todd, is yes, we
3 can consider temporal benefits, but then the
4 derivative question is how do we allocate
5 the cost of those realtime meters that
6 potentiate that consideration in the rate
7 design.

8 MR. BIANCO: When we consider that
9 it seems like what we heard from Tim
10 earlier, though, when I think about 160
11 perfectly timed, it still might not be
12 enough to provide benefits that can be --
13 that are useful. I mean, that's a
14 paraphrase, I'm paraphrasing, but you
15 remember. You mentioned something like 300
16 megawatts.

17 MR. HANDY: 160 megawatts isn't all
18 there is.

19 MR. BIANCO: That's what I'm
20 asking. So we have to consider --

21 MR. MUSHER: The Tiverton/Little
22 Compton, there's different system levels
23 that we're talking about. We're trying to
24 figure out if we can defer one megawatt in

1 Tiverton/Little Compton so that would save a
2 few million dollars for ratepayers.

3 MR. BIANCO: What if the customer
4 wants that, though, right?

5 MR. ROUGHAN: That's the flip side.
6 So the challenge is that even though you may
7 not actually get to reduced peak load in
8 Rhode Island, you may be able to accumulate
9 more customers with more loads with the same
10 system you have today.

11 MR. ZSCHOKKE: And improve the
12 efficiency of the investment plan.

13 MR. BIANCO: So are we looking at
14 the benefits, though, aggregate in the
15 system or do we -- was it contemplated that
16 it would be ratepayer-by-ratepayer benefits?

17 MR. ELMER: No. The way that
18 Section 24 is written is that the Commission
19 is obligated in significant part to look at
20 the benefits large of the DG and net
21 metering build-out. That's why issues like
22 system reliability, carbon emissions,
23 environmental benefits were so carefully
24 written in is that you're not only going --

1 rate design principles talk about fair
2 allocation, so ratepayer by ratepayer I
3 think has to be an aspect of it, but it
4 doesn't end there. You're looking at the
5 benefits -- the system reliability benefits
6 as well.

7 MR. HANDY: I would just follow-up
8 on what Jerry said about the fact that this
9 specific section of the statute doesn't
10 contemplate location incentives doesn't mean
11 that that couldn't be a relevant
12 consideration in this proceeding because I
13 think the list isn't inclusive. It says
14 consider these things among others. So to
15 the extent that this group feels or the
16 Commission feels that that's a worthy
17 consideration, I think it should be.

18 MR. ROUGHAN: The thing that has to
19 be looked at with the least cost procurement
20 law that invented the system reliability
21 plan, that was the tool we were using to
22 value this, right, to try to sort it out,
23 and that's why the pilot is going into its
24 fourth summer. That's the process by which

1 we're trying to get a sense of what the
2 value equation really is on the system to
3 then further help people understand what we
4 can do with things like rate design and all
5 the rest. So that's part and parcel of why
6 we did that. We just have to remember what
7 we're doing already and the fact that we
8 made -- tried to simply target efficiency
9 dollars was a huge change on how we allocate
10 efficiency dollars. It was always peanut
11 butter. Everyone got the same. Now we're
12 saying, no, we're going to take a bucket of
13 it and we're going to put it here. That's a
14 very different construct than we had prior
15 to this. So we need to keep building up
16 what we've been doing. We can't forget that
17 we've got things in play that we can
18 continue to work on and get feedback when we
19 have those hearings.

20 MR. BIANCO: Is there a consultant
21 in America that's prepared to support that
22 broad of a look in a docket like this?

23 MR. ZSCHOKKE: Let's be honest.
24 We're at the dawn of new age, okay? It

1 sounds so dramatic. Seriously, we're
2 talking about a whole different premise
3 which was the last slide which was the
4 integrated grid which doesn't exist today,
5 and how it operates and what we would ask of
6 customers with DG and without DG to make
7 this grid as efficient as possible we will
8 learn about. I mean, there's a whole lot of
9 stuff we have to learn. We're making a lot
10 of statements about benefits and this and
11 that and we don't really know. We have a
12 solar phase two project to see what happens,
13 how we can use them on the distributed grid,
14 different types of conditions. But right
15 now under net metering what's happening is
16 people are just putting the systems on the
17 maximum kilowatt hours and we already know
18 that there are things happening?

19 You look at Hawaii and the fact
20 that they're being overwhelmed on their
21 systems and they're now going out to
22 requisition very fast backup generation
23 because they need something that goes on
24 when the clouds come in the afternoon

1 because there's so much PV in certain areas
2 of their system.

3 If you look at Germany where
4 they've got so much renewable that they're
5 running the coal plants in a different way
6 on certain days and they're actually -- my
7 understanding is they're actually producing
8 more carbon than they did before which is
9 counter-intuitive, but it's because of the
10 way they're running the power plants. So we
11 don't want to end up like Hawaii or Germany
12 and have the law of unintended consequences.
13 We want to be able to be do it in a way that
14 makes sense for solar developers, for
15 customers on the system and recognizes the
16 fact that we're going to become UPS. You
17 deliver the packages to customers, but when
18 the packages want to be returned by the
19 customer, you got to send it back. So it's
20 going to be two ways and how you charge for
21 that and how you -- and what's the fair
22 compensation for services provided to UPS is
23 going to be something we have to debate and
24 deliver.

1 But we are right at the beginning
2 of this new age and so to say there's
3 definite benefits, I mean, we had this
4 discussion in New York because New York
5 wanted to replicate, or PSU wanted to
6 replicate the ISO tariffs at the retail
7 level because of the concerns about the --
8 complaints of Order 745. When you look at
9 what the ISO requires from generators, I
10 can't see a customer with generation
11 following any of those rules. You got to be
12 ready, you got to be instantaneous, you got
13 to be doing, all of those requirements for
14 certainty of provision of service. And so
15 how we take what the engineers who run the
16 system need to do and transform that into
17 something where the customers can deliver
18 something that we can use on average,
19 knowing that some customers will deliver it
20 some days and some customers won't, that's
21 going to be the challenge as we go forward
22 here as we try to make the system more
23 efficient.

24 But let's not assume that we're

1 creating efficiencies right now
2 automatically without actually doing the
3 research, getting the numbers, figuring out
4 how to work it. That's what the pilot in
5 Tiverton is about with solar and customer
6 demand. That's what the solar phase two is,
7 smart grid projects. That's what we're
8 trying to do is get the information to
9 really make a good assessment for customers,
10 all customers, those with DG and those
11 without because they all use the system in
12 different ways. And I go back to what I
13 said earlier about the time varying rates.
14 The Brattle Group, customers say if you go
15 through all the different pilots and now the
16 customers say no one has done the assessment
17 whether or not the system has saved any
18 money.

19 MS. WILSON-FRIAS: And so this has
20 been -- I'm cutting you off.

21 MR. ZSCHOKKE: I know.

22 MS. WILSON-FRIAS: I've heard, too,
23 this referred to as a grid modernization
24 docket. I think what this discussion has

1 made clear is that this is really sort of
2 more of a rate restructuring docket because
3 as I've done research since our last
4 meeting, I almost wonder if we're at this --
5 if this is the right time for this.
6 Obviously, we need to do it, we're required
7 to do it, we're going to do it, but in the
8 revenue neutral context and with the
9 redesign of rates where we're in the --
10 there's no -- you look at even the New
11 England Clean Energy Council's paper which
12 was very helpful and a couple of others that
13 I've looked at, there's an assumption that
14 there's certain kinds of investments that
15 are going to happen and certain capital
16 investments and lots of changes so that
17 ultimately the utility becomes like ISO at
18 the local level if you take this all the way
19 out to its logical conclusion.

20 And so I guess what I'm wondering
21 and what I think -- I think this has been a
22 really good discussion because what's sort
23 of jelling for me because -- I got into that
24 research place where you get completely lost

1 and you don't know which end is up, and I
2 said well, what are we really going to
3 accomplish here? And I think today's been
4 clear what we're not going to accomplish
5 through this process. And so I'm still
6 trying to figure out what we're trying to
7 accomplish through this rate design process.
8 What is the Commission's ultimate -- what is
9 our ultimate responsibility and what is the
10 ultimate goal of these rates given the
11 current system structure, given the current
12 program structure where -- and we've been
13 going around and around in lots of dockets
14 over the past couple of months. For those
15 of you who have been here know we keep
16 asking all of the same questions over and
17 over again, where's the planning document,
18 where's the planning tool. It's great that
19 all these programs are out there, but at the
20 end of the day the Commission still needs to
21 set just and reasonable rates. And how do
22 we know we're doing that if we're setting
23 them in dockets that happen every few months
24 as opposed to really looking at whether the

1 rates are set appropriately and doing what
2 they're supposed to do with all of those
3 programs. Where's the infrastructure
4 planning document? Where's the document
5 that encourages those efficiencies? How do
6 we set rates to encourages those
7 efficiencies? And again, we're one piece of
8 it just on the distribution side and in a
9 revenue neutral way, and I think this needs
10 to be more than an academic exercise as
11 well.

12 So I guess I keep coming back to
13 what are we doing to modernize in quotes,
14 rates where it's revenue neutral and,
15 personally, when I think revenue neutral I'm
16 thinking looking at distribution and ISR
17 together. So it's not that we're going to
18 have revenue neutral based on just the
19 distribution rates and then ISR is going to
20 grow over here in order to support whatever
21 we do in that docket, because at that point
22 it needs to be a full revenue requirement
23 case and that's what -- I'm going to tell
24 you that would be my recommendation to the

1 Commission.

2 And so that's the challenge I think
3 we're facing is how do we make this more
4 than an academic exercise of just sort of
5 tweaking how rates are and really trying to
6 get to what kinds of behaviors are people
7 trying to encourage and how to make sure all
8 these programs are working together to
9 encourage those behaviors through the rate
10 design. I think we've had a really good
11 discussion about what could happen in the
12 future and I think what we've heard is a lot
13 of that would require some capital
14 investment and that was why a few minutes
15 ago I asked what were people thinking? What
16 do they want? Is there a new rate you're
17 thinking about? Are you thinking about an
18 electric vehicle tariff? Are you thinking
19 about time of use rates? Are you thinking
20 about rates that would encourage batteries
21 with distributed generation projects as
22 opposed to upgrades that may need to be done
23 to the system? So that's kind where I was
24 trying to get to and maybe I think this was

1 a good first start, maybe there needs to be
2 more thought and another meeting, but --

3 MR. ELMER: Cindy, it may also help
4 you to consider -- a few minutes ago Peter
5 was saying it's the dawning of a new age,
6 and to the extent that that is correct, the
7 new rates that get designed in this docket
8 don't have to be the be all and end all for
9 all time. This can be -- under Section 24,
10 this can be an iterative process in which
11 the Commission says in this docket yeah, you
12 know, we've got to balance the legitimate
13 needs of the distribution utility to keep
14 that backbone intact in the new world where
15 everybody is net metering and has
16 distributed generation. We've got to
17 balance that with not eviscerating the
18 economic incentives to do net metering and
19 distributed generation. We're going to make
20 a step in the right direction without
21 prejudice to reconsidering the rate design
22 five or seven years later and taking the
23 next iterative step. To the extent that it
24 is a new creation coming into being, you

1 know, Rome wasn't built in a day.

2 MS. WILSON-FRIAS: That's right,
3 but each step costs a lot of money for the
4 utility, for the ratepayers, for everybody
5 involved.

6 MR. ELMER: Yes.

7 MS. WILSON-FRIAS: What are we
8 doing in this docket? What rate structure
9 are we setting now and is there any way to
10 set rates to encourage behavior going
11 forward? Are there -- you made the comments
12 earlier. Lots of new legislation, lots of
13 very prescriptive things. Now the
14 Commission needs to put it into place and
15 make sure there's just and reasonable rates
16 all over. Other utility commissions do
17 these things that the General Assembly has
18 seen fit to do through statute. They have
19 the ability to look at those larger pictures
20 and say where is the future going? We've
21 got a bunch of laws with a bunch of charges
22 on the bill to support all of those things
23 that aren't all -- I'm not clear on the
24 whole pie at this point.

1 MS. GOLD: Can I --

2 MS. WILSON-FRIAS: Sure.

3 MS. GOLD: I know we have five more
4 minutes, but I think your point is really
5 well taken as is yours and I think what
6 you've kind of done is lay the groundwork
7 for this group to work together to say okay,
8 here's what's going on in New York. We
9 can't do that. We're not big enough. We
10 don't have enough money. What's going on in
11 Massachusetts? We can learn from that. So
12 what is it that we can do in our small state
13 with its not very good economy with some
14 really terrific programs. I think it's kind
15 of a challenge for us all to think what is
16 it that we need to take the next step, and I
17 think we're all very pleased and we're
18 learning from what's going on in Little
19 Compton and Tiverton, and as Dan was the
20 first to say, it hasn't been obvious. We've
21 been kind of feeling our way along, but it's
22 been a good partnership and maybe the next
23 time, I'm not sure, but we just need to say
24 okay, building on what Jerry said, here's

1 what we can do this year and here's maybe
2 what we'll try next year and start to
3 identify some discrete steps that would move
4 us forward working with you.

5 MR. ZSCHOKKE: What we're talking
6 about, and we've mentioned it before, is
7 moving to demand based rates or -- in lieu
8 of demand capability -- reading demand
9 capability moving to size based rates based
10 upon the total usage of a facility, whether
11 it be a home or apartment or a business for
12 those non-demand customers and therefore
13 maintaining the incentive to conserve by
14 lowering your usage in the house with and
15 without -- not considering generation just
16 the total usage because you don't want the
17 generation to mask the need for more
18 efficiency but at the same time fairly
19 allocating the cost of the system because
20 larger customers cost more than smaller
21 customers, right? So therefore for
22 residential in particular not doing what,
23 for example, Madison Gas & Electric and/or
24 Salt River project did. It's 68 bucks for

1 Madison and it's \$50 for Salt River project
2 for everybody but actually saying, you know,
3 it's \$5.50 for really small customers, it's
4 ten bucks for intermediate. I'll see an
5 inclining customer charge example in the
6 charge. But actually reflecting the larger
7 size of customers and the needs of those
8 customers because the facilities necessary
9 to serve them are not -- they're not shared
10 with as many customers. So a 3,000 kilowatt
11 hour customer should not be paying the same
12 facility charge as a 250 kilowatt hour
13 customer because I can put a transformer in
14 to serve a lot of 250 kilowatt hours
15 customers. I'm going to be only able to
16 serve maybe one or two or three 3,000
17 kilowatt hour customers in a neighborhood.
18 So reflecting that size differential, so
19 that's what we're contemplating as part of
20 that and yet at the same time designing it
21 and establishing it in such a way that if
22 they -- if they can reduce the consumption
23 in their whole house below a certain level,
24 they would drop to the lower level.

1 MS. WILSON-FRIAS: So are you
2 considering new classes of customers?

3 MR. ZSCHOKKE: No. And that goes
4 down to -- we don't want to discriminate
5 against anybody. We don't want to do
6 something special for PV that is unfair to
7 them. We want to maintain -- everybody is
8 going to use the system. Everybody is going
9 to have a capacity need and the system is
10 going to be designed to manage everything.
11 That doesn't say that you would create
12 different types of credits or discounts or
13 something else for services provided. I
14 don't have any data yet to tell me what
15 those are. We're working on the solar phase
16 two, but certainly I can talk to our
17 engineers and see what they can craft up.
18 But that's another option that can be
19 considered in this docket.

20 MS. GOLD: I don't want to get out
21 in front of everybody, but I know the
22 specific thing you mentioned, Jerry, was
23 that Ron Gerwatowski said we need to find a
24 way of recovering cost for maintenance from

1 DG or local generation projects, and maybe a
2 useful thing would be to have a discussion
3 where we drill down on that whole
4 controversy over fixed charges versus
5 minimum charges, and I was trying to
6 remember what that was and there seems to be
7 at least in some of the renewable energy
8 side I think there's a sense that a minimum
9 charge might be better than a fixed charge.
10 Does that resonate with you? Have you guys
11 talked about that? Because that was the
12 first thing that was considered and then a
13 bunch of other things got added to the
14 legislation.

15 MR. ELMER: Charity, I think New
16 England Clean Energy Council has some
17 specific thoughts and research on that.

18 MS. PENNOCK: I would say we
19 haven't come to any conclusions and I
20 wouldn't say that any one is necessarily the
21 perspective of the industry at this point so
22 we're still working on all the options.

23 MS. GOLD: Is there a logical way
24 for us -- Cindy, to take advantage of this

1 group to move us forward collectively? I'd
2 just like to know more about that.

3 MS. PENNOCK: I think we've done
4 work, Grid's done work, Arcadia has done
5 work and I think we can come together and
6 perhaps drill down on more specific options
7 the next time we come together.

8 MR. ELMER: That would be very
9 helpful.

10 MS. GOLD: That would be helpful
11 for me and that does get to when you look at
12 the long laundry list of things that you've
13 been asked to consider, that is one that's
14 at the top of the list.

15 MR. HANDY: This is interesting
16 because I agree, I think the context was
17 there was concern about in particular net
18 metering and the impact on stranded costs
19 basically and taking people off the grid and
20 not paying fees to maintain the grid. And
21 my sense is that some of that -- and there
22 was an interest in establishing a charge to
23 eliminate that. And my sense is that some
24 of that came from Massachusetts where

1 there's a totally different net metering
2 policy than there is in Rhode Island. We do
3 have restrictions on the capacity in net
4 metering in Rhode Island. If you're an
5 industry, you have to match load on-site.
6 If you're a municipality, you have to match
7 -- you effectively have to match the load of
8 your municipal infrastructure, and if you go
9 over, you get the wholesale rate. You're
10 getting a much reduced rate. So there is
11 significant incentive not to over-produce in
12 the context of net metering and I think it's
13 important to be mindful of that as we design
14 a rate structure that is suited to Rhode
15 Island because it may be different than
16 what's required in Massachusetts.

17 MR. ELMER: And it's also I think
18 important when you were talking earlier,
19 Peter, about the multi-faceted requirements
20 that the ISO puts into place for generation
21 assets is that those are requirements for
22 generation assets that cleared in auction
23 and acquire a CSO. The net meter guy who
24 has PV on his roof doesn't play in the

1 capacity market, doesn't acquire a CSO and
2 it's a significantly different kettle of
3 fish.

4 MR. ZSCHOKKE: It is, but keep in
5 mind that an event that happens on the
6 distribution grid that impacts customers, we
7 will get the call. So that the question is
8 if people want to be paid for services paid
9 to the grid, you have to provide the
10 services that the grid needs, not take
11 services that the grid doesn't need or
12 create issues that the grid now needs to
13 manage. So it's a balancing act and we need
14 to learn more about what those services can
15 be provided. Whether or not there's enough
16 money in the pot for people to actually
17 think about turning your solar units
18 westward, putting in an advance inverter so
19 you can constrain your output but you manage
20 your voltage and do other things that the
21 engineers really want. And I can't speak to
22 all that stuff, but that's what has to come
23 forward. And we want to see that. I mean,
24 our engineers are yeah, you could use solar

1 in different areas, but it's a question of
2 are you going to maintain the stability of
3 the system and it's a question of are we
4 saving costs going forward because the costs
5 we have today are the costs that are in
6 service. Everybody that net meters under
7 decoupling, if you're net metering and we
8 have less revenue this year, we'll recover
9 it next year, but it's going to be lower
10 kilowatt hours. We're going to continue to
11 have this process. We can't net meter
12 ourselves to where there's no revenues
13 whatsoever. If the solar industry is
14 successful and you want it to be successful,
15 we eventually have to address the question
16 of what do you want the grid to do and how
17 are you going to pay for it, everybody, not
18 just the load customers. So -- and this is
19 the beginning of the process. That's what
20 we see this as, the beginning of the process
21 of crafting that future solution and it's
22 not a one-year issue, it's a ten, maybe even
23 longer issue.

24 MR. ROUGHAN: I think it also helps

1 us to understand what sort of additional
2 infrastructure needs do we want. Maybe you
3 can slowly bring in advance meters to some
4 customer classes that it makes after some
5 time when we under makes sense to do so.
6 And there will be some -- a lot more
7 information coming out of this stimulus
8 project that were done for advanced
9 metering. There's not a lot of data showing
10 the value yet, as Peter said, about time of
11 use rates. So it is probably best to wait a
12 little while to see if those numbers shake
13 out nationally before we here in Rhode
14 Island say yeah, let's go ahead and do that
15 but there may be segments of the population
16 that it may not be a bad idea to try and I
17 think that's where the phased in approach
18 works very well.

19 COMMISSIONER DeSIMONE: So it looks
20 like we have a lot to digest. I think we'll
21 see you all in April then.

22 (ADJOURNED AT 1:06 P.M.)
23
24

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

C E R T I F I C A T E

I hereby certify that the foregoing
is a true and accurate transcript of the
hearing taken before the Rhode Island Public
Utilities Commission, on March 26, 2015, at
10:00 a.m.

JO ANNE M. SUTCLIFFE, RPR/CSR
Notary Public, State of Rhode Island

\$	<p>10:07 [1] - 2:2 11:00 [1] - 39:4 11:30 [1] - 75:15 12 [2] - 66:6, 71:17 12-hour [2] - 31:7, 31:22 12-hours [1] - 31:24 120 [1] - 59:2 13 [1] - 43:22 142 [2] - 111:6, 111:7 147 [1] - 78:11 15 [3] - 54:1, 85:13, 128:22 160 [2] - 138:10, 138:17 175 [3] - 128:1, 128:2, 131:8 1962 [1] - 8:19 1978 [1] - 42:13 1986 [1] - 71:11 1988 [1] - 8:22 1:06 [1] - 161:22</p>	<p>71:11, 71:12, 101:10, 138:15 32 [1] - 83:11</p>	<p>ability [7] - 19:5, 74:21, 107:23, 126:24, 127:3, 151:19 able [14] - 2:6, 11:13, 12:5, 12:6, 47:9, 51:4, 60:20, 65:19, 90:17, 93:1, 104:15, 139:8, 143:13, 154:15 absolutely [1] - 114:1 AC [10] - 22:15, 27:8, 28:22, 29:22, 31:17, 46:8, 73:15, 87:4, 129:2, 129:3 academic [2] - 148:10, 149:4 acceptability [1] - 9:16 acceptable [1] - 75:1 access [1] - 2:14 accommodate [1] - 123:17 accomplish [3] - 147:3, 147:4, 147:7 account [1] - 135:1 accounted [1] - 134:15 accounting [1] - 134:10 accumulate [1] - 139:8 accuracy [1] - 50:14 accurate [1] - 162:4 accustomed [1] - 119:14 achieve [1] - 135:9 acquire [2] - 158:23, 159:1 Act [1] - 4:2 act [1] - 159:13 actively [6] - 87:6, 87:7, 113:24, 114:14, 121:18, 121:19 actual [3] - 70:15, 133:17, 133:19 add [4] - 30:9, 33:12, 111:3, 135:16 added [1] - 156:13 addition [1] - 136:7 additional [5] - 107:14, 109:1, 116:11, 137:17, 161:1 address [3] - 46:21, 53:9, 160:15 addressing [1] - 126:2 adds [1] - 35:11 ADJOURNED [1] -</p>	<p>161:22 adjustments [2] - 63:2, 63:7 administer [2] - 24:8, 25:20 administrative [1] - 135:13 advance [2] - 159:18, 161:3 advanced [1] - 161:8 advantage [2] - 84:13, 156:24 advent [1] - 109:3 affect [1] - 11:8 affects [2] - 73:7, 119:15 afternoon [4] - 28:6, 124:12, 126:6, 142:24 age [3] - 141:24, 144:2, 150:5 aggregate [1] - 139:14 aggregated [1] - 17:3 aggressively [1] - 114:15 ago [9] - 20:9, 22:4, 61:1, 66:1, 66:8, 88:9, 105:1, 149:15, 150:4 agree [5] - 94:3, 94:5, 94:10, 97:14, 157:16 agreed [2] - 56:18, 82:16 agreement [1] - 44:14 ahead [1] - 161:14 Ahmad [2] - 69:15, 69:18 air [32] - 15:5, 15:12, 15:15, 17:20, 17:24, 20:23, 21:5, 21:6, 22:24, 26:1, 27:17, 27:20, 28:3, 31:12, 36:6, 52:8, 66:3, 66:6, 67:1, 67:4, 71:17, 86:16, 86:24, 89:3, 89:17, 92:16, 96:21, 126:10, 128:3, 128:15, 130:1, 130:4 Alan [1] - 4:12 ALAN [1] - 1:19 aligned [1] - 106:19 allocate [4] - 33:15, 137:16, 138:4, 141:9 allocated [8] - 2:24, 5:23, 19:17, 19:20, 32:5, 33:3, 33:5, 33:9 allocates [1] - 53:17 allocating [3] - 59:3,</p>							
.	<p>2 [3] - 76:17, 83:23, 84:4 20 [2] - 42:4, 103:23 20,000 [2] - 77:3, 78:5 200 [3] - 49:4, 49:9, 93:24 2000s [1] - 25:7 2010 [1] - 24:13 2015 [3] - 1:6, 1:12, 162:6 2017 [1] - 26:12 2018 [1] - 26:12 24 [6] - 134:11, 135:15, 136:13, 137:2, 139:18, 150:9 24-hour [1] - 123:4 24/7 [1] - 64:15 25 [2] - 52:7, 134:6 250 [3] - 66:4, 154:12, 154:14 26 [3] - 1:12, 69:1, 162:6 27,000 [1] - 69:1 2:00 [2] - 73:23, 74:1</p>	<p>4 [2] - 32:4, 80:4 4,000 [1] - 22:7 40 [2] - 127:21, 127:22 400 [1] - 99:9 4545 [1] - 1:8 46 [4] - 77:4, 78:11, 111:5, 111:6 4:00 [1] - 74:1</p>	<p>5 [2] - 78:1, 80:4 5,000 [2] - 68:23, 69:1 50 [5] - 16:6, 53:6, 56:17, 89:19, 98:21 5:00 [1] - 46:14</p>	<p>6 [3] - 98:21, 103:14, 116:7 600 [1] - 64:20 660 [1] - 109:19 68 [1] - 153:24 6:00 [4] - 79:5, 79:8, 82:5, 114:24</p>	<p>7 [1] - 77:2 70 [1] - 98:21 720 [2] - 51:10 745 [1] - 144:8 75 [1] - 54:7 7:00 [1] - 39:4</p>	<p>8 [1] - 1:13 8:00 [4] - 79:7, 111:23, 111:24, 112:1</p>	<p>9 [1] - 18:1 9:00 [2] - 28:12, 112:1</p>	<p>A [2] - 1:12, 2:2 a.m [3] - 79:7, 111:23, 162:7 Abigail [4] - 14:19, 14:21, 42:19, 91:5</p>	<p>2</p>	<p>3</p>	<p>3 [4] - 18:8, 80:4, 84:6, 99:9 3,000 [2] - 154:10, 154:16 30 [4] - 22:16, 48:5, 71:12, 128:12 30-day [1] - 115:16 300 [6] - 68:22, 69:2</p>
1	<p>1 [4] - 76:17, 77:5, 83:23, 84:4 1,300 [1] - 109:17 1,400 [1] - 99:6 1,600 [1] - 16:6 1,650 [1] - 99:6 1,760 [1] - 78:7 1,892 [1] - 99:7 1,900 [2] - 99:4, 99:6 10 [3] - 42:4, 80:2, 128:12 100 [9] - 16:9, 52:7, 66:7, 68:22, 92:7, 94:1, 97:10, 103:20, 127:24 10:00 [4] - 1:12, 39:4, 82:6, 162:7</p>	<p>7 [1] - 77:2 70 [1] - 98:21 720 [2] - 51:10 745 [1] - 144:8 75 [1] - 54:7 7:00 [1] - 39:4</p>	<p>8</p>	<p>9</p>	<p>A</p>						
'08 [1] - 67:16 '10 [1] - 67:16 '20s [1] - 64:1 '30s [1] - 64:1 '40s [1] - 64:1 '50s [1] - 64:2 '60s [1] - 64:2 '80s [5] - 22:20, 31:9, 88:23, 100:11, 114:12 '90s [4] - 16:15, 31:10, 54:16, 114:12	<p>2 [3] - 76:17, 83:23, 84:4 20 [2] - 42:4, 103:23 20,000 [2] - 77:3, 78:5 200 [3] - 49:4, 49:9, 93:24 2000s [1] - 25:7 2010 [1] - 24:13 2015 [3] - 1:6, 1:12, 162:6 2017 [1] - 26:12 2018 [1] - 26:12 24 [6] - 134:11, 135:15, 136:13, 137:2, 139:18, 150:9 24-hour [1] - 123:4 24/7 [1] - 64:15 25 [2] - 52:7, 134:6 250 [3] - 66:4, 154:12, 154:14 26 [3] - 1:12, 69:1, 162:6 27,000 [1] - 69:1 2:00 [2] - 73:23, 74:1</p>	<p>60 [3] - 98:21, 103:14, 116:7 600 [1] - 64:20 660 [1] - 109:19 68 [1] - 153:24 6:00 [4] - 79:5, 79:8, 82:5, 114:24</p>	<p>7</p>	<p>8</p>							
1	<p>3</p>	<p>9</p>	<p>A</p>	<p>161:22 adjustments [2] - 63:2, 63:7 administer [2] - 24:8, 25:20 administrative [1] - 135:13 advance [2] - 159:18, 161:3 advanced [1] - 161:8 advantage [2] - 84:13, 156:24 advent [1] - 109:3 affect [1] - 11:8 affects [2] - 73:7, 119:15 afternoon [4] - 28:6, 124:12, 126:6, 142:24 age [3] - 141:24, 144:2, 150:5 aggregate [1] - 139:14 aggregated [1] - 17:3 aggressively [1] - 114:15 ago [9] - 20:9, 22:4, 61:1, 66:1, 66:8, 88:9, 105:1, 149:15, 150:4 agree [5] - 94:3, 94:5, 94:10, 97:14, 157:16 agreed [2] - 56:18, 82:16 agreement [1] - 44:14 ahead [1] - 161:14 Ahmad [2] - 69:15, 69:18 air [32] - 15:5, 15:12, 15:15, 17:20, 17:24, 20:23, 21:5, 21:6, 22:24, 26:1, 27:17, 27:20, 28:3, 31:12, 36:6, 52:8, 66:3, 66:6, 67:1, 67:4, 71:17, 86:16, 86:24, 89:3, 89:17, 92:16, 96:21, 126:10, 128:3, 128:15, 130:1, 130:4 Alan [1] - 4:12 ALAN [1] - 1:19 aligned [1] - 106:19 allocate [4] - 33:15, 137:16, 138:4, 141:9 allocated [8] - 2:24, 5:23, 19:17, 19:20, 32:5, 33:3, 33:5, 33:9 allocates [1] - 53:17 allocating [3] - 59:3,</p>							

109:21, 153:19
allocation [8] - 19:15, 41:2, 41:4, 58:21, 58:23, 59:5, 89:14, 140:2
allocations [1] - 32:23
allocator [2] - 33:2, 33:14
allow [4] - 13:11, 63:9, 94:17, 107:21
allowed [3] - 61:21, 66:5, 106:10
allowing [1] - 10:7
allows [2] - 10:14, 13:9
almost [3] - 77:7, 109:2, 146:4
alone [2] - 17:1, 40:11
Amazon [1] - 45:13
America [1] - 141:21
amount [15] - 7:13, 54:22, 56:18, 62:13, 62:14, 67:1, 67:3, 77:2, 77:8, 77:15, 81:4, 87:17, 90:10, 110:14, 110:20
amounts [1] - 88:19
amperes [2] - 43:2, 117:18
amps [2] - 8:10, 125:12
AMRs [1] - 49:14
analysis [2] - 31:2, 37:16
ANALYST [1] - 1:19
analysts [1] - 4:13
AND [1] - 1:1
angel [1] - 69:17
ANNE [1] - 162:10
annual [4] - 6:11, 16:24, 17:5, 122:14
answer [3] - 103:1, 136:9, 138:2
answered [1] - 104:4
answers [1] - 2:18
ANTHONY [1] - 57:10
ANTHONY [2] - 57:21, 58:1
ANTICIPATION [1] - 1:6
antitrust [1] - 40:6
anyway [2] - 32:1, 90:24
apartment [1] - 153:11
apologize [1] - 6:10
appear [1] - 121:17
application [1] - 9:16
applied [2] - 63:3, 111:23
applies [1] - 3:23

apply [4] - 62:19, 102:16, 117:11, 121:5
applying [1] - 113:15
approach [3] - 41:24, 98:15, 161:17
appropriate [4] - 53:18, 80:9, 81:21, 136:6
appropriately [2] - 13:10, 148:1
approve [1] - 136:19
approved [3] - 11:4, 19:10, 83:3
approves [1] - 19:13
April [1] - 161:21
arbitrage [1] - 94:13
Arcadia [4] - 5:13, 5:15, 14:21, 157:4
architect [1] - 88:21
area [6] - 21:3, 25:9, 29:6, 50:7, 55:4, 74:10
areas [4] - 52:24, 60:9, 143:1, 160:1
argument [1] - 88:21
Arizona [6] - 20:20, 20:22, 20:24, 21:14, 40:1, 134:23
article [1] - 57:11
aspect [1] - 140:3
Assembly [1] - 151:17
assessment [2] - 145:9, 145:16
assets [5] - 44:23, 81:13, 81:14, 158:21, 158:22
assigned [2] - 34:7, 116:2
assignment [3] - 32:23, 33:21, 33:22
ASSOCIATE [1] - 1:19
associate [1] - 4:12
assume [9] - 7:21, 36:5, 37:20, 52:5, 54:24, 55:1, 68:12, 119:15, 144:24
assumed [2] - 38:21, 87:21
assuming [4] - 7:1, 38:22, 43:16, 61:12
assumption [1] - 146:13
AT [2] - 2:2, 161:22
ATTENDANCE [1] - 1:16
attention [3] - 9:7, 84:2, 85:6
attic [2] - 29:7, 29:9
Attorney [1] - 4:16

attractive [1] - 92:12
attribute [1] - 10:11
attributes [3] - 9:10, 9:14, 10:3
auction [2] - 26:10, 158:22
auctions [1] - 24:15
auto [2] - 16:18, 17:8
automatically [2] - 54:19, 145:2
automotive [3] - 16:14, 16:24, 30:13
available [11] - 18:24, 55:7, 86:18, 89:14, 91:23, 100:15, 100:16, 111:21, 112:5, 122:23, 123:9
average [16] - 13:2, 14:7, 14:10, 15:2, 15:3, 15:13, 15:18, 15:22, 16:8, 21:21, 21:23, 28:16, 64:5, 109:16, 128:21, 144:18
averaged [1] - 16:10
averages [1] - 128:9
avoid [3] - 59:18, 107:9, 134:23
avoidance [1] - 12:10
avoided [1] - 63:5
aware [1] - 72:11

B

B's [1] - 12:3
Bachelor's [2] - 99:15, 99:23
backbone [7] - 41:14, 126:23, 129:24, 134:16, 137:6, 150:14
backup [1] - 142:22
backwards [1] - 126:9
bad [5] - 32:1, 42:19, 66:9, 134:22, 161:16
balance [9] - 22:21, 55:10, 59:11, 86:10, 101:14, 101:15, 135:9, 150:12, 150:17
balanced [1] - 41:24
balancing [1] - 159:13
Baltimore [5] - 66:1, 66:5, 67:8, 70:13, 71:16
base [5] - 17:7, 17:24, 32:7, 75:8, 98:22
based [30] - 11:14, 11:22, 17:23, 20:6, 30:5, 38:5, 48:16, 52:19, 54:22, 55:12, 58:15, 76:17, 77:22, 80:18, 83:4, 94:2, 109:8, 110:1, 111:12, 114:23, 115:4, 117:13, 118:1, 121:3, 129:11, 130:15, 148:18, 153:7, 153:9
basement [1] - 29:13
basic [1] - 38:20
basics [1] - 5:23
basis [9] - 14:15, 45:20, 56:24, 57:3, 57:9, 94:15, 119:9, 122:17, 123:14
batteries [3] - 130:9, 130:23, 149:20
battery [7] - 131:2, 131:4, 131:11, 131:12, 131:23, 131:24, 132:9
battled [1] - 18:13
became [1] - 79:21
become [3] - 22:2, 24:16, 143:16
becomes [3] - 50:19, 96:8, 146:17
becoming [1] - 60:23
bedroom [2] - 28:4, 28:14
beer [1] - 96:18
began [1] - 24:13
beginning [7] - 7:8, 97:21, 113:3, 118:10, 144:1, 160:19, 160:20
behalf [1] - 24:9
behavior [8] - 75:24, 80:1, 80:5, 87:11, 132:7, 132:9, 133:12, 151:10
behavioral [1] - 47:14
behaviors [5] - 3:10, 76:3, 76:10, 149:6, 149:9
below [3] - 102:6, 102:7, 154:23
beneficial [1] - 68:2
benefit [9] - 20:10, 38:11, 85:6, 87:20, 87:23, 113:11, 135:2, 137:18, 137:21
benefits [22] - 65:20, 113:13, 135:4, 135:6, 135:7, 135:8, 135:19, 136:11, 136:23, 137:4, 137:6, 137:7, 138:3,

138:12, 139:14, 139:16, 139:20, 139:23, 140:5, 142:10, 144:3
best [4] - 82:3, 92:2, 136:4, 161:11
better [8] - 62:7, 65:20, 66:19, 89:13, 90:21, 106:14, 106:19, 156:9
between [4] - 82:5, 123:16, 126:23
BIANCO [39] - 1:19, 26:16, 46:19, 47:2, 47:13, 48:22, 49:13, 49:22, 50:24, 55:9, 55:21, 56:13, 57:6, 58:6, 66:10, 66:17, 71:15, 72:4, 82:20, 90:7, 90:14, 92:9, 95:6, 116:15, 119:18, 120:8, 120:12, 121:9, 122:11, 130:19, 131:6, 131:10, 131:22, 137:3, 138:8, 138:19, 139:3, 139:13, 141:20
Bianco [1] - 4:12
bidirectional [1] - 119:21
big [5] - 18:20, 30:14, 65:18, 84:18, 152:9
bigger [1] - 57:1
bill [34] - 3:17, 13:9, 13:13, 15:3, 15:10, 27:23, 27:24, 38:13, 40:24, 50:18, 61:18, 78:7, 78:13, 82:13, 87:20, 93:18, 93:19, 95:17, 102:3, 102:17, 103:7, 103:13, 103:19, 103:24, 104:1, 104:6, 104:9, 110:6, 116:8, 121:5, 121:6, 127:21, 151:22
billed [1] - 19:14
billing [5] - 8:7, 33:3, 61:19, 61:21, 115:16
bills [4] - 15:2, 15:18, 15:23, 32:16
bit [12] - 2:5, 22:20, 32:5, 35:11, 62:7, 70:12, 70:18, 78:15, 95:7, 122:6, 124:11, 134:9
blobs [1] - 84:19
block [7] - 62:11,

62:24, 63:4, 63:6, 63:16, 64:7, 65:12 Block [1] - 63:24 blocks [1] - 64:19 Board [1] - 40:3 body [2] - 53:24, 84:9 boils [1] - 58:20 Bonbright [2] - 8:20, 9:1 Bonbright's [2] - 19:3, 79:16 bottom [1] - 37:12 BOULEVARD [1] - 1:13 bounce [1] - 22:5 Brattle [2] - 69:15, 145:14 bread [4] - 94:21, 94:22, 95:2, 95:5 break [4] - 6:13, 75:15, 113:1, 125:8 BRIEF [1] - 68:6 bring [3] - 58:2, 124:24, 161:3 broad [1] - 141:22 broadband [1] - 50:12 brought [1] - 79:12 buck [2] - 56:17, 105:8 bucket [2] - 18:22, 141:12 bucks [7] - 66:4, 93:24, 94:1, 97:19, 97:20, 153:24, 154:4 budget [3] - 93:21, 93:22, 93:23 build [13] - 38:7, 43:12, 77:11, 77:17, 95:20, 105:12, 105:14, 110:20, 111:2, 111:4, 130:21, 137:24, 139:21 build-out [2] - 137:24, 139:21 builder [1] - 29:2 builder's [2] - 29:13, 30:5 builders [1] - 28:21 building [14] - 38:10, 38:15, 51:17, 85:17, 86:15, 86:23, 89:12, 89:17, 89:19, 89:20, 113:18, 122:19, 141:15, 152:24 buildings [1] - 37:19 built [6] - 17:9, 29:2, 50:8, 53:7, 128:21, 151:1 bulbs [6] - 97:11, 97:15, 97:17,	101:17, 102:12, 125:7 bulk [1] - 57:1 bunch [6] - 64:19, 67:4, 88:22, 151:21, 156:13 burden [1] - 34:6 burden [1] - 53:14 business [11] - 23:12, 59:23, 79:14, 92:23, 93:12, 95:20, 97:22, 105:15, 105:21, 124:1, 153:11 butter [1] - 141:11 buy [15] - 28:2, 45:12, 56:23, 56:24, 57:1, 57:8, 63:14, 63:18, 63:19, 94:21, 95:1, 95:5, 131:2, 131:20, 132:1	44:6, 52:9, 52:14, 53:23, 55:12, 82:7, 82:8, 82:9, 111:14, 111:20, 130:19, 131:22, 131:24 carbon [3] - 135:7, 139:22, 143:8 card [1] - 57:16 Cards [1] - 59:15 care [5] - 12:18, 12:22, 29:16, 115:2, 115:11 career [1] - 18:9 careful [1] - 35:18 carefully [1] - 139:23 cars [2] - 84:21, 99:17 carve [1] - 127:14 case [12] - 2:21, 18:10, 18:14, 44:22, 66:11, 89:9, 101:3, 107:9, 120:18, 131:6, 135:18, 148:23 cases [1] - 9:11 cash [2] - 10:16, 10:23 causing [3] - 53:20, 65:4, 126:5 CELIA [1] - 1:22 Celia [2] - 4:21, 5:17 cellphones [2] - 60:24, 61:1 Center [4] - 5:14, 5:16, 14:21, 127:11 central [8] - 22:15, 27:8, 28:22, 29:22, 31:12, 73:15, 129:2, 129:3 certain [17] - 20:11, 56:1, 61:3, 62:12, 64:19, 87:17, 87:19, 90:10, 90:14, 119:6, 119:20, 143:1, 143:6, 146:14, 146:15, 154:23 certainly [8] - 2:16, 27:7, 60:5, 78:9, 106:23, 107:1, 119:24, 155:16 certainty [1] - 144:14 certify [1] - 162:3 cetera [2] - 37:9, 77:21 challenge [20] - 21:11, 21:19, 27:16, 50:10, 50:12, 65:11, 71:8, 75:3, 89:6, 110:1, 116:9, 121:15, 121:21, 122:24, 126:13, 130:14, 139:6, 144:21, 149:2, 152:15 change [16] - 9:9, 11:4, 37:16, 45:5,	45:6, 50:15, 50:16, 79:24, 80:5, 87:10, 99:7, 99:9, 101:17, 102:10, 111:15, 141:9 changed [5] - 11:11, 14:5, 31:11, 79:18, 103:17 changes [4] - 9:12, 62:13, 92:15, 146:16 changing [5] - 7:5, 11:19, 26:22, 113:4, 113:6 channels [1] - 55:24 characteristics [4] - 32:15, 32:21, 38:6, 41:16 charge [65] - 3:13, 11:11, 18:4, 18:5, 40:9, 43:9, 45:14, 45:19, 47:16, 52:14, 52:16, 54:21, 56:17, 56:19, 59:7, 59:10, 62:22, 78:1, 78:14, 78:22, 79:6, 79:21, 80:9, 80:13, 81:5, 82:12, 82:17, 85:5, 86:2, 86:5, 86:13, 87:9, 88:14, 89:21, 96:10, 105:8, 107:24, 108:3, 108:5, 110:7, 110:8, 110:10, 111:10, 111:11, 111:18, 111:22, 112:22, 113:7, 113:15, 116:22, 116:23, 116:24, 124:19, 124:20, 124:22, 143:20, 154:5, 154:6, 154:12, 156:9, 157:22 charged [3] - 80:20, 97:22, 108:16 charges [25] - 3:24, 4:3, 12:19, 40:4, 42:20, 42:22, 43:5, 76:20, 79:1, 79:2, 80:2, 80:7, 80:14, 86:14, 114:3, 114:21, 115:2, 115:4, 115:8, 115:10, 116:2, 151:21, 156:4, 156:5 charging [4] - 38:14, 63:10, 76:19, 105:13 CHARITY [1] - 1:21 Charity [2] - 4:19, 156:15 cheap [2] - 13:20,	28:22 cheaper [5] - 28:23, 64:3, 64:4, 102:8, 131:15 cheat [2] - 6:15, 6:20 check [1] - 121:7 chemical [2] - 16:5, 16:9 Chicago [1] - 95:3 chime [1] - 76:12 choice [4] - 29:13, 30:5, 74:8, 100:17 choose [2] - 45:12, 102:5 chosen [1] - 40:8 CHRISTOPHER [1] - 1:22 chunks [1] - 99:4 Cindy [8] - 4:9, 5:19, 5:24, 6:3, 18:10, 134:10, 150:3, 156:24 circuit [2] - 96:16 circuits [2] - 27:4, 96:24 City [2] - 39:21, 40:5 claim [1] - 99:22 class [21] - 12:14, 13:3, 18:24, 32:14, 32:20, 33:14, 33:19, 34:8, 35:1, 35:2, 35:4, 35:6, 35:17, 35:20, 40:10, 40:11, 41:2, 41:3, 42:14, 60:6 classes [14] - 12:15, 18:22, 19:19, 32:19, 32:24, 33:10, 33:15, 36:22, 38:4, 38:5, 60:6, 61:3, 155:2, 161:4 classify [1] - 32:21 clause [1] - 62:17 Clean [3] - 4:20, 146:11, 156:16 clean [1] - 127:11 cleaner [1] - 85:19 clear [4] - 75:5, 146:1, 147:4, 151:23 cleared [1] - 158:22 clearer [1] - 58:18 clearly [3] - 28:18, 31:8, 133:15 closes [1] - 96:16 clouds [1] - 142:24 club [1] - 57:13 clubs [1] - 55:13 coal [2] - 77:20, 143:5 coffee [1] - 82:4 coincident [16] - 33:9,
C				
	C&I [2] - 64:23, 115:13 cable [4] - 55:13, 56:1, 59:1, 59:19 Cal [1] - 74:6 calculate [2] - 70:3, 70:15 calculating [1] - 34:12 calculation [1] - 136:10 California [3] - 9:18, 9:21, 62:23 canceled [1] - 74:12 capabilities [1] - 104:18 capability [6] - 36:15, 128:18, 128:20, 128:24, 153:8, 153:9 capacitors [1] - 131:17 capacity [28] - 22:18, 23:5, 24:12, 24:15, 25:2, 25:19, 26:10, 26:24, 45:3, 45:13, 45:14, 51:9, 54:9, 55:4, 55:7, 56:9, 70:6, 77:11, 80:14, 81:13, 101:10, 111:21, 112:5, 112:23, 124:10, 155:9, 158:3, 159:1 capital [4] - 14:12, 101:5, 146:15, 149:13 capture [4] - 51:5, 51:6, 51:7, 51:9 captures [1] - 49:21 car [16] - 44:2, 44:5,			

33:12, 34:10, 34:16,
34:18, 34:19, 34:22,
35:8, 35:19, 36:2,
36:3, 36:9, 36:10,
113:19, 121:13
coke [1] - 57:1
cold [1] - 22:9
collect [1] - 49:24
collectively [1] - 157:1
collects [1] - 46:22
college [1] - 42:14
colored [1] - 84:22
combination [2] -
80:18, 90:3
combine [1] - 121:20
comfort [1] - 92:24
comfortable [1] -
112:24
coming [8] - 2:4, 5:21,
37:2, 39:9, 118:18,
148:12, 150:24,
161:7
COMMENCED [1] -
2:2
comments [1] -
151:11
Commercial [1] -
12:17
commercial [3] -
37:12, 76:14, 84:20
**commercial/
industrial** [9] - 12:14,
12:20, 17:16, 19:21,
36:18, 36:20, 64:18,
92:22, 93:20
**commercial/
residential** [1] - 38:7
commercially [1] -
50:23
Commission [19] -
4:10, 10:13, 11:5,
19:12, 21:16, 38:17,
40:20, 70:15,
109:10, 133:21,
136:19, 139:18,
140:16, 147:20,
149:1, 150:11,
151:14, 162:6
COMMISSION [1] -
1:2
Commission's [1] -
147:8
COMMISSIONER [7] -
1:18, 57:19, 58:2,
58:7, 67:7, 84:7,
161:19
Commissioner [5] -
4:11, 5:11, 5:19,
5:20, 57:23
commissions [1] -

151:16
committed [2] - 55:1,
55:5
commodity [4] - 99:3,
103:14, 103:18,
116:6
communicating [2] -
49:19, 51:13
communication [1] -
51:6
company [5] - 18:15,
58:11, 99:14,
105:19, 136:18
compare [2] - 17:16,
54:14
compared [1] - 26:7
compelling [1] -
102:13
compensated [1] -
22:19
compensation [2] -
136:20, 143:22
competition [1] -
105:14
competitive [4] - 60:4,
102:18, 103:2, 103:6
competitors [1] -
105:5
complain [1] - 93:22
complains [1] -
135:10
complaints [1] - 144:8
complete [1] - 9:9
completed [2] - 25:14,
61:17
completely [3] - 31:5,
31:11, 146:24
complex [3] - 84:12,
115:3, 118:8
complicated [3] -
24:17, 25:4, 34:13
component [2] - 49:7,
116:5
components [3] -
85:13, 103:19,
103:20
compressor [1] -
130:4
Compton [4] - 73:13,
138:22, 139:1,
152:19
computing [1] -
104:14
conceivably [1] -
113:8
concept [2] - 18:10,
43:5
concern [2] - 81:12,
157:17
concerned [3] - 91:18.

106:9, 117:21
concerns [2] - 8:2,
144:7
concerted [1] - 90:5
conclusion [1] -
146:19
conclusions [1] -
156:19
condition [1] - 89:18
conditioner [7] - 36:7,
66:6, 126:11, 128:3,
128:15, 130:1, 130:4
conditioners [6] -
27:20, 28:4, 67:1,
67:4, 71:17, 92:17
conditioning [15] -
15:5, 15:12, 15:16,
20:24, 21:5, 21:6,
23:1, 26:2, 27:17,
46:8, 66:3, 86:16,
86:24, 89:4, 96:21
conditions [2] - 74:5,
142:14
condo [1] - 39:5
conference [5] -
14:19, 14:22,
104:24, 105:1, 105:2
confess [1] - 42:13
confident [1] - 11:17
configuration [2] -
116:18, 120:2
configured [2] -
117:5, 117:6
conflict [1] - 4:5
connected [6] - 7:11,
45:16, 126:22,
129:23, 130:12,
131:3
Connecticut [1] - 37:9
connection [1] - 50:14
connects [1] - 120:14
consequences [1] -
143:12
conservation [1] -
114:17
Conservation [1] - 5:5
conserve [1] - 153:13
consider [15] - 11:21,
13:8, 21:16, 35:9,
40:14, 55:7, 84:23,
111:19, 133:21,
138:3, 138:8,
138:20, 140:14,
150:4, 157:13
considerably [1] -
17:7
consideration [8] -
11:16, 14:16, 15:23,
35:5, 60:14, 138:6,
140:12, 140:17

considerations [1] -
107:17
considered [9] - 9:11,
40:13, 60:5, 60:8,
62:2, 104:20,
137:10, 155:19,
156:12
considering [5] - 9:4,
118:9, 137:8,
153:15, 155:2
considers [1] - 35:10
consistency [1] -
53:11
consistent [2] - 37:3,
95:12
constrain [1] - 159:19
construct [2] - 126:14,
141:14
construction [2] -
25:10, 29:15
consultant [1] -
141:20
consume [1] - 13:19
Consumers' [1] -
16:17
consuming [3] - 30:3,
122:9, 122:10
consumption [3] -
13:19, 123:4, 154:22
contemplate [1] -
140:10
contemplated [4] -
136:12, 136:14,
136:24, 139:15
contemplating [1] -
154:19
context [6] - 106:5,
122:2, 132:5, 146:8,
157:16, 158:12
continual [2] - 62:3,
85:19
continually [1] - 85:22
continue [6] - 59:4,
59:16, 92:23,
101:17, 141:18,
160:10
contract [3] - 97:2,
112:10, 112:15
contractor [1] - 85:10
contracts [1] - 93:9
contributed [1] - 23:9
contributing [1] - 41:1
control [15] - 26:1,
26:3, 66:6, 66:12,
66:13, 66:15, 67:5,
72:8, 73:15, 74:19,
85:17, 90:11, 92:21,
93:10, 94:4
controlled [2] - 25:22,
25:23

controlling [1] -
115:11
controls [1] - 102:5
controversy [1] -
156:4
conundrum [1] -
129:13
convenience [3] -
92:24, 93:17, 96:13
conveniences [1] -
37:15
conversation [2] -
32:2, 91:9
converting [1] - 79:15
convince [1] - 55:23
cool [4] - 21:4, 98:3,
98:9
cooler [2] - 94:8,
96:22
cooperative [2] -
39:22, 39:23
copy [1] - 41:10
correct [3] - 135:14,
136:23, 150:6
correctly [1] - 137:12
cost [59] - 5:24, 11:22,
12:3, 12:5, 13:19,
14:8, 14:10, 14:13,
15:1, 15:22, 19:7,
19:15, 20:10, 20:13,
29:14, 32:5, 32:8,
41:1, 44:15, 45:22,
45:23, 48:2, 52:18,
53:4, 53:17, 53:20,
58:12, 59:22, 60:3,
63:21, 63:22, 64:14,
70:7, 70:16, 77:14,
77:19, 85:3, 85:15,
86:8, 97:12, 101:4,
105:3, 105:9,
105:10, 107:15,
108:4, 109:1,
109:14, 110:3,
115:6, 115:11,
115:18, 131:11,
137:17, 138:5,
140:19, 153:19,
153:20, 155:24
costs [49] - 3:16,
11:23, 12:7, 14:12,
14:15, 15:13, 15:15,
19:16, 19:20, 21:23,
22:18, 23:3, 32:22,
33:2, 33:3, 33:16,
48:14, 53:16, 59:4,
59:6, 59:10, 62:9,
64:5, 64:8, 64:21,
64:22, 68:9, 68:10,
68:11, 77:16, 78:4,
81:4, 81:6, 93:23,

99:2, 101:1, 101:5,
107:13, 108:5,
109:21, 109:23,
133:6, 137:24,
151:3, 157:18,
160:4, 160:5
cough [2] - 6:11, 6:14
Council [2] - 4:20,
156:16
Council's [1] - 146:11
COUNSEL [1] - 1:18
counsel [2] - 4:10,
4:22
counter [1] - 143:9
counter-intuitive [1] -
143:9
counterintuitive [1] -
96:7
country [1] - 126:15
couple [8] - 6:12,
23:7, 66:8, 66:20,
73:18, 74:4, 146:12,
147:14
course [6] - 10:10,
12:1, 19:22, 64:12,
109:23, 136:21
cover [1] - 10:7
Cox [2] - 58:3, 58:4
craft [1] - 155:17
crafting [1] - 160:21
crafty [1] - 99:19
crank [1] - 30:3
cranking [1] - 29:20
crazy [3] - 87:6, 87:13,
130:21
create [7] - 54:1,
56:14, 69:12, 71:4,
87:13, 155:11,
159:12
created [2] - 104:21,
112:3
creating [4] - 19:4,
101:9, 125:2, 145:1
creation [1] - 150:24
credit [1] - 121:5
credits [3] - 12:23,
92:5, 155:12
critical [1] - 22:10
crush [1] - 99:17
crusher [12] - 44:2,
44:5, 52:9, 52:14,
53:23, 82:7, 82:8,
82:9, 82:11, 111:14,
111:20
crushes [1] - 44:6
CSO [2] - 158:23,
159:1
Cumberland [2] -
127:10, 127:19
curious [1] - 96:3

current [8] - 3:7, 3:10,
49:14, 130:3, 133:7,
147:11
curve [8] - 14:2, 37:19,
67:10, 67:15, 68:16,
68:18, 68:20
customer [101] - 10:2,
10:22, 12:2, 12:4,
12:6, 13:2, 13:12,
17:2, 24:18, 28:5,
32:14, 32:19, 32:20,
32:22, 33:12, 33:19,
35:13, 37:3, 39:15,
40:3, 42:21, 43:8,
44:14, 44:17, 47:10,
49:8, 50:9, 50:20,
52:2, 52:17, 52:20,
52:22, 53:2, 53:5,
53:8, 53:15, 55:2,
58:24, 71:3, 73:10,
73:20, 74:2, 74:22,
75:8, 75:24, 76:22,
76:23, 77:4, 77:6,
78:6, 78:8, 78:9,
78:18, 80:1, 80:5,
84:8, 84:13, 85:2,
86:1, 87:2, 87:3,
87:17, 89:11, 90:15,
92:16, 93:20, 95:14,
95:15, 95:16, 96:1,
96:4, 96:6, 96:9,
98:21, 100:4,
100:17, 107:20,
110:5, 110:16,
110:18, 110:21,
110:22, 112:7,
114:23, 120:18,
120:21, 125:18,
126:6, 126:20,
129:20, 132:7,
133:12, 139:3,
143:19, 144:10,
145:5, 154:5,
154:11, 154:13,
161:4
Customer [4] - 12:3,
12:4, 76:16, 76:17
customer's [7] -
34:20, 48:11, 50:12,
61:18, 77:10, 94:2,
110:17
customers [152] -
9:13, 10:6, 10:9,
11:12, 11:19, 11:24,
12:8, 12:12, 12:16,
12:21, 13:1, 13:8,
13:17, 14:10, 15:6,
16:2, 18:9, 18:16,
19:2, 19:14, 20:4,
20:12, 20:16, 20:18,

21:1, 21:9, 21:24,
24:9, 27:14, 31:23,
32:15, 33:1, 33:4,
33:6, 35:6, 35:10,
35:13, 36:6, 38:14,
38:15, 40:10, 40:11,
40:19, 45:10, 45:20,
46:1, 46:5, 49:4,
50:16, 52:2, 52:5,
53:10, 53:11, 53:19,
54:11, 54:16, 55:23,
61:3, 61:22, 63:11,
64:11, 66:2, 66:4,
69:10, 69:19, 70:4,
71:1, 73:4, 73:8,
73:22, 73:23, 74:24,
75:10, 75:11, 78:1,
78:5, 79:4, 80:10,
81:7, 81:16, 81:23,
84:18, 85:1, 86:1,
86:11, 86:13, 87:10,
87:14, 90:6, 91:5,
91:24, 92:4, 93:2,
93:10, 93:17, 93:18,
94:16, 94:18, 97:3,
98:14, 98:20, 99:23,
101:2, 101:6, 105:6,
105:22, 107:14,
109:18, 110:2,
110:5, 110:12,
111:12, 112:20,
114:9, 114:12,
114:13, 116:1,
118:22, 119:15,
121:22, 122:20,
124:20, 125:15,
127:9, 127:17,
129:14, 133:8,
133:9, 139:9, 142:6,
143:15, 143:17,
144:17, 144:19,
144:20, 145:9,
145:10, 145:14,
145:16, 153:12,
153:20, 153:21,
154:3, 154:7, 154:8,
154:10, 154:15,
154:17, 155:2,
159:6, 160:18
customers' [1] - 7:3
cut [2] - 116:23, 121:6
cutting [1] - 145:20
cyber [1] - 50:13
cycle [2] - 73:14, 74:3
cycles [1] - 128:12
cycling [1] - 73:19
CYNTHIA [1] - 1:18

D

dah [3] - 98:4
daily [3] - 47:23,
94:15, 122:16
damage [1] - 125:14
dams [1] - 29:7
Dan [2] - 67:17,
152:19
DANIEL [1] - 1:21
Danielson [1] - 8:23
Danny [2] - 5:8, 68:1
dark [2] - 106:15,
107:8
data [19] - 46:22, 47:9,
47:12, 47:23, 49:15,
49:21, 50:1, 50:9,
50:14, 50:15, 51:1,
51:3, 51:7, 51:10,
73:11, 103:18,
155:14, 161:9
dates [1] - 2:6
dawn [1] - 141:24
dawning [1] - 150:5
day-to-day [1] - 24:17
days [27] - 22:14,
23:24, 45:7, 48:5,
62:17, 66:8, 67:19,
68:19, 71:12, 75:10,
75:11, 83:11, 83:14,
83:15, 83:18, 83:21,
83:23, 84:4, 88:10,
91:7, 98:23, 99:10,
105:4, 114:7, 114:8,
143:6, 144:20
deal [5] - 16:11, 58:1,
66:20, 103:11,
111:19
dealing [1] - 72:13
debate [11] - 58:10,
59:5, 60:17, 60:22,
61:6, 62:24, 69:15,
70:1, 109:9, 143:23
decade [1] - 81:3
decades [4] - 7:10,
21:20, 22:4, 23:7
decide [2] - 13:18,
58:23
decision [3] - 21:8,
21:9, 107:20
decisions [5] - 11:13,
19:1, 91:5, 92:1,
107:22
decline [1] - 64:8
declining [1] - 64:7
Decoupling [1] - 4:1
decoupling [4] - 9:21,
9:22, 63:3, 160:7
decrease [1] - 80:6
dedicated [1] - 54:18

deep [1] - 39:10
default [2] - 113:20,
120:21
defer [1] - 138:24
define [1] - 35:22
defined [2] - 31:8,
57:4
definite [1] - 144:3
definitely [3] - 26:21,
27:1, 81:20
degree [2] - 102:6,
102:7
degrees [6] - 66:7,
66:20, 72:10, 74:4,
94:6, 94:7
delays [1] - 25:10
deliver [12] - 10:8,
11:23, 18:2, 20:2,
26:5, 32:18, 47:10,
110:2, 143:17,
143:24, 144:17,
144:19
delivered [6] - 26:12,
31:3, 45:15, 77:13,
112:6
delivering [1] - 109:7
delivery [2] - 13:5,
86:8
demand [134] - 11:11,
12:19, 17:24, 18:4,
20:13, 20:23, 21:2,
22:8, 23:8, 23:12,
23:15, 23:18, 23:20,
24:2, 24:14, 24:24,
25:8, 27:14, 31:16,
31:22, 32:22, 32:24,
34:10, 34:12, 34:18,
35:1, 42:21, 42:23,
43:5, 43:9, 44:3,
45:20, 45:24, 46:15,
47:15, 47:19, 47:23,
48:2, 48:10, 48:12,
49:5, 51:20, 52:13,
53:8, 54:2, 54:3,
54:7, 54:21, 58:14,
59:7, 59:9, 62:7,
65:18, 66:2, 66:19,
75:9, 76:17, 76:19,
77:5, 77:7, 78:14,
78:19, 78:22, 78:23,
79:1, 79:2, 79:6,
79:9, 79:21, 80:2,
80:6, 80:9, 80:13,
80:21, 81:8, 81:17,
81:24, 82:12, 82:17,
83:4, 85:4, 86:2,
86:3, 86:13, 86:14,
87:9, 88:8, 89:21,
90:20, 92:20, 94:9,
101:7, 101:16,

106:14, 110:5,
110:6, 110:8, 110:9,
111:10, 111:18,
111:22, 112:22,
113:7, 113:9,
113:14, 113:15,
114:1, 114:3, 114:7,
114:10, 114:21,
114:23, 115:2,
115:3, 115:10,
115:14, 115:16,
115:17, 116:1,
116:5, 116:21,
116:22, 116:24,
117:6, 124:9,
128:21, 129:6,
145:6, 153:7, 153:8,
153:12

demands [2] - 33:9,
87:8

Depot [2] - 28:2,
131:20

derivative [1] - 138:4

derived [1] - 137:18

described [1] - 125:5

description [1] - 41:11

DESIGN [1] - 1:7

design [42] - 2:21,
2:23, 3:9, 5:23, 9:2,
9:12, 18:12, 19:24,
21:8, 38:2, 38:4,
38:9, 39:14, 40:13,
43:17, 49:1, 52:12,
52:21, 58:19, 61:15,
63:21, 85:24, 86:10,
96:2, 100:13,
100:22, 100:24,
111:17, 121:24,
123:17, 129:19,
129:20, 134:14,
134:24, 137:15,
138:7, 140:1, 141:4,
147:7, 149:10,
150:21, 158:13

designed [12] - 3:8,
7:1, 13:10, 23:17,
61:19, 80:18, 89:5,
119:20, 123:23,
150:7, 155:10

designing [9] - 7:9,
43:20, 43:21, 84:24,
92:10, 119:8,
129:17, 154:20

designs [3] - 54:12,
75:24, 76:6

DeSimone [10] - 1:18,
4:11, 5:20, 57:19,
57:23, 58:2, 58:7,
67:7, 84:7, 161:19

despite [1] - 110:12

detailed [1] - 6:2

details [1] - 102:20

determination [1] -
20:10

determine [11] -
18:17, 18:18, 19:7,
19:18, 33:11, 35:3,
35:13, 35:16, 38:5,
38:8, 107:6

determined [1] - 34:21

determines [1] - 19:15

determining [2] -
19:17, 33:17

Detroit [1] - 16:16

developed [3] - 50:4,
135:23

developers [1] -
143:14

development [1] -
132:22

developments [1] -
37:14

devices [1] - 131:18

DG [12] - 41:13, 117:6,
117:14, 130:24,
135:5, 136:20,
137:20, 139:20,
142:6, 145:10, 156:1

dictorial [1] - 2:5

difference [1] - 76:18

different [59] - 3:11,
6:22, 7:6, 7:20, 8:2,
12:21, 17:7, 21:6,
27:4, 31:6, 32:24,
35:24, 38:5, 38:9,
38:11, 41:15, 47:22,
48:16, 52:3, 60:14,
62:14, 64:12, 65:14,
68:9, 68:10, 75:23,
76:5, 76:14, 77:20,
77:21, 77:22, 84:21,
84:22, 84:23, 95:7,
95:22, 100:10,
106:23, 110:13,
112:7, 116:10,
118:4, 118:6,
119:11, 127:5,
134:2, 138:22,
141:14, 142:2,
142:14, 143:5,
145:12, 145:15,
155:12, 158:1,
158:15, 159:2, 160:1

differential [1] -
154:18

differently [4] - 34:16,
35:11, 40:13, 100:1

difficult [4] - 21:18,
31:21, 88:17, 92:7

difficulty [1] - 71:13

dig [1] - 122:1

digest [1] - 161:20

digress [1] - 95:22

dimming [1] - 108:20

dips [1] - 11:1

direct [6] - 26:1,
32:23, 33:21, 33:22,
59:17, 102:10

direction [2] - 124:7,
150:20

directly [1] - 34:7

Director [1] - 4:24

discount [4] - 16:18,
16:20, 16:21

discounts [1] - 155:12

discrete [1] - 153:3

discretion [1] - 135:13

discriminate [1] -
155:4

discrimination [2] -
12:10, 40:12

discuss [2] - 39:19,
127:16

discussed [1] - 48:17

discussion [19] - 2:14,
3:2, 5:22, 6:4, 15:1,
39:16, 42:1, 42:9,
75:21, 75:22, 119:1,
132:6, 134:5, 136:7,
144:4, 145:24,
146:22, 149:11,
156:2

disgust [1] - 91:21

disincentive [1] -
108:12

dispatch [9] - 66:24,
71:18, 72:12, 72:14,
73:1, 73:4, 73:21,
73:24, 93:11

dispatched [2] -
71:17, 71:21

dispatching [1] - 67:1

disposal [2] - 53:24,
84:9

distributed [17] - 7:7,
7:13, 7:17, 7:19,
7:23, 41:23, 42:7,
113:5, 132:11,
134:19, 135:20,
135:24, 136:11,
142:13, 149:21,
150:16, 150:19

distribution [37] - 7:3,
7:18, 27:3, 27:5,
27:11, 28:9, 32:11,
33:7, 33:16, 34:23,
37:5, 38:24, 53:17,
54:21, 58:11, 80:15,
80:16, 102:16,
102:23, 103:6,

104:1, 104:6,
110:15, 118:11,
120:15, 129:21,
132:10, 134:17,
135:2, 135:5, 136:4,
136:18, 148:8,
148:16, 148:19,
150:13, 159:6

diversity [8] - 35:5,
35:10, 36:6, 36:15,
37:4, 37:6, 43:17,
75:8

Division [2] - 4:16,
4:18

DOCKET [1] - 1:8

docket [11] - 3:22,
39:17, 96:2, 141:22,
145:24, 146:2,
148:21, 150:7,
150:11, 151:8,
155:19

dockets [2] - 147:13,
147:23

document [3] -
147:17, 148:4

dollar [1] - 91:2

dollars [4] - 90:24,
139:2, 141:9, 141:10

done [20] - 44:7,
50:21, 56:6, 69:20,
70:19, 72:19, 72:23,
75:19, 91:15, 124:5,
130:5, 136:3,
145:16, 146:3,
149:22, 152:6,
157:3, 157:4, 161:8

Donuts [1] - 82:2

door [2] - 43:12,
103:22

doorstep [1] - 6:24

double [1] - 88:2

down [24] - 2:10, 7:3,
7:22, 32:21, 36:14,
36:18, 37:23, 39:14,
58:21, 60:21, 80:4,
85:21, 88:10, 89:7,
91:15, 101:11,
118:15, 118:16,
122:1, 122:6,
124:24, 155:4,
156:3, 157:6

downhill [2] - 27:12,
27:13

download [1] - 51:11

downstairs [1] - 29:12

drafted [1] - 137:1

drafters [2] - 136:13,
136:14

dramatic [3] - 59:3,
79:24, 142:1

dramatically [1] -
11:20

dream [7] - 93:9,
93:14, 94:19, 95:6,
104:18, 109:13,
109:15

Dreaming [1] - 42:15

drill [3] - 122:6, 156:3,
157:6

drive [7] - 21:8, 22:23,
68:9, 68:11, 84:21,
99:1, 104:22

driven [1] - 22:1

driver [1] - 115:6

drives [2] - 49:20, 51:8

driving [8] - 13:15,
22:18, 23:3, 23:4,
40:23, 48:14, 51:5,
62:8

drop [2] - 99:10,
154:24

drops [1] - 33:5

drove [1] - 41:21

due [1] - 80:5

dumb [1] - 29:9

Dunkin [1] - 82:2

duration [3] - 14:2,
68:18, 68:20

during [6] - 21:3,
69:10, 70:7, 89:4,
112:4, 113:14

dusty [1] - 27:20

E

early [1] - 114:12

earning [1] - 95:9

easier [1] - 109:16

easiest [2] - 33:24,
52:3

easy [2] - 10:6, 41:13

economic [7] - 10:18,
24:7, 24:22, 57:22,
131:2, 131:3, 150:18

economy [4] - 11:1,
30:11, 30:12, 152:13

Edison [2] - 16:16,
74:6

edited [1] - 8:23

effect [2] - 79:17,
120:22

effective [2] - 10:12,
72:22

effectively [2] -
116:14, 158:7

effectiveness [1] -
10:11

efficiencies [6] -
17:10, 45:23, 86:19,
145:1, 148:5, 148:7

<p>efficiency [31] - 13:5, 13:8, 13:16, 13:21, 22:23, 22:24, 29:15, 60:12, 61:14, 61:17, 62:1, 62:3, 62:6, 65:7, 71:4, 80:24, 87:7, 87:15, 87:18, 89:24, 97:14, 97:17, 101:13, 102:12, 114:8, 114:11, 114:17, 139:12, 141:8, 141:10, 153:18</p> <p>efficient [13] - 13:6, 13:7, 29:17, 81:18, 90:19, 97:15, 101:1, 101:18, 123:22, 126:17, 129:19, 142:7, 144:23</p> <p>effort [1] - 90:5</p> <p>eight [4] - 9:14, 28:7, 30:1, 67:11</p> <p>either [3] - 60:5, 119:5, 124:4</p> <p>elderly [1] - 72:1</p> <p>Electric [4] - 66:1, 66:5, 70:13, 153:23</p> <p>ELECTRIC [1] - 1:6</p> <p>electric [17] - 27:23, 40:24, 42:13, 62:15, 63:14, 63:15, 63:18, 63:20, 91:13, 96:12, 115:18, 121:5, 121:6, 121:18, 135:18, 149:18</p> <p>electrical [1] - 91:20</p> <p>electricity [6] - 15:7, 30:2, 91:21, 96:17, 99:3, 118:2</p> <p>element [1] - 64:10</p> <p>elements [1] - 101:9</p> <p>elevator [1] - 91:11</p> <p>eliminate [1] - 157:23</p> <p>Elmer [1] - 5:4</p> <p>ELMER [15] - 1:21, 5:4, 36:1, 36:11, 95:23, 134:8, 136:9, 136:17, 137:10, 139:17, 150:3, 151:6, 156:15, 157:8, 158:17</p> <p>embraced [1] - 116:6</p> <p>emergencies [1] - 74:7</p> <p>emergency [3] - 24:7, 25:1, 74:19</p> <p>emission [1] - 135:7</p> <p>emissions [1] - 139:22</p> <p>emphasizing [1] -</p>	<p>114:20</p> <p>EMR [1] - 51:2</p> <p>encourage [5] - 41:6, 149:7, 149:9, 149:20, 151:10</p> <p>encouraged [1] - 75:23</p> <p>encourages [2] - 148:5, 148:6</p> <p>end [15] - 8:4, 13:22, 14:20, 61:24, 70:5, 87:4, 89:10, 89:11, 98:10, 118:21, 140:4, 143:11, 147:1, 147:20, 150:8</p> <p>ended [1] - 71:21</p> <p>ends [1] - 33:17</p> <p>energy [43] - 18:4, 18:5, 29:15, 32:22, 33:1, 35:7, 49:5, 60:12, 61:14, 61:17, 61:24, 62:3, 62:6, 70:7, 73:14, 77:1, 77:2, 77:12, 78:15, 83:4, 87:15, 87:18, 90:3, 95:10, 97:14, 97:15, 97:17, 101:13, 108:9, 113:22, 113:24, 114:8, 114:11, 114:16, 115:14, 119:24, 120:5, 121:7, 122:12, 122:23, 123:9, 126:1, 156:7</p> <p>Energy [6] - 4:20, 5:9, 5:11, 127:11, 146:11, 156:16</p> <p>EnerNOC [1] - 23:16</p> <p>engine [1] - 130:22</p> <p>engineer [3] - 8:9, 125:7, 128:11</p> <p>engineered [2] - 89:13, 131:19</p> <p>engineering [1] - 88:22</p> <p>engineers [13] - 7:21, 8:8, 8:13, 43:1, 85:12, 117:17, 118:11, 125:10, 129:15, 144:15, 155:17, 159:21, 159:24</p> <p>England [24] - 4:20, 14:4, 14:6, 15:3, 15:16, 15:19, 16:4, 17:6, 17:8, 17:22, 21:17, 21:20, 22:4, 24:7, 28:11, 31:4, 36:14, 37:6, 68:24,</p>	<p>81:2, 109:19, 146:11, 156:16</p> <p>England's [1] - 62:5</p> <p>ensure [2] - 61:16, 112:7</p> <p>entered [1] - 87:18</p> <p>entire [1] - 137:22</p> <p>entities [1] - 26:14</p> <p>envelope [1] - 70:5</p> <p>environment [1] - 91:19</p> <p>environmental [2] - 135:6, 139:23</p> <p>EPA [1] - 41:8</p> <p>EPRI [3] - 117:15, 126:19, 129:1</p> <p>equal [1] - 110:19</p> <p>equation [5] - 9:23, 10:1, 101:15, 107:4, 141:2</p> <p>equipment [1] - 90:19</p> <p>equitable [1] - 55:23</p> <p>ERT [2] - 50:5, 50:8</p> <p>ESQ [5] - 1:21, 1:22, 1:22, 1:23, 1:23</p> <p>establish [1] - 11:17</p> <p>establishing [3] - 73:2, 154:21, 157:22</p> <p>et [2] - 37:9, 77:21</p> <p>etiology [2] - 134:11, 135:15</p> <p>evaporated [1] - 89:3</p> <p>evening [1] - 28:7</p> <p>event [2] - 91:6, 159:5</p> <p>events [2] - 73:17, 73:19</p> <p>eventually [1] - 160:15</p> <p>everywhere [5] - 29:4, 38:1, 41:7, 97:11, 127:14</p> <p>eviscerating [1] - 150:17</p> <p>evolve [2] - 118:24, 119:11</p> <p>evolving [1] - 107:19</p> <p>exactly [1] - 65:2</p> <p>example [41] - 3:12, 3:19, 12:23, 20:20, 20:22, 28:21, 33:2, 33:21, 37:23, 37:24, 38:20, 39:6, 39:20, 52:1, 52:4, 52:24, 54:14, 81:24, 82:8, 84:12, 85:4, 85:9, 89:15, 90:8, 90:9, 91:17, 99:14, 99:20, 100:3, 100:9, 101:23, 101:24, 104:5, 110:18, 111:14, 112:19,</p>	<p>117:7, 127:10, 153:23, 154:5</p> <p>examples [5] - 6:19, 21:15, 75:14, 76:2, 76:3</p> <p>except [2] - 49:3, 133:16</p> <p>excess [2] - 126:4, 126:24</p> <p>excluding [1] - 111:24</p> <p>excuse [1] - 46:11</p> <p>exemplar [1] - 134:23</p> <p>exercise [3] - 55:13, 148:10, 149:4</p> <p>exhausted [1] - 2:23</p> <p>exist [1] - 142:4</p> <p>exists [1] - 67:15</p> <p>expect [1] - 73:16</p> <p>expenditures [1] - 10:24</p> <p>expense [1] - 32:8</p> <p>expenses [1] - 33:8</p> <p>expensive [9] - 13:17, 20:15, 30:7, 86:6, 86:8, 102:8, 104:20, 108:6, 131:5</p> <p>expertise [1] - 104:13</p> <p>explain [4] - 34:9, 42:11, 43:9, 43:11</p> <p>explained [1] - 84:12</p> <p>explanation [1] - 53:21</p> <p>explanatory [1] - 132:18</p> <p>explore [1] - 132:18</p> <p>exposition [1] - 126:20</p> <p>extend [1] - 28:12</p> <p>extension [1] - 130:6</p> <p>extent [5] - 133:16, 133:18, 140:15, 150:6, 150:23</p> <p>extra [2] - 121:7, 124:23</p> <p>extreme [2] - 3:19, 111:9</p> <p>extrusion [2] - 85:18</p>	<p>71:20, 80:24, 96:20, 106:10, 107:6, 110:12, 135:14, 140:8, 141:7, 142:19, 143:16</p> <p>factor [16] - 18:1, 21:19, 30:17, 37:21, 38:8, 54:10, 71:7, 76:24, 77:9, 78:20, 81:1, 83:17, 86:4, 86:7, 87:2, 100:19</p> <p>factories [1] - 16:15</p> <p>factors [3] - 12:19, 30:15, 107:4</p> <p>fair [7] - 12:8, 36:1, 53:2, 111:11, 135:1, 140:1, 143:21</p> <p>fairly [3] - 53:16, 132:17, 153:18</p> <p>fairness [7] - 12:2, 53:2, 53:7, 53:9, 110:24, 111:2, 137:16</p> <p>fall [1] - 118:13</p> <p>falling [3] - 21:20, 21:21, 81:2</p> <p>falls [1] - 128:8</p> <p>family [3] - 82:9, 82:16, 82:24</p> <p>far [2] - 42:7, 82:19</p> <p>Farm [1] - 127:19</p> <p>Farms [1] - 127:10</p> <p>Faruqui [1] - 69:15</p> <p>fast [2] - 23:20, 142:22</p> <p>faster [1] - 60:20</p> <p>fatigue [4] - 73:20, 74:2, 74:22, 75:12</p> <p>fatigued [1] - 18:12</p> <p>favorite [3] - 62:16, 94:6, 94:8</p> <p>feasibility [1] - 9:16</p> <p>February [1] - 26:11</p> <p>fee [4] - 57:20, 58:24, 61:13, 106:7</p> <p>feedback [1] - 141:18</p> <p>feeder [8] - 36:16, 36:21, 37:2, 37:4, 38:19, 48:20, 54:15, 93:9</p> <p>feeders [3] - 36:16, 36:19, 48:19</p> <p>fees [1] - 157:20</p> <p>fellow [1] - 70:2</p> <p>felt [1] - 24:24</p> <p>few [8] - 22:4, 65:24, 72:10, 114:4, 139:2, 147:23, 149:14, 150:4</p> <p>fewer [4] - 14:14,</p>
F				
<p>face [1] - 71:8</p> <p>faceted [1] - 158:19</p> <p>facilities [3] - 17:4, 125:1, 154:8</p> <p>facility [5] - 85:11, 92:21, 127:3, 153:10, 154:12</p> <p>facing [1] - 149:3</p> <p>fact [16] - 8:12, 40:17, 54:8, 64:16, 65:7,</p>				

72:16, 81:14
fight [1] - 88:24
figure [8] - 4:4, 4:6, 10:1, 31:21, 95:1, 101:22, 138:24, 147:6
figured [2] - 17:17, 61:19
figuring [1] - 145:3
file [2] - 19:11
filter [1] - 2:16
finally [2] - 13:4, 132:15
financial [2] - 26:4, 87:20
fine [1] - 123:1
finished [1] - 70:18
fire [1] - 122:21
firm [3] - 85:10, 85:11, 88:22
firms [2] - 16:6, 31:13
first [19] - 6:10, 6:23, 8:16, 16:19, 16:21, 27:13, 30:19, 30:24, 31:3, 54:19, 64:20, 76:13, 91:6, 127:18, 134:1, 150:1, 152:20, 156:12
fish [1] - 159:3
fit [1] - 151:18
Fitness [2] - 57:24, 60:15
five [25] - 16:20, 28:2, 41:15, 43:13, 43:14, 43:15, 43:20, 44:4, 44:8, 44:9, 44:16, 44:19, 45:2, 47:7, 52:4, 52:6, 52:17, 82:13, 83:20, 102:6, 123:3, 124:11, 127:5, 150:22, 152:3
five-minute [2] - 47:7, 123:3
fixed [16] - 4:2, 14:8, 14:12, 14:13, 21:23, 44:23, 58:24, 59:22, 61:13, 81:6, 95:17, 97:8, 103:20, 109:21, 156:4, 156:9
flat [6] - 11:1, 64:13, 79:10, 85:15, 106:7, 109:14
flatten [3] - 67:3, 78:22, 93:12
flatter [1] - 65:19
flexibility [1] - 106:15
flip [2] - 44:24, 139:5
flow [3] - 10:16, 10:23, 27:12
flows [2] - 7:2, 27:13

fly [2] - 130:21, 131:17
focus [3] - 101:7, 101:8, 101:13
focussed [1] - 83:5
folks [3] - 71:20, 116:14, 119:2
follow [1] - 140:7
follow-up [1] - 140:7
followed [1] - 10:4
following [5] - 25:12, 62:18, 64:5, 73:12, 144:11
footprint [4] - 25:7, 88:19, 94:19, 98:2
forecast [1] - 70:20
foregoing [1] - 162:3
foremost [1] - 137:1
forever [1] - 9:3
forget [3] - 135:4, 135:6, 141:16
format [1] - 58:13
forms [1] - 21:6
forth [1] - 123:16
fortunately [1] - 25:13
forward [16] - 7:16, 23:16, 24:12, 25:2, 25:19, 25:22, 40:15, 104:22, 109:5, 126:13, 144:21, 151:11, 153:4, 157:1, 159:23, 160:4
foundation [1] - 91:17
Foundation [1] - 5:5
four [12] - 15:17, 21:13, 27:18, 29:23, 30:21, 54:24, 55:1, 55:5, 83:3, 83:14, 124:11, 128:20
four-and-a-half [1] - 29:23
fourth [1] - 140:24
frame [1] - 42:1
frankly [1] - 24:21
free [5] - 6:12, 8:14, 41:9, 76:12, 77:18
frequency [4] - 117:20, 125:12, 127:6, 127:7
FRIAS [38] - 1:18, 2:3, 5:17, 21:10, 26:19, 33:20, 34:1, 37:10, 38:18, 39:8, 39:12, 40:16, 43:4, 43:19, 45:18, 60:16, 62:10, 75:13, 75:18, 80:8, 81:22, 87:12, 88:1, 88:3, 110:4, 110:11, 110:23, 111:13, 112:9, 132:4, 133:18, 135:16,

145:19, 145:22, 151:2, 151:7, 152:2, 155:1
Frias [1] - 4:9
friends [1] - 85:21
front [2] - 109:9, 155:21
full [6] - 2:14, 52:12, 54:20, 120:22, 124:9, 148:22
fully [1] - 108:23
fun [1] - 32:2
functionalized [1] - 32:9
functions [1] - 32:10
future [17] - 7:6, 11:15, 11:18, 56:7, 58:12, 74:21, 75:4, 99:2, 101:6, 117:12, 118:4, 119:11, 123:21, 149:12, 151:20, 160:21

G

G-30 [1] - 124:19
G-32 [1] - 115:21
gain [1] - 45:24
garage [1] - 27:20
Gas [4] - 66:1, 66:5, 70:13, 153:23
gas [7] - 62:11, 77:22, 127:12, 127:16, 128:15, 128:19, 131:7
General [1] - 151:17
general [8] - 7:10, 32:12, 32:13, 36:13, 38:4, 65:12, 112:11, 112:13
General's [1] - 4:16
generally [1] - 122:8
generate [3] - 20:12, 65:5, 65:10
generated [1] - 120:1
generating [2] - 116:21, 129:8
generation [36] - 6:23, 7:2, 7:7, 7:14, 41:23, 64:3, 80:20, 113:5, 113:10, 113:18, 114:3, 116:18, 116:20, 117:9, 118:7, 120:11, 120:12, 121:13, 121:19, 127:2, 132:12, 134:19, 135:20, 136:1, 136:12, 142:22, 144:10, 149:21,

150:16, 150:19, 153:15, 153:17, 156:1, 158:20, 158:22
generator [3] - 77:15, 77:16, 126:11
generators [2] - 81:5, 144:9
geography [1] - 42:14
Germany [3] - 41:18, 143:3, 143:11
Gerwatowski [1] - 155:23
giggles [1] - 71:1
given [6] - 36:16, 57:15, 71:9, 106:21, 147:10, 147:11
glad [1] - 2:6
glass [2] - 96:18, 96:19
goal [3] - 75:18, 96:3, 147:10
goals [5] - 75:22, 76:4, 76:9, 100:24, 127:6
God [1] - 87:5
Gold [2] - 5:10, 5:20
GOLD [12] - 1:21, 5:10, 16:1, 17:17, 93:15, 94:20, 95:4, 152:1, 152:3, 155:20, 156:23, 157:10
granularity [1] - 49:3
great [4] - 56:5, 98:13, 127:20, 147:18
greater [4] - 36:10, 37:7, 71:4, 105:24
grew [1] - 64:1
Grid [8] - 3:5, 4:22, 5:1, 5:3, 38:24, 72:6, 102:1, 133:5
grid [29] - 22:11, 31:1, 41:8, 41:12, 41:23, 42:3, 42:6, 45:17, 70:1, 73:5, 77:12, 98:2, 117:15, 119:4, 130:7, 131:4, 142:4, 142:7, 142:13, 145:7, 145:23, 157:19, 157:20, 159:6, 159:9, 159:10, 159:11, 159:12, 160:16
Grid's [1] - 157:4
grocery [1] - 39:2
groundwork [1] - 152:6
group [6] - 73:22, 74:1, 82:15, 140:15, 152:7, 157:1

Group [3] - 5:3, 69:15, 145:14
groups [2] - 49:1, 84:19
grow [1] - 148:20
growing [2] - 23:20, 67:11
growth [2] - 10:18, 120:5
guarantee [3] - 59:24, 97:5, 102:2
guess [9] - 27:10, 38:18, 38:21, 57:6, 72:7, 106:16, 107:18, 146:20, 148:12
guy [4] - 8:24, 127:19, 127:23, 158:23
guys [2] - 103:11, 156:10
gyms [1] - 60:7

H

hack [1] - 50:15
half [6] - 9:24, 29:23, 44:8, 44:20, 128:13, 131:14
handful [1] - 98:19
handle [1] - 130:3
handling [1] - 66:18
handouts [1] - 6:5
HANDY [18] - 1:22, 5:6, 106:3, 107:18, 108:10, 108:19, 109:12, 113:1, 122:1, 122:15, 123:1, 123:15, 125:16, 133:16, 136:16, 138:17, 140:7, 157:15
Handy [2] - 5:6
happy [3] - 39:17, 79:22, 84:16
hard [3] - 81:7, 81:16, 90:23
harder [1] - 109:18
hate [2] - 57:14, 61:20
Hawaii [2] - 142:19, 143:11
head [3] - 6:14, 88:7, 132:15
health [1] - 57:13
healthcare [1] - 30:11
healthy [2] - 53:21, 58:10
hear [1] - 105:3
heard [5] - 13:13, 134:1, 138:9, 145:22, 149:12

hearing [1] - 162:5
hearings [1] - 141:19
heat [2] - 27:19, 29:11
heater [2] - 25:23, 85:13
heats [1] - 29:8
heavily [1] - 14:11
heavy [3] - 57:18, 59:22, 62:8
hell [1] - 62:20
help [4] - 45:17, 129:18, 141:3, 150:3
helpful [5] - 2:19, 6:3, 146:12, 157:9, 157:10
helps [2] - 42:1, 160:24
HERBERT [1] - 1:18
hereby [1] - 162:3
high [16] - 12:23, 18:1, 63:16, 70:7, 73:7, 73:9, 76:24, 81:11, 81:12, 83:21, 85:10, 86:3, 86:7, 87:9, 93:23, 102:11
higher [20] - 13:1, 14:9, 21:22, 22:8, 27:23, 30:15, 56:19, 59:9, 63:11, 68:13, 78:21, 79:2, 87:2, 89:21, 90:1, 94:5, 97:6, 115:9
highest [2] - 68:21, 83:12
highlight [2] - 91:9, 91:10
hilarious [1] - 91:7
hilarity [1] - 97:20
hire [1] - 29:3
history [1] - 71:14
hit [2] - 49:11, 115:15
hold [2] - 24:16, 43:23
holding [1] - 14:21
holidays [1] - 111:24
holy [1] - 31:5
home [9] - 27:24, 36:21, 37:2, 124:1, 125:6, 129:8, 129:12, 137:20, 153:11
Home [2] - 28:2, 131:20
homes [2] - 28:3, 36:22
honest [1] - 141:23
hop [1] - 71:19
hop-in [1] - 71:19
hope [1] - 72:23
hopefully [1] - 13:10
hospitals [1] - 18:3

hosted [1] - 91:6
hot [8] - 21:1, 21:3, 28:6, 28:13, 29:19, 69:3, 74:18, 86:16
hottest [2] - 67:19, 115:1
hour [19] - 10:1, 14:15, 15:1, 15:13, 17:23, 20:15, 20:18, 47:6, 63:17, 64:22, 79:13, 81:19, 85:16, 86:5, 99:5, 115:8, 154:11, 154:12, 154:17
hourly [8] - 35:2, 47:5, 47:23, 83:6, 121:13, 123:11, 123:12, 123:14
hours [35] - 8:8, 14:14, 15:15, 15:22, 30:22, 32:18, 42:21, 43:3, 51:10, 59:3, 64:20, 66:6, 68:22, 69:2, 69:8, 71:5, 71:11, 71:12, 71:18, 76:19, 77:3, 77:9, 77:18, 78:6, 81:10, 101:10, 101:14, 101:19, 107:3, 107:8, 109:7, 109:17, 142:17, 154:14, 160:10
house [17] - 28:21, 28:23, 28:24, 29:1, 29:2, 29:3, 29:9, 29:12, 29:22, 45:15, 46:6, 74:17, 93:12, 97:16, 126:7, 153:14, 154:23
House [1] - 59:15
houses [1] - 27:8
huge [6] - 16:6, 74:11, 97:12, 128:8, 141:9
human [1] - 32:12
humid [1] - 28:14
hump [18] - 31:6, 31:7, 31:10, 65:16, 65:21, 66:18, 66:23, 67:11, 67:15, 67:19, 68:1, 68:19, 69:7, 69:8, 71:9, 71:20, 72:13
hundred [2] - 97:19, 97:20
hurdle [1] - 137:12
hurt [2] - 107:9, 107:10
HVAC [1] - 94:4

I

ice [6] - 29:7, 88:10, 88:15, 88:20, 89:5,

100:9
idea [9] - 13:15, 32:1, 66:9, 90:11, 96:3, 111:17, 111:18, 135:24, 161:16
ideas [2] - 6:22, 134:2
identified [1] - 99:2
identify [1] - 153:3
IES [1] - 88:12
IFC [1] - 56:2
illustration [1] - 113:4
imagine [1] - 93:16
immediate [1] - 119:13
impact [3] - 92:20, 100:14, 157:18
impacted [1] - 71:24
impacting [2] - 30:16, 118:22
impacts [2] - 60:8, 159:6
implement [1] - 107:23
implemented [1] - 106:17
important [15] - 7:8, 10:4, 11:7, 11:16, 14:8, 14:16, 15:23, 18:14, 18:20, 21:7, 64:16, 75:9, 134:14, 158:13, 158:18
improve [2] - 13:21, 139:11
IN [2] - 1:6, 1:16
inappropriate [1] - 61:6
incandescent [1] - 97:11
incent [10] - 62:3, 78:18, 87:14, 89:22, 116:16, 121:22, 130:23, 132:8, 132:9, 133:13
incented [1] - 117:4
incentive [14] - 3:18, 60:12, 61:14, 106:18, 111:15, 114:21, 121:3, 122:3, 122:8, 123:16, 134:18, 136:16, 153:13, 158:11
incentives [3] - 136:18, 140:10, 150:18
incentivize [3] - 3:11, 76:4, 135:19
incent [2] - 92:10, 92:11
inclining [3] - 62:23,

64:19, 154:5
include [1] - 51:22
included [1] - 80:13
inclusive [1] - 140:13
increase [3] - 78:20, 126:5, 136:20
increased [2] - 83:16, 84:2
increasing [1] - 21:24
incremental [2] - 99:8, 137:16
incrementally [1] - 59:9
increments [3] - 123:3, 123:5
incur [2] - 53:20, 79:9
incurred [2] - 11:23, 109:24
incurring [1] - 53:19
individual [6] - 33:11, 35:4, 35:12, 35:16, 39:14
individually [2] - 37:22, 38:22
industrial [7] - 16:2, 16:8, 17:7, 17:11, 76:15, 79:11, 84:20
industry [23] - 9:3, 9:9, 20:21, 22:3, 55:10, 55:11, 55:16, 55:19, 57:7, 60:4, 60:14, 64:1, 64:6, 71:9, 81:12, 81:20, 91:2, 91:3, 105:17, 132:3, 156:21, 158:5, 160:13
information [5] - 48:15, 73:6, 104:15, 145:8, 161:7
infrastructure [13] - 70:10, 95:21, 104:19, 105:24, 106:2, 107:12, 107:15, 109:8, 137:23, 148:3, 158:8, 161:2
innovation [2] - 30:11, 64:5
inputs [2] - 32:6, 32:13
install [1] - 102:11
instantaneous [5] - 126:23, 128:6, 128:9, 129:6, 144:12
instantaneously [1] - 30:3
instead [2] - 91:12, 131:18
insurance [3] - 26:4, 56:8, 58:16

intact [1] - 150:14
integrated [6] - 41:8, 106:11, 108:2, 108:11, 117:15, 142:4
intentions [1] - 92:3
interest [1] - 157:22
interested [4] - 98:16, 121:9, 132:24, 133:1
interesting [11] - 17:18, 37:18, 40:7, 46:4, 66:12, 71:15, 88:16, 109:4, 118:24, 129:13, 157:15
intermediate [1] - 154:4
internet [3] - 59:20, 60:18, 74:16
interpretation [1] - 9:17
interrupt [2] - 6:12, 8:15
interruptible [4] - 24:5, 24:19, 90:17, 92:5
interval [12] - 47:5, 47:6, 47:7, 47:17, 47:22, 48:7, 48:14, 48:19, 49:5, 49:10, 115:23
intervals [2] - 48:1, 123:11
intuitive [1] - 143:9
inures [1] - 137:21
invented [2] - 41:3, 140:20
inverter [2] - 130:15, 159:18
invest [4] - 10:21, 91:3, 92:13, 105:24
investment [9] - 11:13, 33:8, 33:16, 59:23, 60:1, 79:19, 90:18, 139:12, 149:14
investments [4] - 10:24, 14:12, 146:14, 146:16
invisibility [1] - 96:1
invisible [4] - 92:15, 92:19, 95:16, 96:4
involved [4] - 73:2, 132:22, 133:2, 151:5
IP [1] - 46:21
Island [20] - 10:5, 11:8, 17:13, 21:12, 25:6, 26:9, 50:7, 53:23, 72:5, 75:5, 80:3, 99:5, 115:13,

<p>139:8, 158:2, 158:4, 158:15, 161:14, 162:5, 162:11 island [1] - 126:21 ISLAND [2] - 1:1, 1:14 ISO [12] - 21:20, 24:6, 24:18, 24:20, 28:18, 31:3, 36:14, 48:23, 144:6, 144:9, 146:17, 158:20 ISR [3] - 135:18, 148:16, 148:19 issue [13] - 10:15, 14:3, 14:4, 40:22, 53:10, 75:12, 95:22, 95:24, 108:19, 122:16, 125:2, 160:22, 160:23 issues [4] - 41:19, 119:1, 139:21, 159:12 ISSUES [1] - 1:6 Italian [2] - 82:9, 82:16 item [1] - 105:7 iterative [2] - 150:10, 150:23 itron [1] - 50:3 itself [3] - 87:14, 119:16, 130:14</p>	<p>91:24, 130:17, 141:15, 147:15, 148:12, 150:13, 159:4 keeping [1] - 107:16 kettle [1] - 159:2 keys [1] - 96:11 kicked [1] - 130:1 kicks [7] - 36:7, 36:8, 96:15, 128:4, 128:5, 128:16, 129:3 kilovolt [1] - 43:2 kilowatt [41] - 8:8, 14:14, 14:15, 15:1, 15:13, 15:22, 17:23, 20:15, 20:18, 28:6, 28:8, 29:22, 32:17, 42:21, 42:24, 43:3, 63:17, 64:20, 64:21, 76:19, 77:3, 77:5, 77:8, 77:18, 78:1, 78:6, 81:10, 85:15, 86:5, 109:7, 109:17, 111:6, 114:7, 115:8, 124:21, 142:17, 154:10, 154:12, 154:14, 154:17, 160:10 kilowatts [15] - 8:7, 26:22, 26:23, 29:24, 30:2, 35:7, 49:4, 49:9, 111:5, 117:19, 127:22, 127:24, 129:4, 131:8 kind [23] - 2:9, 3:11, 6:18, 6:20, 10:20, 43:7, 57:14, 61:9, 90:14, 100:8, 107:6, 125:17, 127:23, 129:18, 130:11, 132:6, 132:20, 132:24, 135:23, 149:23, 152:6, 152:14, 152:21 kindly [1] - 3:5 kinds [3] - 20:16, 146:14, 149:6 knowing [1] - 144:19 knows [1] - 69:16 kV [1] - 43:22 kVa [2] - 42:24, 124:20</p>	<p>139:20 largely [1] - 135:14 larger [7] - 20:16, 78:8, 78:9, 132:11, 151:19, 153:20, 154:6 largest [2] - 17:2, 17:12 last [11] - 12:9, 22:16, 25:17, 51:14, 55:16, 73:17, 88:24, 89:2, 91:2, 142:3, 146:3 lasts [2] - 6:11, 26:17 late [3] - 54:16, 88:23, 114:11 latency [1] - 27:17 latent [1] - 27:17 laundry [1] - 157:12 law [3] - 3:23, 140:20, 143:12 Law [2] - 5:5, 5:7 Lawrence [3] - 44:3, 82:10, 82:22 laws [2] - 61:8, 151:21 lay [1] - 152:6 lead [1] - 5:22 learn [4] - 142:8, 142:9, 152:11, 159:14 learning [1] - 152:18 least [4] - 73:6, 86:23, 140:19, 156:7 leave [2] - 3:15, 18:6 leaving [2] - 31:14, 37:1 LeBel [10] - 1:23, 5:13, 26:21, 48:9, 56:22, 57:8, 60:7, 80:12, 114:19 LED [8] - 106:10, 107:23, 108:1, 108:5, 108:6, 108:14, 108:15, 108:18 LEDs [1] - 106:20 left [5] - 17:8, 19:7, 30:15, 69:17, 134:7 legacy [1] - 117:24 LEGAL [1] - 1:18 legal [2] - 4:10, 4:21 legislation [5] - 40:18, 63:1, 63:8, 151:12, 156:14 legislative [1] - 133:2 legitimate [1] - 150:12 lens [1] - 100:21 Leslie [1] - 5:15 LESLIE [1] - 1:24 less [10] - 15:4, 15:7, 15:10, 30:11, 37:4</p>	<p>65:21, 111:3, 124:13, 134:9, 160:8 lesser [1] - 122:10 level [22] - 10:20, 10:21, 10:23, 13:2, 27:3, 27:5, 28:9, 34:23, 34:24, 37:5, 43:17, 68:12, 68:14, 71:6, 86:24, 115:10, 124:16, 125:1, 144:7, 146:18, 154:23, 154:24 levels [3] - 12:22, 45:2, 138:22 lever [1] - 91:13 liability [1] - 107:5 licensed [1] - 50:3 lieu [1] - 153:7 life [2] - 87:21, 122:21 lifeline [1] - 61:2 light [12] - 40:17, 44:12, 97:22, 101:17, 102:12, 108:4, 108:14, 108:15, 108:22, 108:23, 125:7 lighting [4] - 33:23, 34:5, 34:7, 109:3 lights [11] - 3:15, 3:19, 74:10, 74:15, 74:20, 106:10, 107:8, 108:1, 108:6, 108:7, 156:18 likely [1] - 129:3 line [18] - 7:23, 8:1, 8:4, 43:22, 44:9, 44:21, 45:10, 52:6, 52:11, 52:19, 53:6, 54:11, 55:2, 64:4, 65:19, 118:16, 118:21, 130:6 list [3] - 140:13, 157:12, 157:14 live [2] - 56:3, 84:22 lives [1] - 84:23 living [3] - 10:3, 117:24, 130:7 load [83] - 12:16, 12:17, 14:1, 14:7, 18:1, 20:24, 21:5, 21:19, 21:21, 21:22, 23:1, 23:19, 25:9, 25:12, 26:1, 27:18, 28:6, 28:8, 28:15, 30:15, 30:16, 31:2, 31:10, 32:14, 32:18, 32:20, 34:20, 36:6, 37:19, 37:20, 38:8, 44:9, 44:12, 44:21, 46:5, 46:10, 46:12,</p>	<p>46:18, 47:1, 52:3, 64:13, 67:3, 68:18, 68:20, 68:23, 71:7, 76:16, 76:24, 77:9, 78:20, 79:9, 81:1, 83:18, 86:3, 86:7, 86:16, 86:20, 86:24, 87:2, 90:1, 90:10, 93:7, 93:13, 99:4, 99:5, 100:20, 113:17, 113:21, 114:9, 114:14, 114:18, 120:13, 120:23, 121:12, 122:4, 122:5, 139:7, 158:5, 158:7, 160:18 loads [11] - 17:11, 28:18, 31:4, 35:3, 52:11, 67:21, 68:21, 111:4, 113:17, 121:18, 139:9 local [5] - 27:5, 48:13, 115:4, 146:18, 156:1 localized [3] - 25:5, 25:8 located [1] - 86:9 location [1] - 140:10 locational [3] - 135:19, 136:11, 136:23 logger [1] - 51:1 logical [2] - 146:19, 156:23 logs [2] - 46:23, 51:2 long-term [1] - 125:23 look [29] - 2:16, 9:19, 12:15, 16:7, 27:12, 28:20, 34:17, 35:2, 37:6, 54:11, 55:10, 58:16, 60:2, 68:20, 70:23, 77:24, 89:22, 100:13, 100:21, 116:11, 129:9, 139:19, 141:22, 142:19, 143:3, 144:8, 146:10, 151:19, 157:11 Look [1] - 83:10 looked [6] - 31:4, 48:5, 85:14, 98:5, 146:19, 146:13 looking [9] - 40:21, 68:22, 127:21, 133:3, 133:13, 139:13, 140:4, 147:24, 148:16 looks [4] - 19:11, 35:15, 110:7, 161:19 loosely [1] - 35:23 lose [2] - 50:17, 60:11</p>
J				
<p>James [1] - 8:20 Japanese [1] - 82:15 Jeanne [1] - 77:5 JEFFERSON [1] - 1:13 jelling [1] - 146:23 Jerry [4] - 5:4, 140:8, 152:24, 155:22 JERRY [1] - 1:21 JO [1] - 162:10 job [1] - 60:24 join [1] - 120:16 joy [2] - 15:9, 130:8 jump [1] - 130:8 jumped [2] - 15:9, 26:9 jurisdictions [1] - 39:20 justify [2] - 20:13, 45:22</p>				
K	L			
<p>Karen [2] - 4:13, 4:15 KAREN [1] - 1:23 KEARNS [1] - 1:22 keep [12] - 6:20, 10:5, 74:9, 74:19, 77:11,</p>	<p>lack [1] - 31:16 landline [1] - 58:4 large [9] - 16:14, 17:11, 46:2, 75:7, 76:22, 110:16, 110:21, 137:23,</p>			

loss [1] - 30:9
lost [4] - 26:3, 74:7,
 74:20, 146:24
love [4] - 8:18, 15:21,
 37:20, 130:12
low [6] - 15:12, 26:6,
 29:14, 76:24, 110:3,
 115:17
lower [22] - 14:9, 48:2,
 69:7, 77:10, 78:18,
 79:21, 81:17, 83:18,
 90:20, 94:7, 95:17,
 97:7, 101:2, 101:4,
 101:5, 101:11,
 101:15, 108:13,
 110:6, 116:21,
 154:24, 160:9
lowering [1] - 153:14
lowest [1] - 68:21
lunch [1] - 57:2
luxury [2] - 61:1,
 105:7
Lyons [1] - 4:15
LYONS [2] - 1:23, 4:15

M

machine [1] - 44:6
machines [2] - 79:8,
 79:10
Madison [2] - 153:23,
 154:1
main [1] - 54:17
Maine [1] - 37:8
maintain [7] - 10:20,
 38:11, 93:5, 118:17,
 155:7, 157:20, 160:2
maintaining [3] -
 10:23, 107:15,
 153:13
maintenance [1] -
 155:24
major [3] - 25:10,
 60:11, 74:7
majority [2] - 53:3,
 56:23
mall [1] - 71:24
MALONE [2] - 1:24,
 5:15
Malone [1] - 5:15
manage [27] - 21:2,
 21:5, 25:9, 46:5,
 81:17, 81:23, 86:2,
 87:8, 93:4, 94:9,
 94:14, 94:18, 98:7,
 104:15, 105:15,
 113:24, 123:2,
 123:11, 123:13,
 124:5, 127:7, 127:8,
 155:10, 159:13,

159:19
managed [4] - 106:5,
 114:14, 124:17,
 125:10
management [15] -
 62:7, 65:18, 66:2,
 86:21, 90:2, 93:7,
 100:21, 101:7,
 106:13, 106:14,
 113:17, 114:9,
 114:18, 122:20,
 124:19
manager [2] - 85:11,
 88:8
managing [5] -
 121:18, 121:19,
 122:19, 122:23,
 127:6
manufacturers [5] -
 16:18, 17:1, 17:8,
 30:14, 94:23
manufacturing [2] -
 30:10, 30:12
March [1] - 162:6
MARCH [1] - 1:12
margin [4] - 95:19,
 104:8, 105:18,
 105:21
Marion [1] - 5:10
MARION [1] - 1:21
Mark [2] - 61:11,
 115:15
mark [3] - 5:13, 26:19,
 56:21
MARK [1] - 1:23
market [13] - 23:15,
 24:12, 25:3, 25:19,
 25:20, 25:24, 77:21,
 80:22, 94:14, 103:2,
 103:6, 116:6, 159:1
marketers [1] - 23:22
Maryland [1] - 70:15
mask [1] - 153:17
Mass [7] - 26:8, 44:3,
 80:3, 82:10, 82:22,
 89:7, 127:11
Massachusetts [13] -
 11:10, 11:12, 17:3,
 17:5, 64:17, 65:9,
 79:3, 79:14, 111:22,
 112:10, 152:11,
 157:24, 158:16
massive [4] - 17:9,
 44:7, 88:19, 99:4
Master's [2] - 99:16,
 99:24
match [7] - 106:9,
 122:3, 125:20,
 126:15, 158:5,
 158:6, 158:7

matching [1] - 123:24
matter [1] - 114:24
mature [1] - 132:2
maximum [11] - 35:1,
 35:20, 47:19, 48:1,
 48:10, 48:11, 54:7,
 102:6, 102:7, 124:9,
 142:17
mean [36] - 9:20,
 20:19, 22:7, 27:6,
 32:6, 35:20, 43:7,
 46:20, 55:14, 55:21,
 57:4, 58:3, 59:4,
 59:8, 62:20, 65:20,
 68:7, 72:14, 78:8,
 79:1, 80:19, 87:15,
 89:15, 101:12,
 113:11, 116:15,
 119:22, 125:20,
 128:2, 129:21,
 137:13, 138:13,
 140:10, 142:8,
 144:3, 159:23
means [7] - 21:21,
 21:23, 34:19, 59:8,
 73:22, 101:4, 109:20
meant [2] - 63:4,
 119:18
measure [3] - 34:20,
 124:15, 128:22
measured [1] - 118:5
measures [1] - 34:18
mechanical [1] -
 91:13
mechanism [1] -
 94:13
mechanisms [2] -
 93:11, 119:12
medium [2] - 39:17,
 115:13
meet [2] - 10:21, 19:3
meeting [4] - 75:4,
 134:1, 146:4, 150:2
meets [1] - 123:4
megawatt [11] - 16:6,
 16:7, 16:9, 16:10,
 16:12, 52:4, 69:1,
 85:13, 99:5, 99:10,
 138:24
megawatts [25] - 22:8,
 26:2, 43:13, 43:14,
 43:15, 43:23, 44:1,
 44:4, 44:8, 44:9,
 44:16, 44:19, 45:2,
 52:6, 52:11, 52:17,
 54:24, 55:1, 55:5,
 68:23, 69:1, 82:13,
 83:20, 138:16,
 138:17
memorandum [1] -

6:2
mention [1] - 79:24
mentioned [11] - 6:1,
 18:11, 21:12, 30:20,
 42:10, 61:7, 65:15,
 100:9, 138:15,
 153:6, 155:22
met [1] - 76:4
metal [5] - 28:24, 29:4,
 29:6, 29:10, 30:7
meter [36] - 20:11,
 20:13, 33:2, 45:22,
 45:23, 46:20, 46:21,
 47:3, 47:5, 47:11,
 47:17, 47:22, 47:23,
 47:24, 48:2, 48:7,
 48:10, 48:15, 49:5,
 49:10, 51:8, 51:12,
 51:16, 98:4, 103:17,
 103:21, 115:18,
 118:1, 120:7, 120:9,
 120:13, 126:8,
 126:12, 137:20,
 158:23, 160:11
metered [3] - 37:22,
 38:22, 117:10
metering [41] - 12:24,
 40:19, 48:19, 65:3,
 65:8, 70:17, 116:11,
 117:7, 118:1,
 119:22, 120:6,
 120:9, 120:19,
 120:21, 120:23,
 120:24, 122:2,
 122:7, 123:8,
 123:10, 123:13,
 124:4, 126:14,
 127:13, 130:23,
 133:7, 134:19,
 135:3, 135:24,
 139:21, 142:15,
 150:15, 150:18,
 157:18, 158:1,
 158:4, 158:12,
 160:7, 161:9
meters [22] - 20:6,
 20:7, 20:14, 20:15,
 20:17, 20:18, 20:20,
 32:17, 45:24, 46:17,
 47:1, 70:9, 97:23,
 104:14, 119:19,
 119:21, 137:13,
 137:17, 138:5,
 160:6, 161:3
Michigan [1] - 16:17
mid [1] - 16:15
middle [2] - 15:19,
 85:21
midnight [2] - 46:14,
 114:24

might [8] - 37:12,
 39:1, 57:11, 76:3,
 76:8, 90:16, 138:11,
 156:9
migrate [1] - 25:1
military [1] - 85:10
milk [1] - 96:19
million [4] - 16:21,
 16:23, 17:5, 139:2
mind [7] - 10:2, 56:5,
 77:11, 91:24,
 107:16, 136:21,
 159:5
mindful [2] - 56:11,
 158:13
minds [1] - 137:1
minimal [2] - 7:14,
 126:7
minimize [1] - 13:24
minimum [4] - 3:24,
 51:20, 156:5, 156:8
minute [6] - 47:7,
 51:20, 56:17, 69:24,
 75:15, 123:3
minutes [6] - 54:1,
 128:22, 134:6,
 149:14, 150:4, 152:4
mix [1] - 86:10
mixed [2] - 37:11, 38:7
mobility [1] - 72:2
model [5] - 59:14,
 60:11, 95:7, 101:24,
 113:5
models [3] - 60:2,
 105:12, 105:14
modernization [1] -
 145:23
modernize [1] -
 148:13
monetary [1] - 123:16
monetize [1] - 70:4
money [18] - 13:9,
 13:11, 69:19, 69:22,
 70:8, 70:11, 79:14,
 90:22, 92:13, 95:9,
 97:13, 107:13,
 112:21, 124:3,
 145:18, 151:3,
 152:10, 159:16
month [21] - 44:19,
 51:10, 52:17, 52:20,
 57:24, 58:8, 59:1,
 78:7, 87:5, 93:19,
 93:24, 94:1, 97:20,
 98:10, 102:3,
 109:18, 121:8,
 123:10, 123:12,
 126:2
monthly [4] - 3:17,
 3:24, 57:20, 123:5

months [3] - 62:19, 147:14, 147:23
morning [6] - 2:3, 5:19, 6:9, 36:24, 67:12, 79:5
most [12] - 17:19, 17:21, 27:10, 29:17, 36:22, 55:24, 99:22, 104:8, 105:23, 116:16, 128:23, 137:4
mostly [2] - 82:5, 100:19
mother [1] - 98:1
motor [4] - 45:1, 91:14, 128:4, 128:5
motors [1] - 128:16
move [6] - 18:5, 86:15, 86:20, 90:6, 153:3, 157:1
moved [5] - 17:21, 23:11, 23:12, 55:11, 83:17
moving [10] - 4:2, 7:16, 18:8, 22:15, 28:17, 30:10, 86:5, 112:22, 153:7, 153:9
MR [242] - 4:17, 4:23, 5:2, 5:4, 5:6, 5:8, 5:13, 6:9, 16:3, 17:14, 17:15, 17:19, 21:17, 23:6, 23:10, 23:24, 24:3, 25:21, 25:24, 26:16, 26:18, 26:21, 27:6, 27:16, 28:20, 29:23, 30:1, 33:22, 34:4, 34:11, 34:15, 36:1, 36:4, 36:11, 36:12, 37:17, 39:7, 39:11, 39:18, 40:1, 40:22, 41:5, 42:12, 42:17, 42:18, 43:11, 43:22, 43:24, 44:1, 45:21, 46:19, 46:24, 47:2, 47:4, 47:13, 47:18, 47:21, 48:9, 48:18, 48:22, 48:24, 49:13, 49:16, 49:18, 49:20, 49:22, 50:2, 50:24, 51:4, 51:12, 51:19, 51:23, 53:22, 54:5, 54:6, 55:9, 55:18, 55:21, 56:4, 56:13, 56:16, 56:22, 57:6, 57:8, 58:6, 58:9, 58:20, 59:13, 60:7, 61:11, 62:16, 64:16, 64:24, 65:2, 65:13, 65:22, 65:24, 66:10, 66:15,

66:17, 66:23, 67:9, 67:17, 67:23, 68:5, 68:7, 68:15, 71:15, 71:23, 72:4, 72:18, 73:13, 75:7, 75:16, 76:11, 79:23, 80:11, 80:12, 80:16, 80:17, 82:7, 82:20, 82:22, 84:9, 86:12, 87:22, 88:2, 88:8, 88:12, 88:13, 90:7, 90:13, 90:14, 91:4, 92:9, 92:14, 92:18, 92:20, 93:16, 94:21, 95:5, 95:6, 95:12, 95:23, 96:8, 97:24, 99:13, 100:23, 101:21, 102:22, 103:5, 103:8, 103:12, 104:4, 104:7, 106:3, 106:20, 107:18, 108:3, 108:10, 108:17, 108:19, 108:21, 109:12, 109:15, 110:9, 110:14, 111:1, 111:16, 112:13, 112:16, 112:18, 113:1, 113:12, 113:16, 114:16, 114:19, 115:12, 116:15, 117:11, 119:18, 120:4, 120:8, 120:11, 120:12, 120:17, 121:9, 121:11, 122:1, 122:13, 122:15, 122:18, 123:1, 123:7, 123:15, 123:20, 125:16, 125:22, 126:1, 126:19, 128:12, 128:14, 129:22, 130:19, 131:1, 131:6, 131:9, 131:10, 131:16, 131:22, 131:24, 133:16, 134:8, 136:9, 136:16, 136:17, 137:3, 137:10, 138:8, 138:17, 138:19, 138:21, 139:3, 139:5, 139:11, 139:13, 139:17, 140:7, 140:18, 141:20, 141:23, 145:21, 150:3, 151:6, 153:5, 155:3, 156:15, 157:8, 157:15, 158:17

159:4, 160:24
MS [62] - 2:3, 4:15, 4:19, 4:21, 5:10, 5:15, 5:17, 5:18, 16:1, 17:17, 21:10, 26:19, 33:20, 34:1, 34:9, 34:13, 37:10, 38:18, 39:8, 39:12, 40:2, 40:16, 42:10, 43:4, 43:19, 45:18, 57:21, 58:1, 60:16, 62:10, 75:13, 75:18, 80:8, 81:22, 87:12, 88:1, 88:3, 93:15, 94:20, 95:4, 100:8, 110:4, 110:11, 110:23, 111:13, 112:9, 132:4, 133:18, 135:16, 145:19, 145:22, 151:2, 151:7, 152:1, 152:2, 152:3, 155:1, 155:20, 156:18, 156:23, 157:3, 157:10
multi [1] - 158:19
multi-faceted [1] - 158:19
multiple [1] - 24:1
muni/regional [1] - 39:23
municipal [1] - 158:8
municipalities [1] - 109:11
municipality [1] - 158:6
Musher [1] - 5:8
MUSHER [10] - 1:21, 5:8, 65:13, 68:5, 68:7, 92:18, 101:21, 103:5, 104:4, 138:21
must [2] - 84:7, 107:7

N

named [1] - 42:15
narrow [2] - 57:5, 71:19
NARUC [1] - 8:18
national [1] - 14:24
National [7] - 3:5, 4:22, 4:24, 5:3, 38:24, 102:1, 133:5
nationally [1] - 161:13
natural [1] - 77:22
Nault [1] - 4:13
NAULT [1] - 1:19
necessarily [6] - 47:24, 48:12, 82:1, 105:24, 124:6,

156:20
necessary [11] - 20:2, 20:3, 53:20, 60:18, 60:23, 101:6, 102:4, 104:9, 107:16, 125:15, 154:8
need [80] - 3:21, 4:4, 4:6, 7:11, 7:15, 7:24, 8:13, 11:21, 12:5, 12:7, 14:22, 18:15, 22:23, 23:4, 23:19, 23:23, 33:18, 42:8, 43:14, 44:17, 45:11, 46:19, 46:22, 47:4, 47:8, 47:11, 48:7, 49:7, 55:4, 56:11, 58:16, 58:18, 58:19, 66:24, 67:3, 72:16, 73:22, 73:24, 77:15, 84:23, 85:15, 90:9, 91:21, 94:12, 94:14, 94:15, 95:1, 98:21, 99:3, 99:4, 103:17, 104:16, 104:17, 109:1, 111:3, 115:23, 124:7, 124:21, 125:19, 127:22, 128:6, 131:8, 131:9, 131:13, 131:14, 135:8, 141:15, 142:23, 144:16, 146:6, 149:22, 152:16, 152:23, 153:17, 155:9, 155:23, 159:11, 159:13
needed [10] - 7:18, 7:20, 18:21, 84:10, 88:20, 89:1, 89:2, 91:11, 91:22, 130:4
needs [19] - 7:12, 8:5, 10:22, 77:12, 81:9, 104:12, 110:17, 126:16, 136:19, 147:20, 148:9, 148:22, 150:1, 150:13, 151:14, 154:7, 159:10, 159:12, 161:2
NEES [1] - 62:17
negative [1] - 68:1
negotiated [1] - 133:24
neighborhood [3] - 27:7, 127:15, 154:17
neighborhoods [1] - 28:10
neighbors [1] - 15:8
nervous [1] - 25:11

NEST [1] - 72:5
net [34] - 40:18, 65:3, 65:8, 117:7, 117:9, 119:22, 120:6, 120:19, 120:21, 120:22, 120:24, 122:2, 122:7, 124:3, 126:1, 126:14, 130:23, 133:7, 134:19, 135:3, 135:24, 139:20, 142:15, 150:15, 150:18, 157:17, 158:1, 158:3, 158:12, 158:23, 160:6, 160:7, 160:11
Netflix [2] - 59:14, 60:15
netflix [1] - 60:7
neutral [5] - 146:8, 148:9, 148:14, 148:15, 148:18
never [11] - 10:2, 14:5, 25:14, 61:20, 88:18, 91:10, 92:7, 95:2, 98:8, 106:10, 106:12
new [22] - 10:22, 29:15, 30:12, 41:3, 69:12, 71:1, 91:20, 97:17, 98:4, 106:21, 130:6, 132:2, 134:17, 141:24, 144:2, 149:16, 150:5, 150:7, 150:14, 150:24, 151:12, 155:2
New [28] - 4:20, 14:3, 14:6, 15:3, 15:16, 15:18, 16:3, 17:6, 17:8, 17:22, 21:17, 21:20, 22:4, 24:6, 28:11, 31:3, 36:14, 37:6, 62:4, 68:24, 81:1, 109:19, 144:4, 146:10, 152:8, 156:15
newer [2] - 27:7, 37:14
next [15] - 12:9, 14:23, 42:4, 51:2, 51:24, 64:2, 64:3, 108:7, 110:7, 150:23, 152:16, 152:22, 153:2, 157:7, 160:9
nice [2] - 82:23, 84:11
night [8] - 13:20, 21:4, 37:2, 67:14, 88:15, 101:18, 106:15, 126:10
nilly [2] - 113:22, 113:23

nine [3] - 30:2, 126:9, 129:4
NO [1] - 1:8
nobody [7] - 9:17, 25:21, 31:23, 55:14, 70:19, 72:19, 96:23
non [11] - 33:9, 33:12, 34:10, 34:16, 35:8, 35:19, 36:2, 36:9, 79:6, 115:14, 153:12
non-coincident [8] - 33:9, 33:12, 34:10, 34:16, 35:8, 35:19, 36:2, 36:9
non-demand [1] - 153:12
non-peak [1] - 79:6
non-time [1] - 115:14
none [1] - 28:13
noon [2] - 73:23, 124:13
normally [1] - 65:11
Notary [1] - 162:11
notation [1] - 98:11
note [1] - 7:8
nothing [2] - 50:24, 98:6
notice [1] - 6:2
noticed [1] - 4:7
Notwithstanding [1] - 62:18
NOX [1] - 135:7
NRRRI [1] - 8:18
nuanced [1] - 134:9
nuclear [1] - 77:20
number [10] - 13:24, 26:23, 33:4, 33:6, 34:12, 48:4, 48:16, 58:22, 72:16, 88:9
numbers [6] - 33:1, 80:3, 83:8, 83:9, 145:3, 161:12

O

O'BRIEN [6] - 1:22, 4:21, 5:18, 34:9, 34:13, 42:10
O'Brien [1] - 4:21
o'clock [9] - 36:7, 36:8, 67:12, 67:13, 75:19, 124:11, 126:6, 126:9
oats [2] - 94:24, 95:3
obligated [1] - 139:19
obvious [1] - 152:20
obviously [28] - 10:16, 18:14, 19:10, 20:5, 20:24, 23:10, 29:8, 33:17, 37:7, 42:22,

44:7, 44:11, 44:18, 52:18, 56:16, 72:15, 76:22, 78:11, 103:14, 108:24, 109:20, 111:2, 111:5, 122:3, 124:12, 126:11, 133:5, 146:6
occur [1] - 113:14
occurred [3] - 48:4, 49:12, 115:20
occurs [1] - 48:3
OF [3] - 1:1, 1:6, 1:6
off-peak [1] - 116:3
offered [4] - 3:6, 16:18, 66:1, 72:6
offering [1] - 108:18
Office [2] - 5:8, 5:11
office [5] - 4:16, 94:13, 104:10, 104:21, 105:16
offices [1] - 31:14
offline [1] - 130:2
offset [1] - 119:24
offsets [2] - 117:6, 120:2
often [5] - 47:2, 49:13, 49:14, 114:22, 135:10
oil [1] - 104:11
old [6] - 8:17, 27:19, 42:15, 47:1, 62:17, 120:6
on-site [8] - 113:10, 114:3, 116:18, 116:19, 117:8, 121:12, 126:7, 158:5
on/off [3] - 66:22, 72:9, 72:14
once [4] - 18:23, 44:2, 58:21, 77:17
one [54] - 2:12, 4:13, 8:17, 17:12, 28:1, 33:24, 34:14, 34:18, 37:11, 39:15, 39:18, 40:19, 42:3, 42:5, 45:8, 46:17, 47:19, 52:6, 52:7, 52:19, 59:2, 60:5, 62:1, 75:2, 75:19, 77:3, 78:13, 83:12, 100:21, 103:9, 103:10, 107:5, 111:8, 111:9, 112:15, 118:10, 118:12, 119:7, 120:7, 121:16, 121:23, 126:5, 132:5, 135:17, 135:20, 136:17,

138:24, 145:16, 148:7, 154:16, 156:20, 157:13, 160:22
one-way [1] - 136:17
one-year [1] - 160:22
ones [2] - 97:17, 117:9
ongoing [1] - 14:5
open [4] - 17:9, 39:4, 39:16, 96:14
opening [1] - 3:23
opens [1] - 96:16
operated [1] - 84:10
operates [1] - 142:5
operating [2] - 33:8, 129:11
operation [2] - 33:16, 111:15
opportunities [2] - 26:14, 89:23
opportunity [10] - 5:22, 6:7, 66:19, 76:7, 89:23, 90:18, 100:5, 112:3, 112:21, 132:19
opposed [5] - 8:3, 53:11, 81:9, 147:24, 149:22
opposite [1] - 85:9
option [2] - 57:15, 155:18
options [3] - 116:12, 156:22, 157:6
order [9] - 3:16, 47:8, 60:24, 74:1, 98:17, 98:24, 126:16, 132:11, 148:20
Order [1] - 144:8
oriented [1] - 31:13
original [1] - 8:21
originally [1] - 41:2
otherwise [3] - 74:10, 87:3, 101:3
ourselves [1] - 160:12
outline [1] - 74:11
outline [5] - 6:1, 6:16, 6:17, 6:19
output [3] - 49:15, 129:5, 159:19
outputting [1] - 49:17
outside [6] - 16:3, 17:6, 43:12, 89:17, 103:22, 112:1
outweighs [1] - 86:9
over-generation [1] - 127:2
over-produce [2] - 122:9, 158:11
over-producing [2] - 118:19, 124:14

over-voltage [1] - 118:20
overall [1] - 68:13
overcome [1] - 137:12
overinvest [1] - 10:19
overly [1] - 57:5
overnight [2] - 46:8, 127:4
overuse [1] - 56:18
overwhelm [1] - 129:5
overwhelmed [1] - 142:20
own [9] - 13:8, 24:5, 24:19, 34:2, 51:1, 91:5, 92:1, 118:7, 127:2
owned [1] - 82:9

P

P.M [1] - 161:22
p.m [4] - 28:12, 73:23, 111:24, 114:24
pace [1] - 32:3
pack [1] - 15:20
package [1] - 56:2
packaged [1] - 61:4
packages [2] - 143:17, 143:18
page [2] - 110:7, 113:3
paid [6] - 65:4, 66:3, 104:2, 119:3, 159:8
paper [7] - 8:9, 41:9, 42:15, 117:16, 126:19, 129:1, 146:11
parallel [4] - 119:19, 119:21, 120:2, 120:8
paraphrase [1] - 138:14
paraphrasing [1] - 138:14
parcel [1] - 141:5
park [1] - 82:19
parking [2] - 34:2, 89:16
part [23] - 10:14, 11:20, 38:4, 40:8, 41:5, 60:11, 72:24, 73:5, 74:13, 75:22, 89:1, 89:18, 97:24, 102:9, 102:16, 103:6, 104:6, 109:13, 115:5, 137:9, 139:19, 141:5, 154:19
participants [1] - 76:7
participate [2] - 24:18, 98:20
particular [4] - 22:17,

100:12, 153:22, 157:17
particularly [5] - 21:18, 40:17, 61:7, 124:15, 132:23
partly [2] - 137:19, 137:21
partnership [1] - 152:22
parts [2] - 104:8, 122:22
party [3] - 24:10, 95:14, 102:19
passive [1] - 98:15
past [4] - 23:7, 26:10, 117:14, 147:14
path [1] - 50:11
pattern [1] - 36:23
Paul [1] - 135:10
PAUSE [1] - 68:6
pay [36] - 9:7, 12:3, 12:5, 12:6, 13:11, 13:19, 15:7, 18:19, 27:22, 45:13, 52:21, 53:3, 55:15, 56:1, 57:2, 57:16, 59:1, 59:19, 60:1, 60:20, 70:9, 70:10, 78:14, 82:12, 82:17, 84:2, 97:6, 102:2, 107:14, 107:24, 110:14, 111:5, 111:6, 119:7, 160:17
paying [15] - 16:12, 38:13, 44:18, 54:20, 58:4, 63:17, 78:9, 78:13, 85:5, 97:12, 110:16, 110:18, 110:19, 154:11, 157:20
pays [6] - 18:19, 55:14, 65:9, 78:7, 78:8, 110:6
peak [73] - 14:7, 15:20, 21:22, 22:6, 22:8, 22:10, 23:19, 25:12, 26:22, 28:6, 28:15, 28:16, 28:18, 30:20, 31:19, 33:9, 33:12, 34:10, 34:16, 34:19, 34:21, 34:22, 35:4, 35:9, 35:12, 35:16, 35:19, 36:2, 36:3, 36:9, 36:10, 46:9, 46:12, 48:6, 48:13, 49:11, 54:2, 65:15, 65:16, 65:23, 66:18, 68:3, 68:11, 68:13, 68:19, 69:2, 69:4, 69:12, 71:5,

71:6, 71:18, 76:23,
77:1, 79:6, 86:20,
89:4, 90:1, 98:22,
99:5, 100:20,
101:16, 113:19,
114:23, 115:17,
116:3, 124:8,
137:22, 139:7
peakiness [1] - 67:18
peaking [1] - 22:2
peaks [7] - 27:9,
28:11, 28:15, 48:16,
48:21, 82:4, 115:5
peanut [1] - 141:10
penalty [1] - 24:23
penetration [1] -
41:20
PENNOCK [5] - 1:21,
4:19, 100:8, 156:18,
157:3
Pennock [1] - 4:19
people [56] - 2:16, 9:2,
9:10, 13:14, 16:16,
17:19, 21:2, 22:9,
22:11, 24:22, 27:19,
31:12, 34:15, 35:19,
42:1, 55:14, 57:14,
59:16, 60:20, 61:20,
63:4, 64:2, 65:4,
65:9, 66:21, 72:16,
74:9, 74:20, 84:11,
88:14, 89:22, 91:2,
99:15, 99:17, 99:23,
101:17, 114:4,
118:7, 118:9,
121:17, 124:24,
128:15, 128:23,
130:7, 132:21,
133:10, 133:22,
134:20, 135:3,
141:3, 142:16,
149:6, 149:15,
157:19, 159:8,
159:16
per [12] - 15:1, 15:13,
29:22, 42:24, 57:3,
57:9, 57:16, 85:15,
101:4, 115:8, 120:23
percent [15] - 16:20,
16:22, 16:23, 18:2,
52:7, 52:8, 52:10,
53:6, 54:7, 92:7,
98:21, 103:14,
103:24, 105:23,
116:8
percentage [1] - 54:5
perfect [4] - 59:13,
67:21, 81:21, 85:4
perfectly [1] - 138:11
performance [1] -

121:2
perhaps [3] - 66:19,
100:11, 157:6
period [11] - 10:19,
31:18, 31:22, 31:23,
65:23, 67:2, 69:10,
79:7, 112:2, 114:14,
115:16
periods [4] - 13:17,
83:5, 112:23, 113:14
person [2] - 2:12, 8:4
personally [1] -
148:15
perspective [5] -
27:15, 107:7,
110:15, 122:14,
156:21
pertain [1] - 104:5
perverse [1] - 65:6
perverted [1] - 65:8
Pete [1] - 66:10
Peter [18] - 4:23, 6:6,
6:8, 24:4, 43:4,
48:17, 65:13, 73:21,
86:21, 88:10, 98:18,
126:17, 134:15,
137:11, 137:14,
150:4, 158:19,
161:10
PETER [1] - 1:22
Peter's [1] - 65:3
Petro [1] - 16:5
petro [1] - 16:9
phase [3] - 142:12,
145:6, 155:15
phased [1] - 161:17
PhD's [2] - 99:16,
99:24
phenomenon [1] -
27:2
phone [4] - 49:24,
55:19, 58:6, 98:17
photovoltaic [1] -
42:12
physics [7] - 121:10,
121:11, 123:17,
123:18, 125:20,
126:3, 126:16
pick [2] - 19:19, 32:3
pickups [1] - 50:17
pictures [1] - 151:19
pie [1] - 151:24
piece [3] - 74:2, 74:23,
148:7
pilot [8] - 22:10, 31:1,
70:1, 73:2, 73:14,
109:10, 140:23,
145:4
piloted [1] - 25:17
pilots [5] - 50:6.

50:21, 74:24, 89:7,
145:15
pinpoint [1] - 88:5
place [13] - 20:6, 20:7,
20:8, 24:3, 29:9,
65:6, 72:11, 119:5,
136:4, 136:6,
146:24, 151:14,
158:20
places [3] - 37:11,
90:21, 92:12
plan [7] - 41:20, 75:6,
102:4, 102:8, 102:9,
139:12, 140:21
Planet [2] - 57:23,
60:15
planned [1] - 37:15
planning [9] - 48:24,
54:24, 55:3, 55:8,
125:6, 136:8,
147:17, 147:18,
148:4
plant [6] - 16:10, 52:8,
64:3, 85:18, 85:19,
90:12
PLANTATIONS [1] -
1:1
plants [9] - 16:7,
17:10, 17:21, 18:1,
30:13, 81:6, 90:9,
143:5, 143:10
plastic [1] - 85:18
play [2] - 141:17,
158:24
playing [2] - 27:2,
98:16
pleasant [1] - 72:3
pleased [1] - 152:17
plug [1] - 131:21
plus [1] - 50:16
Point [3] - 17:13,
85:22, 132:16
point [20] - 3:20,
30:18, 36:13, 39:13,
58:3, 62:4, 65:3,
65:7, 65:14, 66:12,
74:18, 79:23,
116:19, 121:14,
132:5, 132:16,
148:21, 151:24,
152:4, 156:21
points [3] - 51:7,
51:10, 51:11
policies [1] - 135:22
policy [5] - 3:1, 4:12,
60:9, 64:14, 158:2
POLICY [1] - 1:19
pool [1] - 25:23
pop [2] - 125:7
pops [1] - 27:18

population [1] -
161:15
portion [4] - 19:19,
19:23, 58:14, 58:15
portrayed [1] - 67:24
possible [5] - 81:18,
81:19, 93:13, 97:19,
142:7
post-98 [1] - 24:20
postage [1] - 38:3
pot [1] - 159:16
potential [1] - 4:5
potentially [5] - 26:13,
44:21, 99:11,
103:20, 133:8
potentiate [1] - 138:6
Power [2] - 16:17,
132:16
power [14] - 26:12,
43:16, 49:8, 95:10,
104:14, 115:24,
119:23, 120:1,
120:3, 126:24,
127:3, 128:6,
128:19, 143:10
powerful [1] - 113:6
practice [1] - 88:17
pre [4] - 112:17,
112:19, 114:8,
114:11
pre-1998 [1] - 24:19
pre-energy [2] - 114:8,
114:11
pre-restructuring [2] -
112:17, 112:19
preclude [2] - 111:17,
111:18
prefer [3] - 55:15,
57:17, 98:15
prejudice [1] - 150:21
premise [2] - 7:10,
142:2
premises [1] - 7:4
premium [1] - 124:22
prepare [1] - 5:24
prepared [2] - 6:3,
141:21
prescriptive [3] -
135:12, 151:13
presentation [5] -
6:17, 6:18, 13:23,
68:17
presumably [1] - 61:9
prevalent [1] - 28:8
prevent [1] - 89:5
previous [2] - 90:7,
107:22
price [11] - 73:7,
80:10, 81:21, 83:3,
83:5, 83:6, 83:12,

94:24, 95:3, 95:18,
97:8
prices [7] - 73:8, 73:9,
77:21, 77:23, 83:6,
83:13, 83:21
pricing [10] - 22:10,
83:2, 85:8, 92:5,
99:8, 105:1, 105:2,
112:14, 118:24,
119:12
primarily [4] - 31:11,
36:17, 36:20, 112:2
primary [1] - 33:7
principle [4] - 12:9,
19:3, 110:24, 111:2
Principles [1] - 8:19
principles [4] - 9:2,
79:16, 137:15, 140:1
problem [10] - 22:17,
62:5, 63:13, 65:18,
65:24, 71:16, 73:21,
74:7, 104:7, 130:20
problematic [1] -
50:19
proceeding [3] -
134:14, 134:24,
140:12
process [13] - 18:17,
19:15, 86:22,
100:21, 109:4,
133:3, 140:24,
147:5, 147:7,
150:10, 160:11,
160:19, 160:20
processes [3] - 79:11,
85:20, 85:22
procure [1] - 24:14
procurement [1] -
140:19
produce [4] - 119:9,
122:8, 122:9, 158:11
produced [1] - 121:8
producing [4] -
118:19, 124:14,
124:16, 143:7
product [2] - 71:2,
105:6
production [5] -
32:11, 122:4, 123:3,
124:24, 126:4
products [8] - 18:2,
23:16, 23:17, 41:22,
118:23, 118:4,
118:6, 118:8
profile [2] - 64:14,
108:14
profiles [2] - 52:3,
76:16
program [11] - 25:8,
25:16, 25:23, 61:3,

66:2, 66:4, 74:13,
75:2, 87:24, 120:5,
147:12
programs [26] - 23:8,
24:2, 24:8, 24:11,
24:20, 24:23, 25:2,
25:6, 25:20, 26:5,
31:16, 72:5, 86:18,
87:7, 87:19, 88:23,
89:24, 90:4, 104:2,
114:17, 114:18,
119:20, 147:19,
148:3, 149:8, 152:14
progression [2] -
113:2, 115:9
progressively [1] -
106:17
Project [2] - 39:22,
40:23
project [5] - 127:5,
142:12, 153:24,
154:1, 161:8
projects [4] - 114:9,
145:7, 149:21, 156:1
projet [1] - 25:11
promote [2] - 65:6,
118:2
promoting [1] - 14:23
proper [1] - 41:4
propose [2] - 75:1,
136:19
proposed [1] - 120:5
prove [1] - 65:14
provide [14] - 18:16,
23:13, 23:15, 41:4,
41:10, 47:9, 50:9,
100:5, 106:14,
119:3, 125:14,
125:17, 138:12,
159:9
provided [6] - 41:22,
106:13, 118:5,
143:22, 155:13,
159:15
PROVIDENCE [1] -
1:1
provider [2] - 9:22,
59:18
providers [1] - 50:16
provides [2] - 41:12,
41:16
providing [1] - 128:24
provision [4] - 132:20,
132:23, 133:23,
144:14
PSU [1] - 144:5
PUBLIC [1] - 1:2
Public [4] - 8:19,
38:16, 162:5, 162:11
public [2] - 9:15, 60:8

pull [3] - 13:22, 27:19,
130:16
pump [3] - 46:7,
128:3, 128:15
pumps [1] - 25:23
punch [1] - 57:16
pure [1] - 2:20
purely [1] - 86:13
purifier [1] - 85:19
purpose [1] - 43:7
put [27] - 9:23, 20:8,
20:11, 26:2, 27:21,
29:4, 29:5, 29:17,
30:6, 31:12, 32:10,
41:13, 63:5, 63:14,
65:6, 77:18, 81:8,
90:18, 91:13, 94:4,
97:13, 102:4,
127:13, 132:9,
141:13, 151:14,
154:13
puts [1] - 158:20
putting [5] - 28:22,
102:11, 124:2,
142:16, 159:18
PV [18] - 40:4, 40:11,
42:10, 42:11,
118:19, 119:2,
127:14, 127:22,
129:5, 129:8,
129:11, 129:14,
129:18, 130:1,
130:14, 143:1,
155:6, 158:24
PVs [1] - 46:2

Q

questions [6] - 2:15,
15:24, 38:12, 60:19,
106:24, 147:16
quickly [3] - 47:10,
72:17, 84:10
quite [2] - 39:10, 96:3
Quonset [2] - 17:13,
85:21
quote [2] - 27:11,
32:10
quotes [1] - 148:13

R

radio [2] - 49:23, 50:4
raise [1] - 4:7
raises [1] - 39:12
raising [2] - 74:4,
118:15
ran [6] - 24:5, 24:11,
24:20, 74:6, 88:22,
100:2

range [2] - 60:9, 66:21
ratchet [5] - 52:13,
53:8, 59:6, 59:7,
136:17
ratchets [1] - 51:21
rate [83] - 2:21, 2:22,
3:9, 4:13, 5:23, 9:2,
9:11, 10:3, 11:17,
13:2, 18:10, 18:11,
18:14, 20:14, 21:8,
32:7, 32:24, 33:13,
33:15, 34:5, 38:4,
38:9, 39:14, 40:10,
46:16, 49:6, 52:21,
54:6, 55:23, 56:1,
62:12, 63:4, 63:13,
63:21, 64:7, 64:21,
69:20, 75:23, 76:6,
76:18, 79:17, 82:1,
83:2, 84:12, 85:8,
87:14, 87:16, 88:11,
90:4, 96:2, 100:13,
100:22, 103:16,
111:20, 112:12,
112:14, 114:2,
115:13, 115:14,
115:21, 115:22,
121:24, 122:10,
123:8, 123:17,
124:20, 125:20,
134:14, 134:24,
137:15, 138:6,
140:1, 141:4, 146:2,
147:7, 149:9,
149:16, 150:21,
151:8, 158:9,
158:10, 158:14

RATE [3] - 1:6, 1:7,
1:19

ratepayer [5] - 137:19,
139:16, 140:2

**ratepayer-by-
ratepayer** [1] -
139:16

ratepayers [2] - 139:2,
151:4

Rates [1] - 8:20

rates [70] - 2:23, 3:2,
3:3, 3:7, 3:10, 3:12,
6:24, 7:9, 9:12, 10:2,
10:12, 11:3, 11:6,
11:14, 11:21, 13:4,
13:15, 14:17, 16:8,
19:24, 20:1, 20:23,
24:5, 24:20, 38:2,
38:3, 38:11, 47:14,
51:22, 54:15, 55:12,
56:6, 62:11, 62:24,
63:16, 63:24, 64:18,
65:12, 76:5, 76:14,

84:24, 85:1, 88:14,
92:10, 100:24,
112:11, 115:7,
116:13, 117:12,
125:21, 130:22,
133:14, 145:13,
146:9, 147:10,
147:21, 148:1,
148:6, 148:14,
148:19, 149:5,
149:19, 149:20,
150:7, 151:10,
151:15, 153:7,
153:9, 161:11

rather [4] - 3:8, 66:22,
72:13, 96:5

rating [1] - 29:22

ratio [4] - 14:7, 14:9,
26:22, 78:11

reach [1] - 72:17

read [7] - 41:8, 47:3,
47:24, 49:23, 49:24,
51:14, 117:15

reader [1] - 50:8

readers [1] - 50:5

reading [4] - 47:11,
51:8, 57:10, 153:8

ready [3] - 37:1, 44:24,
144:12

real [6] - 44:22, 45:4,
82:8, 91:16, 114:10,
119:22

reality [8] - 53:1,
61:15, 63:20, 84:17,
84:20, 91:23,
127:18, 130:12

realizable [1] - 99:12

realized [2] - 15:9,
91:11

really [87] - 3:1, 3:19,
8:11, 9:5, 9:7, 10:22,
11:10, 16:11, 16:13,
17:15, 21:1, 22:9,
22:22, 22:23, 28:11,
30:16, 32:7, 35:20,
41:24, 42:1, 45:21,
50:22, 50:23, 55:16,
58:20, 59:5, 59:8,
59:12, 62:5, 64:9,
69:2, 73:16, 73:18,
75:20, 75:21, 81:7,
81:10, 81:15, 82:23,
83:5, 84:11, 84:16,
86:15, 87:13, 88:16,
88:20, 90:4, 93:23,
98:24, 100:6,
103:23, 105:18,
106:3, 108:4, 114:6,
114:13, 115:11,
121:21, 122:24,

123:21, 126:3,
126:15, 126:20,
127:24, 130:14,
130:15, 132:19,
132:24, 134:3,
134:4, 136:2, 141:2,
142:11, 145:9,
146:1, 146:22,
147:2, 147:24,
149:5, 149:10,
152:4, 152:14,
154:3, 159:21

realtime [8] - 83:2,
85:7, 92:5, 104:17,
112:14, 137:13,
137:17, 138:5

reason [5] - 23:17,
31:16, 45:19,
105:16, 122:21

reasonable [2] -
147:21, 151:15

reasons [2] - 17:22,
63:19

receive [1] - 113:11

receiving [1] - 38:23

recently [2] - 4:8, 26:9

RECESS [1] - 75:17

recognize [2] - 91:4,
119:5

recognizes [1] -
143:15

recommend [1] - 46:3

recommendation [1] -
148:24

reconsider [1] - 63:8

reconsidering [1] -
150:21

recover [13] - 10:14,
11:22, 18:22, 19:5,
33:18, 44:16, 58:12,
59:10, 78:4, 81:6,
85:2, 133:6, 160:8

recovered [3] - 59:11,
108:24, 109:2

recovering [3] - 14:15,
60:3, 155:24

recovery [3] - 63:9,
69:9, 70:16

redesign [1] - 146:9

reduce [10] - 3:16,
70:6, 70:7, 71:5,
74:2, 113:21, 114:1,
114:2, 114:10,
154:22

reduced [4] - 68:3,
113:9, 139:7, 158:10

reduces [1] - 36:16

reducing [4] - 69:4,
121:12, 124:8,
124:10

<p>reduction [2] - 23:7, 90:2</p> <p>refer [1] - 34:16</p> <p>referred [1] - 145:23</p> <p>referring [1] - 134:15</p> <p>refers [1] - 40:18</p> <p>reflect [8] - 7:15, 19:1, 54:8, 63:22, 64:9, 64:10, 110:21, 129:13</p> <p>reflecting [3] - 64:6, 154:6, 154:18</p> <p>reflects [1] - 63:21</p> <p>refrigerator [3] - 95:8, 96:15, 96:20</p> <p>regard [1] - 35:14</p> <p>region [4] - 18:6, 26:24, 30:16, 30:17</p> <p>regional [1] - 115:4</p> <p>regions [1] - 16:4</p> <p>register [1] - 47:19</p> <p>registers [1] - 47:18</p> <p>regular [1] - 24:17</p> <p>regulated [2] - 38:16, 60:13</p> <p>Regulatory [2] - 4:24, 5:3</p> <p>relate [2] - 102:17, 102:18</p> <p>relative [4] - 21:22, 23:20, 78:10, 131:5</p> <p>relatively [5] - 24:21, 26:6, 106:21, 115:17, 132:2</p> <p>relevant [1] - 140:11</p> <p>reliability [4] - 135:8, 139:22, 140:5, 140:20</p> <p>remain [1] - 131:3</p> <p>remains [1] - 125:13</p> <p>remember [8] - 2:11, 16:15, 23:24, 103:13, 103:21, 138:15, 141:6, 156:6</p> <p>renewable [3] - 120:5, 143:4, 156:7</p> <p>replace [1] - 97:16</p> <p>replacement [1] - 25:22</p> <p>replacing [1] - 108:23</p> <p>replicate [2] - 144:5, 144:6</p> <p>representing [1] - 134:13</p> <p>request [1] - 84:8</p> <p>require [1] - 149:13</p> <p>required [6] - 42:6, 58:11, 123:6, 130:3, 146:6, 158:16</p> <p>requirement [12] -</p>	<p>2:22, 10:15, 18:13, 18:18, 19:5, 19:9, 20:2, 58:22, 70:14, 78:3, 136:2, 148:22</p> <p>requirements [10] - 10:13, 32:9, 61:16, 68:24, 70:6, 101:11, 129:12, 144:13, 158:19, 158:21</p> <p>requires [2] - 48:23, 144:9</p> <p>requisition [1] - 142:22</p> <p>resale [1] - 38:17</p> <p>research [5] - 47:1, 145:3, 146:3, 146:24, 156:17</p> <p>reserve [2] - 54:23, 58:19</p> <p>reserved [1] - 54:9</p> <p>residences [1] - 37:13</p> <p>residential [20] - 12:14, 15:6, 19:21, 20:17, 28:10, 36:17, 36:24, 39:6, 45:20, 64:17, 64:21, 76:15, 84:19, 94:3, 120:19, 120:20, 124:16, 125:1, 129:2, 153:22</p> <p>Residentials [1] - 93:21</p> <p>resilient [1] - 127:12</p> <p>resolve [1] - 4:5</p> <p>resonate [1] - 156:10</p> <p>resources [2] - 24:15, 32:12</p> <p>Resources [2] - 5:9, 5:12</p> <p>respect [1] - 72:21</p> <p>response [13] - 23:8, 23:12, 23:15, 23:18, 23:21, 24:2, 24:14, 24:24, 25:8, 31:16, 31:22, 66:19, 75:9</p> <p>responsibility [2] - 35:17, 147:9</p> <p>responsible [1] - 18:23</p> <p>rest [4] - 86:19, 98:10, 132:17, 141:5</p> <p>restaurants [1] - 39:2</p> <p>restoring [1] - 128:19</p> <p>restrictions [1] - 158:3</p> <p>restructuring [14] - 9:7, 9:8, 11:9, 23:11, 24:4, 24:6, 79:20, 80:1, 80:17, 81:3, 84:15, 112:17, 112:19, 146:2</p> <p>result [1] - 111:7</p>	<p>results [3] - 23:23, 79:22, 87:23</p> <p>retail [2] - 39:3, 144:6</p> <p>retailer [1] - 105:19</p> <p>return [1] - 32:7</p> <p>returned [1] - 143:18</p> <p>returns [1] - 73:10</p> <p>revealing [1] - 8:12</p> <p>revenue [26] - 2:21, 10:13, 10:15, 11:2, 16:24, 17:6, 18:13, 18:15, 18:18, 19:5, 19:8, 20:1, 32:8, 33:18, 58:22, 60:1, 63:6, 78:2, 109:20, 146:8, 148:9, 148:14, 148:15, 148:18, 148:22, 160:8</p> <p>revenues [6] - 10:8, 19:4, 20:3, 63:9, 112:6, 160:12</p> <p>REVIEW [2] - 1:6, 1:7</p> <p>Rhode [20] - 10:5, 11:8, 17:12, 21:12, 25:6, 26:9, 50:7, 53:23, 72:4, 75:5, 80:3, 99:5, 115:13, 139:8, 158:2, 158:4, 158:14, 161:13, 162:5, 162:11</p> <p>RHODE [2] - 1:1, 1:14</p> <p>rid [2] - 59:7, 65:1</p> <p>rip [1] - 30:6</p> <p>risk [3] - 94:12, 97:9, 97:10</p> <p>risks [3] - 94:14, 104:16, 105:15</p> <p>River [4] - 39:21, 40:23, 153:24, 154:1</p> <p>Roberti [1] - 135:10</p> <p>robust [1] - 24:1</p> <p>Rome [1] - 151:1</p> <p>Ron [3] - 134:12, 135:1, 155:23</p> <p>roof [4] - 41:14, 117:1, 120:2, 158:24</p> <p>roofs [1] - 63:5</p> <p>Rooftop [1] - 42:16</p> <p>room [7] - 3:15, 83:19, 89:11, 128:1, 133:20, 134:12, 134:20</p> <p>ROUGHAN [51] - 1:23, 5:2, 17:14, 24:3, 25:24, 26:18, 27:16, 29:23, 40:1, 40:22, 42:17, 43:24, 47:4, 47:21, 48:18, 48:24, 49:16, 49:20, 50:2,</p>	<p>51:4, 54:5, 58:20, 64:16, 65:2, 67:17, 73:13, 79:23, 80:16, 86:12, 88:8, 88:13, 97:24, 103:12, 112:16, 113:16, 115:12, 120:4, 120:11, 120:17, 121:11, 122:13, 122:18, 126:1, 128:12, 129:22, 131:9, 131:16, 131:24, 139:5, 140:18, 160:24</p> <p>Roughan [1] - 5:2</p> <p>router [1] - 50:17</p> <p>RPR/CSR [1] - 162:10</p> <p>rules [1] - 144:11</p> <p>run [20] - 29:5, 53:24, 54:2, 74:5, 77:15, 77:16, 82:10, 82:18, 83:24, 85:11, 86:4, 90:10, 104:10, 107:7, 113:21, 119:20, 126:10, 126:13, 130:6, 144:15</p> <p>running [11] - 28:23, 31:17, 46:13, 69:14, 85:20, 85:22, 117:22, 126:12, 130:18, 143:5, 143:10</p> <p>runs [2] - 45:1, 46:14</p>	<p>99:1, 99:11, 119:6, 121:21</p> <p>saw [3] - 79:24, 98:8, 98:10</p> <p>schedule [2] - 2:9, 44:11</p> <p>Scialabba [1] - 4:17</p> <p>SCIALABBA [10] - 1:23, 4:17, 23:6, 23:24, 51:19, 53:22, 65:22, 67:23, 87:22, 88:2</p> <p>scope [1] - 133:11</p> <p>season [1] - 21:13</p> <p>seasons [1] - 15:17</p> <p>second [6] - 10:10, 54:15, 54:18, 59:2, 128:13, 131:14</p> <p>secondary [1] - 33:7</p> <p>section [3] - 134:11, 136:15, 140:9</p> <p>Section [5] - 135:15, 136:13, 137:2, 139:18, 150:9</p> <p>security [1] - 50:13</p> <p>see [39] - 9:20, 11:14, 14:2, 19:6, 20:16, 26:16, 27:1, 27:4, 27:9, 28:3, 30:23, 31:9, 36:9, 40:7, 46:18, 50:20, 50:22, 58:9, 67:6, 67:10, 67:14, 70:24, 82:15, 82:18, 87:20, 90:21, 99:7, 99:9, 102:15, 107:2, 142:12, 144:10, 154:4, 155:17, 159:23, 160:20, 161:12, 161:21</p> <p>seeing [2] - 23:22, 26:22</p> <p>seem [2] - 35:23, 55:15</p> <p>sees [1] - 51:8</p> <p>segments [1] - 161:15</p> <p>segue [1] - 134:4</p> <p>self [2] - 65:5, 132:18</p> <p>self-explanatory [1] - 132:18</p> <p>sell [4] - 69:17, 99:18, 117:23, 126:24</p> <p>seller [1] - 97:9</p> <p>selling [2] - 50:3, 82:4</p> <p>send [3] - 29:11, 32:16, 143:19</p> <p>sending [1] - 80:9</p> <p>sense [11] - 54:10, 57:22, 102:12, 129:19, 132:8,</p>
S				
<p>safety [1] - 122:21</p> <p>sale [1] - 38:17</p> <p>sales [1] - 117:24</p> <p>Salt [4] - 39:21, 40:23, 153:24, 154:1</p> <p>Salvage [1] - 82:23</p> <p>salvage [2] - 99:14, 99:16</p> <p>Saturday [1] - 45:5</p> <p>save [10] - 13:9, 13:11, 69:19, 69:21, 70:8, 70:11, 72:19, 112:21, 113:13, 139:1</p> <p>saved [2] - 79:13, 145:17</p> <p>saves [2] - 71:3</p> <p>saving [2] - 137:23, 160:4</p> <p>savings [14] - 13:12, 20:12, 70:4, 70:16, 70:22, 70:24, 87:21, 89:3, 90:3, 98:18,</p>	<p>99:1, 99:11, 119:6, 121:21</p> <p>saw [3] - 79:24, 98:8, 98:10</p> <p>schedule [2] - 2:9, 44:11</p> <p>Scialabba [1] - 4:17</p> <p>SCIALABBA [10] - 1:23, 4:17, 23:6, 23:24, 51:19, 53:22, 65:22, 67:23, 87:22, 88:2</p> <p>scope [1] - 133:11</p> <p>season [1] - 21:13</p> <p>seasons [1] - 15:17</p> <p>second [6] - 10:10, 54:15, 54:18, 59:2, 128:13, 131:14</p> <p>secondary [1] - 33:7</p> <p>section [3] - 134:11, 136:15, 140:9</p> <p>Section [5] - 135:15, 136:13, 137:2, 139:18, 150:9</p> <p>security [1] - 50:13</p> <p>see [39] - 9:20, 11:14, 14:2, 19:6, 20:16, 26:16, 27:1, 27:4, 27:9, 28:3, 30:23, 31:9, 36:9, 40:7, 46:18, 50:20, 50:22, 58:9, 67:6, 67:10, 67:14, 70:24, 82:15, 82:18, 87:20, 90:21, 99:7, 99:9, 102:15, 107:2, 142:12, 144:10, 154:4, 155:17, 159:23, 160:20, 161:12, 161:21</p> <p>seeing [2] - 23:22, 26:22</p> <p>seem [2] - 35:23, 55:15</p> <p>sees [1] - 51:8</p> <p>segments [1] - 161:15</p> <p>segue [1] - 134:4</p> <p>self [2] - 65:5, 132:18</p> <p>self-explanatory [1] - 132:18</p> <p>sell [4] - 69:17, 99:18, 117:23, 126:24</p> <p>seller [1] - 97:9</p> <p>selling [2] - 50:3, 82:4</p> <p>send [3] - 29:11, 32:16, 143:19</p> <p>sending [1] - 80:9</p> <p>sense [11] - 54:10, 57:22, 102:12, 129:19, 132:8,</p>			
A-1 COURT REPORTERS, INC.				
(401) 405-0410				

<p>141:1, 143:14, 156:8, 157:21, 157:23, 161:5</p> <p>separate [5] - 25:18, 74:1, 98:24, 112:11, 116:9</p> <p>separation [3] - 17:20, 17:24, 52:8</p> <p>series [1] - 86:18</p> <p>seriously [2] - 91:16, 142:1</p> <p>serve [18] - 7:18, 8:5, 11:22, 12:7, 20:2, 20:3, 21:24, 29:1, 43:12, 45:3, 58:17, 77:11, 81:15, 101:6, 105:21, 154:9, 154:14, 154:16</p> <p>served [3] - 12:6, 12:21, 81:9</p> <p>service [33] - 5:24, 7:12, 7:13, 9:13, 10:8, 11:24, 16:19, 18:16, 19:8, 31:13, 32:6, 32:8, 33:5, 38:24, 44:15, 52:19, 54:15, 54:17, 54:18, 54:20, 60:8, 60:18, 60:21, 61:13, 81:14, 105:3, 105:9, 105:10, 107:16, 124:23, 125:14, 144:14, 160:6</p> <p>services [22] - 56:14, 57:6, 57:13, 60:22, 60:23, 61:4, 61:5, 93:6, 96:12, 97:1, 97:3, 97:4, 97:5, 98:8, 110:2, 119:3, 143:22, 155:13, 159:8, 159:10, 159:11, 159:14</p> <p>servicing [5] - 36:17, 36:19, 36:20, 36:22, 45:9</p> <p>set [14] - 2:9, 9:1, 43:6, 48:4, 52:1, 54:3, 58:22, 66:4, 83:21, 116:19, 147:21, 148:1, 148:6, 151:10</p> <p>Seth [1] - 5:6</p> <p>SETH [1] - 1:22</p> <p>setting [2] - 147:22, 151:9</p> <p>seven [1] - 150:22</p> <p>several [2] - 39:2, 60:24</p> <p>shake [1] - 161:12</p> <p>shall [1] - 62:18</p>	<p>shape [1] - 31:10</p> <p>shapes [2] - 12:16, 12:17</p> <p>share [2] - 111:6, 111:7</p> <p>shared [1] - 154:9</p> <p>shaving [1] - 137:22</p> <p>sheet [7] - 6:15, 6:20, 28:24, 29:4, 29:6, 29:10, 30:7</p> <p>shift [1] - 114:22</p> <p>shirts [1] - 84:22</p> <p>shoot [1] - 73:3</p> <p>shop [1] - 85:12</p> <p>shops [1] - 39:3</p> <p>short [2] - 31:18, 95:2</p> <p>short-term [1] - 95:2</p> <p>shortly [1] - 74:11</p> <p>show [1] - 76:18</p> <p>showed [1] - 113:3</p> <p>showing [1] - 161:9</p> <p>shown [1] - 61:18</p> <p>shows [1] - 68:17</p> <p>shut [5] - 3:15, 74:9, 85:20, 85:23, 93:3</p> <p>side [12] - 19:7, 62:12, 62:15, 72:20, 99:3, 104:1, 120:23, 129:20, 129:21, 139:5, 148:8, 156:8</p> <p>sign [2] - 75:2, 102:14</p> <p>signal [2] - 80:10, 81:21</p> <p>significant [4] - 80:5, 80:6, 139:19, 158:11</p> <p>significantly [1] - 159:2</p> <p>similar [5] - 12:17, 21:11, 36:23, 52:1, 52:2</p> <p>similarly [3] - 12:11, 12:12, 12:13</p> <p>simple [9] - 10:5, 33:5, 76:15, 83:10, 99:20, 116:16, 116:22, 116:24, 119:24</p> <p>simpler [2] - 114:20, 115:1</p> <p>simplicity [1] - 9:15</p> <p>simply [3] - 8:3, 84:13, 141:8</p> <p>single [5] - 50:20, 51:8, 91:1, 120:7, 120:16</p> <p>sit [2] - 15:19, 93:24</p> <p>site [8] - 113:10, 114:3, 116:18, 116:19, 117:8, 121:12, 126:7, 158:5</p> <p>sits [1] - 51:2</p>	<p>sitting [2] - 74:16, 134:12</p> <p>situated [1] - 12:12</p> <p>situation [7] - 21:14, 30:5, 31:21, 66:22, 78:17, 129:23, 133:7</p> <p>situations [1] - 21:15</p> <p>six [6] - 45:7, 48:6, 48:8, 62:19, 69:8</p> <p>size [9] - 52:2, 58:24, 77:7, 78:10, 111:12, 131:12, 153:9, 154:7, 154:18</p> <p>sized [2] - 130:22, 132:10</p> <p>sizes [1] - 110:13</p> <p>ski [1] - 52:24</p> <p>sky [1] - 63:15</p> <p>sleep [1] - 28:13</p> <p>Slide [3] - 18:8, 32:4, 77:2</p> <p>slide [6] - 6:23, 27:13, 51:24, 68:17, 142:3</p> <p>slides [3] - 6:6, 14:1, 132:17</p> <p>slowed [1] - 60:21</p> <p>slowly [1] - 161:3</p> <p>small [9] - 29:6, 64:18, 89:18, 99:8, 110:15, 110:18, 137:7, 152:12, 154:3</p> <p>smaller [5] - 20:17, 78:6, 110:5, 110:22, 153:20</p> <p>smart [12] - 22:11, 31:1, 46:17, 46:19, 46:20, 70:1, 72:7, 73:5, 95:8, 98:2, 98:17, 145:7</p> <p>smoley [1] - 31:5</p> <p>soft [2] - 130:2, 130:16</p> <p>solar [18] - 20:21, 41:12, 41:13, 41:19, 63:5, 77:17, 118:19, 126:12, 127:14, 130:10, 142:12, 143:14, 145:5, 145:6, 155:15, 159:17, 159:24, 160:13</p> <p>Solar [3] - 39:21, 40:5, 42:16</p> <p>solution [2] - 131:19, 160:21</p> <p>solve [1] - 125:24</p> <p>someone [2] - 50:15, 125:5</p> <p>sometimes [3] - 35:22, 84:4, 95:4</p>	<p>somewhat [1] - 107:1</p> <p>somewhere [1] - 18:7</p> <p>sophisticated [2] - 99:22, 134:9</p> <p>sorry [3] - 39:11, 42:8, 95:22</p> <p>sort [24] - 3:3, 3:8, 21:10, 21:11, 37:14, 39:9, 59:24, 75:20, 75:24, 76:2, 76:8, 87:16, 90:15, 98:20, 102:21, 116:1, 121:23, 132:15, 133:12, 140:22, 146:1, 146:22, 149:4, 161:1</p> <p>sorted [1] - 74:23</p> <p>sorts [4] - 3:10, 4:1, 57:3, 68:21</p> <p>sounded [1] - 101:23</p> <p>sounds [3] - 96:7, 132:14, 142:1</p> <p>source [2] - 130:2, 130:16</p> <p>Southeast [1] - 26:8</p> <p>Southern [1] - 74:6</p> <p>southern [1] - 15:21</p> <p>SOX [1] - 135:8</p> <p>spaces [2] - 17:9, 89:16</p> <p>special [5] - 82:14, 82:19, 112:10, 112:15, 155:6</p> <p>specific [8] - 37:23, 37:24, 40:9, 140:9, 155:22, 156:17, 157:6</p> <p>specifically [1] - 40:18</p> <p>spend [2] - 51:20, 90:21</p> <p>spent [1] - 87:17</p> <p>spike [7] - 10:17, 31:8, 31:18, 79:9, 101:9, 128:8, 128:17</p> <p>spikes [1] - 45:1</p> <p>spikier [1] - 76:23</p> <p>spikiness [1] - 68:5</p> <p>spiky [3] - 30:21, 65:21, 68:11</p> <p>spinning [1] - 130:21</p> <p>sporadic [1] - 53:12</p> <p>spot [1] - 120:16</p> <p>spread [4] - 14:13, 15:14, 78:20, 93:1</p> <p>spreading [1] - 109:22</p> <p>stability [6] - 10:16, 11:6, 11:15, 19:4, 117:19, 160:2</p> <p>stable [3] - 11:3, 125:13</p>	<p>staff [1] - 79:12</p> <p>STAKEHOLDERS [1] - 1:4</p> <p>stamp [1] - 38:3</p> <p>standard [3] - 10:21, 42:23, 137:15</p> <p>standards [1] - 118:17</p> <p>start [11] - 3:5, 4:14, 8:16, 19:6, 79:4, 120:20, 127:9, 130:20, 136:6, 150:1, 153:2</p> <p>started [9] - 22:3, 30:19, 30:24, 79:7, 106:6, 117:13, 128:7, 135:17, 135:21</p> <p>starting [1] - 132:14</p> <p>starts [1] - 67:11</p> <p>State [2] - 17:4, 162:11</p> <p>STATE [1] - 1:1</p> <p>state [7] - 21:1, 21:13, 86:6, 86:19, 133:17, 133:19, 152:12</p> <p>statements [1] - 142:10</p> <p>states [3] - 15:19, 15:21, 25:17</p> <p>station [3] - 127:16, 128:20, 131:7</p> <p>stations [1] - 127:12</p> <p>statute [6] - 132:21, 132:23, 134:12, 136:24, 140:9, 151:18</p> <p>statutes [1] - 135:11</p> <p>stay [2] - 79:14, 86:7</p> <p>stayed [1] - 98:9</p> <p>steady [1] - 90:10</p> <p>step [5] - 61:23, 150:20, 150:23, 151:3, 152:16</p> <p>STEPHEN [1] - 4:17</p> <p>STEPHEN [1] - 1:23</p> <p>stepped [3] - 23:14, 103:3, 103:9</p> <p>steps [3] - 14:23, 18:21, 153:3</p> <p>still [26] - 38:21, 38:23, 45:6, 55:10, 67:19, 68:22, 69:8, 71:6, 71:10, 74:15, 74:20, 78:14, 80:20, 90:2, 103:15, 103:17, 107:24, 108:16, 128:24, 129:10, 138:11, 147:5, 147:20, 156:22</p>
--	--	---	--	---

stimulus [1] - 161:7
stop [1] - 73:9
storage [6] - 88:11, 88:14, 88:20, 89:5, 89:10, 100:9
store [2] - 16:10, 39:2
story [1] - 104:23
straight [1] - 6:16
stranded [1] - 157:18
Strategy [1] - 4:24
stream [2] - 60:1, 90:1
Street [1] - 33:23
street [6] - 34:5, 34:7, 36:19, 36:21, 49:9
streetlight [1] - 106:7
streetlights [11] - 19:22, 19:23, 33:23, 34:3, 34:6, 106:4, 106:5, 106:12, 106:22, 107:1, 107:5
strong [3] - 10:18, 41:14, 126:23
structure [14] - 65:8, 87:16, 106:13, 106:18, 109:14, 113:8, 114:2, 118:1, 119:4, 123:8, 147:11, 147:12, 151:8, 158:14
structures [2] - 83:3, 116:4
struggle [1] - 43:6
studies [2] - 72:19, 72:21
study [6] - 20:10, 32:6, 69:20, 70:18, 73:12, 136:3
stuff [15] - 10:22, 14:24, 27:14, 30:12, 59:18, 70:11, 92:8, 99:18, 102:11, 103:22, 104:14, 130:11, 133:20, 142:9, 159:22
stunned [1] - 9:23
stunning [2] - 70:12, 70:18
subscribe [2] - 56:14, 72:16
subscription [14] - 55:12, 56:24, 57:13, 58:15, 59:14, 59:17, 59:20, 59:21, 60:2, 60:11, 61:5, 61:12, 74:13, 101:24
subsidized [2] - 61:2, 133:8
substation [4] - 25:11, 25:14, 74:8, 118:14
substations [1] -

48:20
subtraction [1] - 51:18
successful [4] - 24:21, 72:13, 160:14
sudden [1] - 27:24
suing [2] - 39:21, 40:5
suit [1] - 40:7
suited [1] - 158:14
sum [2] - 35:3, 111:4
summed [1] - 35:15
summer [21] - 22:2, 22:6, 22:7, 22:14, 22:21, 22:24, 27:9, 28:6, 28:7, 29:19, 31:11, 69:3, 72:3, 73:11, 73:12, 73:16, 73:17, 83:11, 86:16, 140:24
summer's [1] - 25:12
summer/winter [1] - 94:9
summers [1] - 66:8
summertime [12] - 22:18, 23:2, 23:23, 27:15, 30:20, 30:22, 31:20, 46:11, 52:16, 52:23, 71:13
supplied [1] - 127:3
supplier [3] - 102:19, 102:24, 103:3
suppliers [2] - 23:13, 24:10
supply [4] - 72:20, 105:19, 127:15, 127:17
support [4] - 132:11, 141:21, 148:20, 151:22
supposed [4] - 3:2, 3:9, 40:20, 148:2
survive [1] - 127:24
sustain [1] - 119:16
sustainability [1] - 91:18
SUTCLIFFE [1] - 162:10
switch [3] - 45:1, 57:15, 115:7
switched [1] - 108:15
swoons [1] - 11:2
system [108] - 7:14, 12:22, 13:6, 13:7, 13:11, 13:16, 13:18, 14:8, 23:3, 28:19, 29:17, 32:19, 34:21, 34:24, 36:13, 36:14, 36:15, 41:1, 41:15, 41:16, 43:12, 43:18, 47:11, 48:13, 49:2,

49:3, 50:11, 51:6, 51:11, 53:18, 54:13, 55:8, 56:9, 62:9, 63:22, 63:23, 67:6, 69:2, 69:22, 70:11, 70:17, 71:3, 71:4, 77:14, 80:24, 81:2, 81:8, 81:15, 83:19, 83:24, 85:3, 93:8, 95:11, 101:1, 106:13, 110:21, 112:24, 115:5, 117:2, 117:20, 117:22, 118:20, 118:21, 120:14, 121:14, 122:22, 123:18, 123:22, 124:9, 124:18, 125:5, 125:13, 126:4, 126:16, 128:24, 129:7, 129:10, 129:18, 129:24, 130:15, 132:10, 134:17, 135:3, 135:5, 136:5, 136:7, 137:6, 137:22, 138:22, 139:10, 139:15, 139:22, 140:5, 140:20, 141:2, 143:2, 143:15, 144:16, 144:22, 145:11, 145:17, 147:11, 149:23, 153:19, 155:8, 155:9, 160:3
systems [11] - 29:1, 46:8, 79:19, 89:13, 117:5, 117:7, 122:20, 123:23, 142:16, 142:21
sytem [1] - 34:22

T

table [2] - 132:21, 133:22
tail [4] - 63:3, 63:6, 63:16, 118:21
takeup [1] - 92:7
talks [6] - 3:24, 4:2, 8:8, 41:17, 41:21, 73:21
Tamburello [1] - 82:23
tank [2] - 88:24, 89:2
target [1] - 141:8
tariff [10] - 62:21, 106:11, 106:15, 107:22, 108:11, 108:14, 112:11, 112:14, 120:24, 149:18
tariffs [2] - 9:20, 144:6
taxes [1] - 55:13
tech [1] - 85:10
technical [1] - 104:13
technically [1] - 116:2
technologies [1] - 100:15
technology [5] - 50:4, 92:14, 100:10, 100:12, 109:3
telephone [1] - 55:13
temperature [5] - 66:14, 66:21, 72:9, 94:6, 94:8
temperatures [1] - 74:4
temporal [2] - 137:4, 138:3
ten [16] - 16:22, 25:18, 43:21, 43:23, 43:24, 44:1, 52:10, 67:12, 67:13, 75:15, 83:17, 84:3, 89:15, 154:4, 160:22
ten-minute [1] - 75:15
tend [2] - 12:16, 108:6
tens [1] - 26:2
term [5] - 8:6, 35:22, 95:2, 119:17, 125:23
terms [10] - 39:1, 40:19, 53:13, 70:21, 76:9, 96:9, 100:16, 100:17, 120:4, 137:22
terrific [1] - 152:14
territory [1] - 16:19
test [1] - 85:13
tested [2] - 50:21, 73:17
Texas [9] - 15:4, 15:5, 15:8, 15:11, 15:13, 16:5, 21:13, 109:17
text [2] - 8:17, 9:3
themselves [4] - 119:8, 126:21, 127:18, 128:7
theoretically [1] - 39:13
theory [1] - 88:15
thereafter [1] - 74:12
therefore [6] - 14:13, 41:3, 81:3, 83:19, 153:12, 153:21
thermal [1] - 88:13
thermostat [1] - 72:5
thermostats [2] - 50:6, 72:8
they've [9] - 20:22,

30:15, 40:8, 54:22, 63:1, 72:23, 87:5, 123:9, 143:4
thinking [20] - 7:17, 38:19, 61:24, 76:9, 82:2, 83:22, 96:23, 97:1, 100:19, 109:12, 133:10, 133:11, 133:14, 133:23, 148:16, 149:15, 149:17, 149:18, 149:19
thinks [1] - 42:19
third [3] - 24:10, 95:14, 102:19
third-party [2] - 24:10, 102:19
thoughts [3] - 133:1, 133:5, 156:17
three [18] - 18:20, 27:18, 28:2, 28:5, 34:17, 36:8, 42:22, 77:7, 78:12, 80:19, 83:14, 94:5, 94:7, 105:4, 105:23, 128:14, 128:16, 154:16
throughout [6] - 22:19, 28:11, 29:11, 31:15, 94:10, 126:14
thrown [1] - 35:23
tim [2] - 5:2, 25:21
Tim [2] - 30:20, 138:9
Tim's [1] - 36:8
timed [2] - 137:7, 138:11
timeframe [2] - 28:12, 114:12
TIMOTHY [1] - 1:23
Timothy [1] - 98:5
Tiverton [4] - 50:7, 136:21, 145:5, 152:19
Tiverton/Little [2] - 138:21, 139:1
toaster [5] - 91:8, 91:10, 91:12, 91:14, 91:23
today [20] - 3:21, 4:6, 4:11, 5:21, 11:14, 26:7, 42:8, 48:4, 67:20, 79:3, 89:14, 114:15, 119:13, 119:14, 119:19, 125:24, 137:5, 139:10, 142:4, 160:5
today's [3] - 58:3, 114:2, 147:3
Todd [3] - 4:12, 120:18, 138:2

<p>TODD [1] - 1:19 Todd's [2] - 132:4, 134:3 together [8] - 34:6, 110:22, 111:3, 148:17, 149:8, 152:7, 157:5, 157:7 tolerance [1] - 72:17 tolerate [1] - 71:22 ton [1] - 89:15 tons [1] - 89:19 took [3] - 62:19, 99:21, 100:1 tool [2] - 140:21, 147:18 tools [2] - 18:24, 20:6 top [4] - 15:20, 19:7, 37:13, 157:14 total [7] - 19:8, 51:13, 51:15, 52:18, 78:2, 153:10, 153:16 totally [1] - 158:1 toward [3] - 86:20, 90:1, 107:19 towards [2] - 4:3, 15:2 toy [1] - 91:20 track [1] - 6:21 tracks [1] - 51:17 trade [1] - 95:3 trading [2] - 95:10, 104:11 traditionally [1] - 20:8 training [1] - 24:24 transcript [2] - 2:11, 162:4 transform [1] - 144:16 transformer [2] - 74:8, 154:13 transmission [5] - 7:2, 26:24, 32:11, 64:4, 80:13 transmitted [1] - 49:23 transparency [4] - 98:1, 98:14, 100:17, 125:18 transparent [2] - 96:5, 96:9 travel [1] - 36:14 treated [1] - 12:13 tremendous [1] - 134:18 tremendously [1] - 22:2 tried [3] - 25:24, 32:1, 141:8 tries [1] - 53:9 trip [3] - 130:2, 130:5, 130:17 true [3] - 16:1, 40:17, 162:4</p>	<p>trust [1] - 29:17 try [12] - 16:8, 26:14, 75:19, 75:20, 113:18, 124:3, 130:16, 132:8, 140:22, 144:22, 153:2, 161:16 trying [28] - 9:12, 9:20, 10:5, 13:24, 19:3, 31:19, 64:24, 65:14, 65:17, 68:12, 78:18, 88:3, 90:20, 100:6, 101:22, 102:21, 107:19, 110:1, 132:7, 138:23, 141:1, 145:8, 147:6, 149:5, 149:7, 149:24, 156:5 turn [6] - 3:18, 6:8, 6:14, 77:2, 79:8, 87:1 turned [2] - 124:6, 126:8 turning [2] - 31:14, 159:17 turns [1] - 44:5 TV [1] - 96:23 TVR [1] - 69:16 TVs [1] - 125:7 tweaking [1] - 149:5 twice [1] - 56:20 two [32] - 8:1, 16:10, 16:12, 19:18, 28:24, 29:20, 36:7, 47:18, 47:21, 52:5, 52:11, 61:8, 76:16, 77:24, 83:5, 83:12, 89:16, 91:6, 97:20, 102:6, 105:22, 110:12, 111:4, 114:5, 121:20, 129:4, 142:12, 143:20, 145:6, 154:16, 155:16 Type [4] - 83:23, 84:4, 84:6 type [9] - 19:16, 20:11, 24:5, 25:16, 47:14, 72:12, 85:24, 87:21, 89:14 types [10] - 20:20, 21:7, 34:18, 68:10, 86:11, 100:18, 116:10, 133:13, 142:14, 155:12 typically [1] - 47:8</p>	<p>147:9, 147:10 ultimately [1] - 146:17 unacceptable [1] - 74:14 under [10] - 7:10, 106:11, 107:22, 111:13, 114:2, 137:15, 142:15, 150:9, 160:6, 161:5 understandability [1] - 9:15 underwear [1] - 74:17 undue [2] - 12:10, 40:12 unfair [2] - 12:3, 155:6 unfortunate [1] - 30:4 unfortunately [4] - 8:21, 26:3, 89:8, 114:4 unintended [1] - 143:12 unit [14] - 15:14, 28:1, 29:5, 29:8, 29:18, 42:20, 44:7, 57:3, 57:9, 81:4, 84:9, 89:16, 101:4, 107:7 units [8] - 28:22, 29:19, 29:21, 39:5, 53:24, 109:22, 129:4, 159:17 universe [1] - 57:4 unless [4] - 57:17, 86:7, 116:17, 137:7 unquote [1] - 32:10 up [38] - 2:15, 19:19, 23:14, 26:13, 27:18, 28:16, 32:3, 33:13, 33:17, 35:15, 36:24, 37:21, 44:8, 46:2, 52:1, 58:2, 66:4, 66:6, 71:21, 75:2, 77:5, 81:4, 81:5, 83:6, 84:5, 89:16, 91:15, 96:1, 102:14, 103:3, 103:9, 113:2, 130:20, 140:7, 141:15, 143:11, 147:1, 155:17 upgrades [1] - 149:22 UPS [2] - 143:16, 143:22 upset [1] - 40:5 upstairs [1] - 29:12 urgent [1] - 84:8 usage [31] - 14:10, 53:12, 55:17, 55:19, 62:13, 62:14, 63:11, 63:12, 63:15, 67:5, 71:19, 83:17, 84:3, 94:2, 96:12, 97:23,</p>	<p>107:2, 107:3, 108:8, 108:13, 109:16, 109:20, 117:3, 118:2, 123:24, 124:22, 126:7, 153:10, 153:14, 153:16 useful [4] - 11:18, 47:9, 138:13, 156:2 user [2] - 57:18, 116:18 uses [8] - 8:17, 8:18, 35:16, 38:10, 52:6, 52:7, 52:22, 77:8 usual [1] - 2:20 Utah [1] - 39:23 Utilities [1] - 162:6 utilities [8] - 9:19, 10:19, 10:20, 14:4, 23:11, 24:1, 55:9, 70:2 UTILITIES [1] - 1:2 utility [16] - 7:18, 10:7, 10:14, 11:23, 32:7, 60:13, 70:13, 102:24, 105:2, 129:24, 134:13, 134:21, 146:17, 150:13, 151:4, 151:16 Utility [2] - 8:20, 38:16 utilization [1] - 81:13</p>	<p>version [3] - 8:19, 8:21, 8:22 versions [2] - 114:20, 115:2 versus [9] - 24:18, 26:23, 37:8, 67:18, 76:19, 96:1, 126:8, 132:2, 156:4 violated [1] - 9:6 violations [1] - 40:6 virtual [1] - 119:23 virtually [1] - 89:9 visibility [1] - 95:24 visit [1] - 57:16 voice [1] - 6:13 volt [1] - 117:18 voltage [23] - 7:22, 7:24, 8:5, 8:6, 8:10, 12:24, 13:1, 118:12, 118:16, 118:18, 118:20, 124:5, 124:14, 124:15, 124:17, 124:18, 124:21, 125:4, 125:12, 126:5, 127:8, 128:7, 159:20 volume [1] - 94:17 volumetric [2] - 3:13, 4:3</p>
U		V		W
				<p>wait [2] - 69:24, 161:11 walks [1] - 6:18 walls [1] - 30:6 Walmart [1] - 34:2 wants [7] - 14:2, 31:23, 41:10, 44:14, 67:14, 133:5, 139:4 warm [1] - 98:9 warmer [1] - 96:22 WARWICK [1] - 1:14 WATCH [4] - 55:24, 59:1, 59:2, 96:23 water [6] - 25:23, 46:7, 85:18, 85:19, 96:18 watt [1] - 97:10 watts [1] - 8:11 wave [1] - 27:19 ways [6] - 34:12, 47:22, 61:8, 121:23, 143:20, 145:12 wearing [1] - 84:21 website [1] - 41:9 week [3] - 45:7, 111:24, 112:4 weekdays [1] - 111:24 weekends [3] - 82:11, 112:2, 116:3</p>

<p>weeks [1] - 6:12 weighted [1] - 86:14 westward [1] - 159:18 whatsoever [1] - 160:13 wheat [2] - 94:24, 95:3 wheel [1] - 130:21 wheels [2] - 24:24, 131:17 whereas [6] - 3:16, 4:1, 20:17, 22:20, 33:6, 87:6 whole [22] - 13:15, 15:15, 16:12, 18:9, 18:16, 31:6, 44:4, 46:5, 60:9, 67:4, 69:7, 93:8, 94:16, 105:20, 109:14, 113:5, 116:8, 142:2, 142:8, 151:24, 154:23, 156:3 wholesale [3] - 80:21, 94:24, 158:9 wide [2] - 17:9, 66:21 wifi [2] - 50:6, 50:16 willing [1] - 97:7 willy [2] - 113:22 WILSON [38] - 1:18, 2:3, 5:17, 21:10, 26:19, 33:20, 34:1, 37:10, 38:18, 39:8, 39:12, 40:16, 43:4, 43:19, 45:18, 60:16, 62:10, 75:13, 75:18, 80:8, 81:22, 87:12, 88:1, 88:3, 110:4, 110:11, 110:23, 111:13, 112:9, 132:4, 133:18, 135:16, 145:19, 145:22, 151:2, 151:7, 152:2, 155:1 Wilson [1] - 4:9 WILSON-FRIAS [38] - 1:18, 2:3, 5:17, 21:10, 26:19, 33:20, 34:1, 37:10, 38:18, 39:8, 39:12, 40:16, 43:4, 43:19, 45:18, 60:16, 62:10, 75:13, 75:18, 80:8, 81:22, 87:12, 88:1, 88:3, 110:4, 110:11, 110:23, 111:13, 112:9, 132:4, 133:18, 135:16, 145:19, 145:22, 151:2, 151:7, 152:2, 155:1 Wilson-Frias [1] - 4:9</p>	<p>window [2] - 28:1, 73:15 windows [1] - 27:21 winter [4] - 6:11, 22:5, 22:8, 22:13 winter/summer [1] - 22:21 wintertime [3] - 46:9, 52:24, 101:19 wire [2] - 120:9, 120:13 wires [1] - 103:22 wish [1] - 76:13 wonder [1] - 146:4 wonderful [1] - 91:6 wondering [3] - 117:4, 136:5, 146:20 Worcester [3] - 22:11, 31:1, 98:2 word [2] - 19:10, 88:5 works [6] - 46:8, 80:22, 88:17, 105:11, 117:2, 161:18 world [17] - 7:5, 7:6, 7:17, 7:19, 7:20, 7:23, 22:15, 31:6, 42:7, 44:22, 91:16, 105:11, 116:7, 117:14, 118:8, 134:17, 150:14 worried [3] - 125:11, 129:16 worries [2] - 55:17, 55:19 worry [16] - 7:22, 7:24, 69:9, 69:11, 69:13, 90:23, 118:12, 118:15, 118:18, 125:3, 127:1, 127:2, 130:9, 130:10, 130:13 worrying [1] - 8:3 worse [3] - 14:6, 71:8, 89:1 worth [3] - 114:19, 121:1, 121:3 worthy [1] - 140:16 write [2] - 42:15, 97:2 writes [1] - 8:9 written [2] - 139:18, 139:24</p>	<p>94:10, 101:11, 115:1, 153:1, 153:2, 160:8, 160:9, 160:22 years [15] - 20:9, 20:23, 22:5, 22:6, 22:16, 25:18, 42:4, 56:6, 61:1, 66:1, 68:18, 88:9, 105:1, 130:7, 150:22 yield [1] - 20:1 yielding [1] - 10:12 York [3] - 144:4, 152:8 you/does [1] - 100:14 yourself [2] - 87:2, 117:3</p>	<p>zSCHOKKE [2] - 93:16, 100:23</p>
Y		Z	
<p>year [21] - 16:20, 16:21, 22:19, 24:16, 26:12, 54:4, 65:16, 65:17, 65:21, 67:20, 68:23, 69:2, 71:12,</p>		<p>zero [4] - 40:24, 48:4, 77:19, 129:10 zone [2] - 26:8, 26:9 ZSCHOKKE [98] - 1:22, 4:23, 6:9, 16:3, 17:15, 17:19, 21:17, 23:10, 25:21, 27:6, 28:20, 30:1, 33:22, 34:4, 34:11, 34:15, 36:4, 36:12, 37:17, 39:7, 39:11, 39:18, 40:2, 41:5, 42:12, 42:18, 43:11, 43:22, 44:1, 45:21, 46:24, 47:18, 49:18, 51:12, 51:23, 54:6, 55:18, 56:4, 56:16, 58:9, 59:13, 61:11, 62:16, 64:24, 65:24, 66:15, 66:23, 67:9, 68:15, 71:23, 72:18, 75:7, 75:16, 76:11, 80:11, 80:17, 82:7, 82:22, 84:9, 88:12, 90:13, 91:4, 92:14, 92:20, 94:21, 95:5, 95:12, 96:8, 99:13, 102:22, 103:8, 104:7, 106:20, 108:3, 108:17, 108:21, 109:15, 110:9, 110:14, 111:1, 111:16, 112:13, 112:18, 113:12, 114:16, 117:11, 123:7, 123:20, 125:22, 126:19, 128:14, 131:1, 139:11, 141:23, 145:21, 153:5, 155:3, 159:4 Zschokke [1] - 4:23</p>	