

STATE OF NEW HAMPSHIRE

PUBLIC UTILITIES COMMISSION

October 22, 2014 - 4:00 p.m.
Concord, New Hampshire

DAY 6
Late Afternoon Session only

RE: DE 11-250

NHPUC NOV03'14 PM 4:13

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE:
Investigation of Scrubber Costs and
Cost Recovery.

PRESENT: Commissioner Martin P. Honigberg, Presiding
Special Commissioner Michael J. Iacopino

F. Anne Ross, Esq., General Counsel

Sandy Deno, Clerk

APPEARANCES: Reptg. Public Service Co. of New Hampshire:
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Wilbur A. Glahn, III, Esq. (McLane, Graf...)

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NOAH KAUFMAN

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E X H I B I T S

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125	Document entitled "Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009" dated August 2009 from EIA	29
126	Chart depicting 3 columns of Waxman-Markey Basic Runs (one in 2007 \$ and two in 2012 \$) and 2 columns of NERA High CO2 Price (one in nominal \$ and one in 2012\$), with an accompanying graph	30
127	Document titled Response to U.S. EPA CWA Section 308 PSNH Merrimack Station Units 1 & 2, Bow, N.H.	42

P R O C E E D I N G**(Hearing resumed at 4:00 p.m.)**

(Brief off-the-record discussion ensued regarding protocols within the building after 4:30 p.m.)

CMSR. HONIGBERG: So, is there anything else we need to do before we start with Harrison and Kaufman?

(No verbal response)

CMSR. HONIGBERG: All right.
Mr. Needleman. Actually, you just want to have the witnesses sworn in, --

MR. NEEDLEMAN: Yes, please he.

CMSR. HONIGBERG: -- since they're already up there.

(Whereupon **David Harrison, Jr.** and **Noah Kaufman** was duly sworn by the Court Reporter.)

DAVID HARRISON, JR., SWORN**NOAH KAUFMAN, SWORN****DIRECT EXAMINATION**

BY MR. NEEDLEMAN:

Q. Dr. Harrison, why don't we start with you. Could you please state your name for the record.

1 A. (Harrison) David Harrison.

2 Q. And, who is your current employer?

3 A. (Harrison) NERA Economic Consulting.

4 Q. And, could you just -- what's your position at NERA?

5 A. (Harrison) I'm a Senior Vice President at NERA, and
6 co-head of NERA's environmental practice.

7 Q. And, could you just give a very brief summary of your
8 educational background and work experience.

9 A. (Harrison) Yes. I have a Bachelor's in Economics from
10 Harvard, a Master's and Ph.D in Economics also from
11 Harvard, and a M.Sc. from the London School of
12 Economics. Before joining NERA, I was an Associate
13 Professor at the Kennedy School of Government at
14 Harvard, where I taught economics, energy,
15 environmental policy, and other topics.

16 Earlier, I was on the Senior Staff of
17 the Council of Economic Advisors, where I had
18 responsibility for energy and environmental policy.

19 Q. And, you, along with Dr. Kaufman, filed prefiled
20 testimony in this proceeding, which has been marked as
21 "Exhibit 24", is that correct?

22 A. (Harrison) That's correct.

23 Q. And, included with Exhibit 24 are Attachments 24-1
24 through 24-17, is that correct?

[WITNESS PANEL: Harrison~Kaufman]

1 A. (Harrison) That's correct.

2 Q. And, then, Dr. Kaufman, let me just go to you quickly.
3 Could you please state your full name.

4 A. (Kaufman) Sure. Noah Kaufman.

5 Q. And, where are you employed?

6 A. (Kaufman) NERA Economic Consulting.

7 Q. And, your position is?

8 A. (Kaufman) I'm a Senior Consultant.

9 Q. And, a brief summary please of your educational
10 background and experience?

11 A. (Kaufman) Sure. I have a B.S. in Economics from Duke
12 University, and a Ph.D in Economics from the University
13 of Texas at Austin. I wrote my dissertation there on
14 the economics of climate change, published papers on
15 that topic and others in environmental economics.

16 Q. Okay. Thank you. Referring both of you then to the
17 prefiled testimony I referenced a moment ago, do you
18 have any corrections or changes to it?

19 A. (Harrison) No, we do not.

20 A. (Kaufman) No.

21 Q. And, then, do you both adopt that testimony today and
22 swear to it?

23 A. (Harrison) We do.

24 A. (Kaufman) Yes.

{DE 11-250} [Day 6/Late Afternoon Session ONLY] {10-22-14}

1 Q. And, Dr. Harrison, I understand you have a brief
2 summary?

3 A. (Harrison) Yes, I do.

4 Q. Could you provide that please.

5 A. (Harrison) Yes. Our major task was to develop an
6 independent assessment of the potential cost to PSNH
7 ratepayers of the Scrubber Project at Merrimack
8 compared to two alternatives. One alternative was
9 market purchases of electricity, and a second
10 alternative was to construct a natural gas combined
11 cycle, that would provide the same power as Merrimack
12 would provide. We were asked to do an independent
13 assessment of these alternatives for two time periods;
14 one in mid-2008 and one in early-2009. We were not
15 asked to evaluate the analysis that PSNH did in 2008.

16 Now, we recognized, when we were doing
17 this analysis, that there were large uncertainties in
18 these time periods. So, we developed estimates of the
19 costs under different scenarios, a total of 12
20 scenarios, that took into account uncertainties in CO2
21 costs and other environmental compliance costs,
22 uncertainties in natural gas and electricity prices,
23 and uncertainties in the cost of constructing a new
24 natural gas pipe -- new natural gas plant.

1 So, that resulted in our analysis of 12
2 different scenarios. And, we used what we considered
3 the best sources of information for this, for this
4 assessment. One of the important things is we wanted
5 to make sure that our estimates were consistent. So,
6 for example, when CO2 prices change, electricity prices
7 and also natural gas prices change. So, we wanted to
8 make sure that, when we were doing these various
9 scenarios, that the data we used were consistent within
10 a scenario. So, that was one of the important
11 elements.

12 Then, so, essentially, what we had is we
13 had these results for a variety of scenarios. And, we
14 looked and we saw -- so, we said what were our
15 conclusions from looking at these results? What we
16 found was, for both of the two analysis periods, the
17 mid-2008 and early-2009, as we looked across those
18 scenarios we found that, in many of those scenarios,
19 that the Scrubber Project was the least expensive
20 option. What we also found that, in some of the other
21 scenarios, one of the other alternatives, either the
22 natural gas plant or relying on market purchases would
23 be less expensive.

24 So, we concluded, and when we looked at

1 this mixed set of results, it frankly was not
2 surprising, given the large uncertainties in natural
3 gas prices, electricity prices, CO2 prices, and other
4 factors that we used in developing our scenarios. So,
5 if we looked at this, we asked ourselves "what would we
6 conclude about what would be reasonable for PSNH to
7 conclude about the costs going forward of those various
8 alternatives?" And, we concluded that it was
9 reasonable for PSNH to conclude that the Scrubber
10 Project would be the low-cost alternative going forward
11 under those circumstances.

12 We were also asked to evaluate the
13 testimony and the analysis done by Dr. Elizabeth
14 Stanton, on behalf of the Conservation Law Foundation.
15 When we looked at her analysis, the structure of her
16 analysis was very similar to ours, in the sense that
17 she looked at a number of factors that influence the
18 future costs of the Scrubber Project or Merrimack Plant
19 with the Scrubber Project. And, she compared it to,
20 conceptually, to an alternative that was similar to
21 relying on market purchases. So that the structure of
22 the analysis was similar.

23 But the inputs were actually quite
24 different. And, so, we looked in detail at her inputs.

[WITNESS PANEL: Harrison~Kaufman]

1 And, in particular, one of the major inputs, which is
2 the cost to PSNH of CO2 emissions, that was one of the
3 key inputs. And, we looked at her cost or what she was
4 using for costs under the different cases that she
5 evaluated. And, when she used her input, she found
6 that four out of the five cases that the cost of the
7 Scrubber would be more expensive than the alternative.

8 But, when we changed that one
9 assumption, so, we looked at those -- that set of CO2
10 prices, we then substituted what we believed were a
11 more reasonable set of CO2 prices. When we made that
12 substitution, the results reversed, in a sense that the
13 majority of the cases that she evaluated, the going
14 forward with the Scrubber was the least expensive
15 alternative or less expensive than relying on market
16 purchases.

17 So, we also looked at other assumptions.
18 So, there were the non-CO2 compliance costs, which we
19 believe also were overstated in her analysis. She also
20 acknowledged that there were some sunk costs associated
21 with the Scrubber that would have to be incurred
22 anyway, but she did not include those in her analysis.
23 So, we concluded that, if we added those additional
24 changes in the input assumptions, that would reinforce

1 our conclusion that using better input assumptions
2 would generate essentially the same results we got,
3 which is that, by and large, there was a mixed -- mixed
4 set of results. That is, under some circumstances, the
5 Scrubber Project was the least expensive alternative,
6 and, in fact, in the majority of cases in her analysis.

7 So, that led us to conclude that looking
8 at her analysis reinforced our conclusion that PSNH was
9 reasonable to conclude that, in mid-2008 and
10 early-2009, that the Scrubber Project would be the
11 low-cost alternative going forward.

12 Q. Is that the end of your summary, Dr. Harrison?

13 A. (Harrison) Yes, it is.

14 Q. Before turning you over for cross-examination, I just
15 wanted to ask a couple of quick questions, if I could.
16 You were present or, Dr. Kaufman, you were present when
17 Dr. Stanton testified, is that right?

18 A. (Kaufman) Yes.

19 Q. And, do you recall Dr. Stanton questioning your use of
20 the August 2009 EIA data?

21 A. (Kaufman) Yes, I do.

22 Q. And, can you explain why you used that data?

23 A. (Kaufman) Yes. So, this is the issue of consistency
24 across energy price forecasts that Dr. Harrison just

1 alluded to. CO2 prices affect natural gas prices, they
2 affect electricity prices. So, we used those CO2
3 prices, because the EIA prices were consistent with our
4 early-2009 prices for EIA for the other energy prices.
5 So, that's gas prices and coal prices and electricity
6 prices.

7 Regarding the timing, Waxman-Markey was
8 first formally proposed in March 2009, although it was
9 very similar to bills that had been previously proposed
10 in Congress and bills that had been previously
11 discussed. Analysis -- preliminary analysis on
12 Waxman-Markey was out in April. At that point, a
13 utility manager could have understood the implications
14 of the bill. And, if you simply just used our mid-2008
15 CO2 prices, which we got from the Lieberman-Warner
16 bill, our results would not have changed much at all,
17 just because of the similarities between
18 Lieberman-Warner and Waxman-Markey. They were very
19 similar bills.

20 Q. Dr. Stanton also specifically questioned your
21 adjustments to those EIA numbers. Can you explain that
22 for the Commission please?

23 A. (Kaufman) Sure. So, Dr. Stanton questioned the
24 adjustment for the free allocation of emissions --

1 emissions allowances to PSNH. This has to do with
2 adjusting to reflect the actual costs to customers of
3 the Merrimack CO2 emissions. So, all federal proposals
4 at the time contemplated that an entity like PSNH would
5 receive a significant amount of "free allowances".
6 When PSNH receives those free allowances, it doesn't
7 have to purchase them from the market, so it doesn't
8 have to pass those costs along to its ratepayers. What
9 matters to ratepayers is not CO2 prices. What matters
10 is the costs of complying with the CO2 regulations.
11 So, it was necessary for us to account for those free
12 allowances, because those are cost reductions. If we
13 hadn't accounted for them, we would have overstated the
14 cost to customers.

15 Q. Regarding that issue, Dr. Stanton testified that she
16 believed the free allocation to Merrimack Station would
17 have been as high as 75 percent. Is that your
18 understanding?

19 A. (Kaufman) It's my understanding that she said that.

20 Q. Okay. And, what is your opinion of that?

21 A. (Kaufman) It's not correct. So, as we explain in our
22 testimony, using formulas in the proposed bill, we
23 estimate that the percent of Merrimack's CO2 emissions
24 that would receive free allowances would decrease from

[WITNESS PANEL: Harrison~Kaufman]

1 roughly 50 percent in 2013, to about 25 percent in
2 2027.

3 Q. When I was questioning Dr. Stanton, I kept referring to
4 these as "EIA prices", and she kept taking issue with
5 me, which created some confusion. Can you shed some
6 light on that?

7 A. (Kaufman) Sure. So, we used the exact prices, CO2
8 prices, from the EIA reports. It's just that, in
9 converting from CO2 prices to actual costs to PSNH
10 ratepayers, as I mentioned before, we had to account
11 for the free emissions allocations. If we didn't
12 account for those free allocations, we would have been
13 overstating costs to customers.

14 Q. And, last question. I think Dr. Stanton testified that
15 the CO2 prices, in your Low Case, were -- declined in
16 real terms over the analysis period. Is that accurate?

17 A. (Kaufman) No, it's not. So, the CO2 prices in our Low
18 Environmental Cost Case were forecasts of RGGI prices
19 based on market expectations at that time. And, we
20 assumed that those prices would increase at the rate of
21 inflation over the analysis period after futures prices
22 were unavailable.

23 MR. NEEDLEMAN: Thank you. Mr. Chair,
24 they're available for cross-examination.

[WITNESS PANEL: Harrison~Kaufman]

1 CMSR. HONIGBERG: Ms. Frignoca.

2 MS. FRIGNOCA: Well, first, I'd like to
3 thank Mr. Needleman for asking some of the questions I was
4 going to ask.

5 CMSR. HONIGBERG: Mr. Needleman is
6 nothing, if not helpful, in that regard.

7 MR. NEEDLEMAN: I'm only here to help.

8 MS. FRIGNOCA: Good afternoon, Dr.
9 Harrison and Dr. Kaufman. My name is Ivy Frignoca. And,
10 I'm an attorney with the Conservation Law Foundation.
11 And, I've been admonished to speak into the microphone.
12 Please let me know if you're not able to hear me, and I
13 will do my best to speak up.

14 **CROSS-EXAMINATION**

15 BY MS. FRIGNOCA:

16 Q. In response to discovery, you produced a letter dated
17 January 17, 2013, between you and PSNH. It appeared to
18 be an engagement letter. And, I wanted to ask you if
19 that is when you were first contacted to work for PSNH
20 in this case?

21 A. (Harrison) Yes. I believe that's right.

22 Q. And, the date of your rebuttal testimony filed in this
23 case is July 11, 2014. Does that sound right?

24 A. (Harrison) Yes, that's right.

1 Q. Can you tell me what services or what work you did for
2 PSNH between January 17 of 2013 and July 11, 2014?

3 A. (Harrison) Yes. I believe that there -- most of the --
4 most of the work we did was in conjunction with
5 developing our testimony. But we had looked at some of
6 the issues relating to the Scrubber Project in the
7 earlier period, looking at what the circumstances were.
8 When we were -- our ultimate, as I said, our assignment
9 was to develop an independent analysis. So, in the
10 context of doing that we were developing various
11 information, data that was available up roughly at the
12 period. We went -- we actually, over that period, I
13 think we did consider what were the relevant periods to
14 use as the basis for analysis. I think we ultimately
15 decided that mid-2008 and early-2009 were the relevant
16 periods.

17 Q. And, did you choose early-2009 because that was the
18 last time period before major construction began on the
19 Scrubber?

20 A. (Harrison) Well, no, I think that was -- I'm not sure
21 what the basis for PSNH is, but we were requested to
22 look at those two periods. And, I'm not sure exactly
23 the full basis for their decision on that.

24 Q. Okay. So, in other words, those two time frames for

1 which you did your analysis, those were the two time
2 periods that you were requested to do analysis for?

3 A. (Harrison) That's correct.

4 Q. Okay. Now, according to your testimony, in order to
5 perform the economic analysis that PSNH asked you to
6 do, you made some assumptions. First, you made an
7 assumption that PSNH had discretion to go forward with
8 the Scrubber, correct?

9 A. (Harrison) Well, it's correct only in the sense that we
10 did not look at any of the legal or administrative
11 issues. We simply, as I think we said in our
12 testimony, we're assuming that there were options, and
13 the options that we looked at were the ones that I
14 described.

15 Q. And, the other assumption that you made, and I'm
16 assuming again without looking at any of the legal
17 issues, is that PSNH had the ability to develop a
18 natural gas facility?

19 A. Well, as I said, I think what we -- when we looked at
20 the natural gas facility, it wasn't a question of PSNH,
21 it was thinking about how the generation at PSNH could
22 be -- what the alternatives might be. And, one
23 alternative would be someone developing a natural gas
24 facility, and the other would be relying on market

1 purchases.

2 Q. Okay. I'm looking at Page 5 of your testimony, Note 2,
3 and it's Bates stamped Page 289. And, the exhibit is
4 24. So, if everyone can find it, whichever way is
5 best. And, the sentence that I was referring to in
6 asking you about the assumptions you were making for
7 purposes of your analysis reads "Solely for the
8 purposes of this analysis, we make the assumption that
9 PSNH had the discretion to go forward with the Scrubber
10 Project as well as to develop a natural gas facility or
11 to rely upon market purchases." So, did I read that
12 sentence correctly?

13 A. (Harrison) Yes, you did.

14 Q. Okay. And, that's why, in reading that sentence, it
15 reads to me that an assumption that you made was that
16 PSNH had the discretion to develop a natural gas
17 facility. And, I'm not asking you to opine on the
18 legal nature of that. I'm just simply asking if that's
19 an assumption that you made for purposes of your
20 economic analysis?

21 A. (Harrison) Well, it is. But, actually, the way I
22 would -- that we thought about it was that we wanted to
23 consider what were reasonable alternatives to providing
24 electricity with the Merrimack Station. So, again, it

1 says here that, I guess the way I was thinking about
2 this, was that a natural gas facility could be built or
3 that those same megawatt-hours could be provided by --
4 through market purchases.

5 Q. And, was that always the way you were thinking about
6 this or did your thinking change at some point in time?
7 In other words, when you first began your analysis, did
8 you simply assume that PSNH had the discretion to
9 develop a natural gas facility?

10 A. (Harrison) I'm not sure that I understand the question.
11 We were -- I don't think it changed. I think we
12 were -- when we were looking at what would be a
13 sensible analysis to think about a comparison for or to
14 evaluate the going-forward costs with the Scrubber
15 Project, we were thinking "well, costs relative to
16 what?" And, so, the two alternatives that seemed to
17 make sense were relying on market purchases, which is
18 the market decides what the resources that would be the
19 replacement resources, or what many people do, when
20 they look at a large amount, a big change, they look at
21 "what would the" -- "what type of facility would be the
22 natural replacement facility?" So, we've done a number
23 of analyses like this.

24 And, so, in that time period, as well as

1 right now, most people think of a new natural gas
2 combined cycle as a replacement facility.

3 Q. Okay. So, when -- before you began your economic
4 analysis, did you know that the law prevented PSNH from
5 building a new generation facility?

6 A. (Harrison) As I said here, we did not look at legal, we
7 not investigate legal issues.

8 Q. But just "yes" or "no", did you know that the law
9 prevented PSNH from building a new generation facility?

10 A. (Harrison) No, I did not know that.

11 Q. Okay. And, did you learn that during the course of
12 this hearing?

13 A. (Harrison) No, I did not.

14 Q. So, you're saying that, having sat through -- well, let
15 me ask you this. How many days of this hearing have
16 you sat through?

17 A. (Harrison) Let's see. I was here for two, I believe.

18 Q. And, did you hear Mr. Frantz testify?

19 A. (Harrison) A part of his testimony.

20 Q. And, did you hear him testify that "PSNH, by law,
21 cannot build a new generation facility"?

22 A. (Harrison) I don't recall that testimony.

23 Q. And, that's not a fact that you knew from PSNH?

24 A. (Harrison) I don't recall it.

1 Q. So, as you sit here today, you have no recollection of
2 anyone ever telling you that the Company can't build a
3 natural gas facility?

4 A. (Harrison) No, I do not.

5 Q. Okay. And, the third assumption that you made was that
6 PSNH could rely upon market purchases to replace the
7 power from Merrimack Station, correct?

8 A. (Harrison) That's correct. But, as I said, what we
9 were thinking about was what would be logical
10 alternatives to replacing the generation at Merrimack,
11 if -- as an alternative for doing our economic
12 analysis.

13 Q. And, looking at market purchases was a logical
14 alternative why?

15 A. (Harrison) Well, I'm sorry, as I think I suggested in
16 my beginning summary, we were thinking that, if the
17 Scrubber Project were -- if Merrimack were not
18 available, and we're trying to compare the cost of the
19 Scrubber Project relative to an alternative, we have to
20 think about what the alternatives are. One alternative
21 is to rely on market purchases. And, I think that's
22 the same, as we said in our opening statement, that's
23 really conceptually equivalent to what Dr. Stanton did
24 in her analysis. So, I don't quite see the question.

1 Q. Okay.

2 A. (Harrison) I think it's just the nature of our
3 analysis.

4 Q. I understand. I think what I need to do is ask the
5 question a little differently. You made that
6 assumption, and is it -- is it your understanding that
7 that is a logical assumption, because PSNH has the
8 ability to purchase power in the ISO-New England
9 market?

10 A. (Harrison) Well, I understand that that is, that is an
11 option that they have, yes.

12 Q. Okay. Now, both of you attached your *curriculum vitas*
13 to your testimony. And, I asked you both in data
14 requests to state your experience with large
15 construction projects. And, I just want to confirm
16 that, according to your CVs and data request responses,
17 like Dr. Stanton, neither of you have worked directly
18 on a large construction project, correct?

19 A. (Harrison) That's correct.

20 Q. Dr. Kaufman, you too?

21 A. (Kaufman) I mean, that's right. We've done economic
22 evaluations that revolve around large construction
23 projects, but we haven't worked on them.

24 Q. Okay. So, similar to Dr. Stanton?

[WITNESS PANEL: Harrison~Kaufman]

1 A. (Harrison) Yes. I assume that what you mean was, have
2 we actually physically worked in putting together a
3 large construction project, as opposed to looking at
4 the engineering cost estimates and so forth?

5 Q. That's correct. Again, same question that was asked to
6 Dr. Stanton, and asked to you in response to data
7 requests. Also neither of you have worked at a
8 coal-fired energy plant like Merrimack Station,
9 correct?

10 A. (Harrison) That's correct.

11 Q. And, I assume, from the answer that Dr. Kaufman just
12 gave me, that the fact that you haven't worked directly
13 on a large construction project or worked directly at a
14 coal-fired energy plant does not disqualify you from
15 conducting a cash flow analysis relevant to whether it
16 was prudent to proceed with the installation of the
17 Scrubber in March of 2009, correct?

18 A. (Harrison) Well, I'm not quite sure how to answer that
19 question. It is certainly -- I think we both feel
20 comfortable developing the analysis that we did.

21 A. (Kaufman) You did mention "prudence" in your question,
22 though. And, one thing we're very clear on is that we
23 are not testifying on the legality of "prudence", and
24 what is and isn't prudent in any way.

[WITNESS PANEL: Harrison~Kaufman]

1 Q. Okay. Subject to that, the fact that you haven't
2 worked directly at a coal-fired plant or at a large
3 construction project doesn't disqualify you from
4 conducting a cash flow economic analysis of the costs
5 and benefits of the Scrubber Project? Is that a better
6 way to state the question?

7 A. (Kaufman) I'm okay with that.

8 Q. Okay. And, you would agree with me?

9 A. (Kaufman) Yes.

10 Q. And, the same would apply with Dr. Stanton, you're not
11 questioning her qualification just because she hasn't
12 worked at a plant, right?

13 MR. NEEDLEMAN: I'll object. I don't
14 think they were questioning her qualifications.

15 MS. FRIGNOCA: Well, your counsel was.

16 MR. NEEDLEMAN: I was, but they weren't.

17 CMSR. HONIGBERG: I understand the point
18 that Ms. Frignoca has made, and I think you understand the
19 point Ms. Frignoca has made, and I think they understand
20 the point Ms. Frignoca has made.

21 MS. FRIGNOCA: And, Ms. Frignoca
22 understands that you would like her to move on. So, I
23 will do that.

24 BY MS. FRIGNOCA:

1 Q. Both you and Dr. Stanton employed a cash flow analysis
2 method to compare the costs of proceeding with the
3 Scrubber against -- she did it against an alternative
4 and you did it against two alternatives. And, so, you
5 would agree that using the cash flow analysis method is
6 a reasonable methodology to employ when making a
7 decision regarding whether to proceed with a major
8 capital expense, correct?

9 A. (Harrison) Well, I think, just to be clear what we did,
10 what we were doing is we were providing an evaluation.
11 So, we were not making assessments about what
12 information is desirable or necessary in terms of
13 making a decision to go forward. We were simply -- we
14 are doing an analysis of these alternatives. And, in
15 the context of that, "cash flow" sounds -- what this
16 simply means is you're looking at the future
17 expenditures under these different scenarios, you can
18 think of them as "cash flows", then you're discounting
19 those cash flows back to a common period. So, you're
20 trying to provide a common metric for evaluating these
21 alternatives. So, that's essentially what we did. We
22 were not -- and, we provided the results of those
23 comparisons in our testimony. And, we also commented
24 on the similar analysis that Dr. Stanton did.

1 A. (Kaufman) But we recognized that the cash flow analysis
2 is just one factor in many that might be taken into
3 account.

4 Q. Okay. But it's certainly a reasonable methodology to
5 employ in part?

6 A. (Harrison) Well, what I think -- maybe the way to
7 think, to ask us questions about our methodology and
8 our inputs, "were those reasonable?" And, as I said,
9 we described the process we used to develop those
10 inputs and the methodology for combining them into the
11 overall assessment.

12 Q. All right. Just so we can move on, it's your testimony
13 that you and Dr. Stanton used a similar methodology,
14 correct?

15 A. (Harrison) I think what we said was "the basic
16 framework is similar."

17 Q. Okay. That's all I need. "The basic framework is
18 similar." And, when you use a framework like that, and
19 you're comparing your project to alternatives, are you
20 looking to compare it to the next least cost
21 alternative?

22 A. (Harrison) I think you could probably think of it that
23 way. But I think it's probably easier to think of it
24 as alternatives that would replace the generation that

1 was represented by Merrimack with the Scrubber Project
2 in place. So, what you want to do is make sure that
3 these comparisons are apples-to-apples. So, one apple
4 is the generation that's provided by Merrimack, and how
5 could that -- what are the costs of alternatives to
6 that? An, as I said before, the common alternatives
7 would be relying on market purchases or building
8 another facility, in this case a natural gas facility,
9 that would have equivalent capacity of generation.

10 Q. Okay. And, I was just asking the question as a matter
11 of economic principle. That, if you're evaluating a
12 number of alternatives against your alternative,
13 leaving aside this project, is what you want to make
14 the comparison to is the alternative that is the least
15 cost alternative?

16 A. (Harrison) I think you'd want to look at plausible
17 alternatives. Then, of course, you'd want to look at
18 those plausible alternatives that are relatively low
19 cost, yes.

20 Q. Okay. Thank you. Now, you told me that you sat
21 through some of Mr. Frantz's testimony. Would you
22 please also tell me what other witnesses you have
23 listened to the testimony of during the course of this
24 hearing?

[WITNESS PANEL: Harrison~Kaufman]

1 A. (Harrison) Let's see. We heard Mr. Smagula and
2 Dr. Stanton are the two I recall.

3 Q. Did you hear Mr. Sahu or Dr. Sahu testify at all?

4 A. (Harrison) I did not.

5 Q. Okay.

6 A. (Kaufman) I was here, not for Mr. Sahu's, but for
7 Mr. Kahal. Sorry if I pronounced that wrong.

8 Q. I'll be -- and, the reason I asked you is because I
9 don't want to ask you questions about witnesses that
10 you didn't hear the testimony of. But, of the
11 witnesses that you heard, would you agree that one of
12 the factors to consider in contemplating, say, the
13 economics of proceeding with a major capital
14 improvement in the first quarter of 2009 would have
15 been to factor in the future costs related with
16 environmental requirements?

17 A. (Harrison) Yes. Those are part of our analyses.

18 Q. One of those environmental costs is the CO2 prices that
19 have been the subject of some discussion, correct?

20 A. (Harrison) That's correct. I think, as Dr. Kaufman
21 pointed out, it's probably better to think of those as
22 cost of CO2 related to the emissions, rather than CO2
23 prices.

24 MS. FRIGNOCA: I'm going to show you an

[WITNESS PANEL: Harrison~Kaufman]

1 exhibit. It just have a couple questions to clarify this
2 area. I think this will be "125".

3 (Atty. Fabish distributing documents.)

4 CMSR. HONIGBERG: 125?

5 MS. HOWARD-PIKE: Yes.

6 CMSR. HONIGBERG: It's "125".

7 (The document, as described, was
8 herewith marked as **Exhibit 125** for
9 identification.)

10 BY MS. FRIGNOCA:

11 Q. Drs. Harrison and Kaufman, is this the EIA report that
12 you used to develop your CO2 price assumptions?

13 A. (Kaufman) It's associated with spreadsheets that we use
14 to develop our analysis. We actually use the
15 underlying data that EIA also publishes.

16 Q. Did you provide that data in response to the data
17 requests?

18 A. (Kaufman) I think to one data request we referenced it,
19 noted it was publicly available.

20 Q. The underlying data, I assume, was also not available
21 until August of 2009?

22 A. (Harrison) The underlying data behind this study?

23 Q. Yes.

24 A. (Harrison) I don't recall when they released the --

[WITNESS PANEL: Harrison~Kaufman]

1 A. (Kaufman) No, I do not. We looked for it as part of
2 this project.

3 Q. So, you don't know the date of when that underlying
4 data was available?

5 A. (Harrison) My guess is it was around August of 2009.

6 Q. Okay. So that, just -- that's the only question I have
7 on that.

8 (Atty. Fabish distributing documents.)

9 CMSR. HONIGBERG: This is "126".

10 (The document, as described, was
11 herewith marked as **Exhibit 126** for
12 identification.)

13 BY MS. FRIGNOCA:

14 Q. Document 120 --

15 MS. FRIGNOCA: Does everyone have the
16 exhibit?

17 BY MS. FRIGNOCA:

18 Q. Document 126 is a document prepared by Dr. Stanton, in
19 which she looks at the numbers from the Waxman-Markey
20 Bill, and compares them to the NERA High CO2 Price that
21 you developed. And, there's a graph on the bottom
22 comparing that chart. And, these figures there, I
23 don't know if you have your figures in front of you, or
24 if we can accept, for the sake of our discussion, that

1 the figures that she put in for the Waxman-Markey Bill
2 are accurate? Can we do that for the sake of
3 discussion?

4 A. (Harrison) You're talking about the top line there?

5 Q. Yes.

6 A. (Harrison) Yes.

7 Q. Okay. And, can you explain, so that we can all
8 understand this -- this clearly shows that the NERA
9 High CO2 Prices are less than the Waxman-Markey Basic
10 Run. Can you clearly explain what discount you
11 applied, what percentage you assumed, to further reduce
12 the price to the figures that you arrived at?

13 A. (Harrison) Yes, I think we can. And, I think this is
14 just going back to what Dr. Kaufman described. If you
15 look at what this, the bottom part of this graph, it
16 says "NERA High CO2 Price". But, if you look at our
17 actual chart, there's a few missing words. So, what we
18 actually have on that chart that she took this from is
19 "NERA High CO2 Price", in parentheses, "National cap
20 and trade net of free allowances". So, this is
21 actually our estimate, not of the price in the
22 Waxman-Markey Bill, but the cost to PSNH, which is the
23 relevant price to them, of the allowances. So, this --
24 this price curve takes into account the fact that a

1 large share of those allowances that PSNH would need to
2 pay for would actually be given to them free in the
3 allowances. So, as Dr. Kaufman said, in the beginning
4 part of the period, about 50 percent of the allowances
5 would be allocated to PSNH for free. And, so, you can
6 see that this curve looks like, in the beginning
7 period, that it's about half as -- the price is half,
8 roughly half of the price of the Waxman-Markey bill.

9 A. (Kaufman) And, that goes down to about 25 percent over
10 the course of this analysis period, which, again, you
11 can see the difference on the graph. But, just to be
12 clear, the Waxman-Markey prices are the CO2 prices in
13 our analysis.

14 A. (Harrison) Yes.

15 A. (Kaufman) The lower line are the costs, the actual cost
16 to customers.

17 A. (Harrison) Yes. So, just to be totally clear on this,
18 I think it would have been very clear if NERA High CO2
19 Price had -- if she had included the additional
20 comments in the original graph, which pointed out that
21 they were net of the allowances.

22 Q. Okay. Let me ask two questions, because I don't -- I
23 think I'm looking for something finer, and I want to
24 make sure I understand. The Waxman-Markey Bill itself

1 had some adjustment for free allowances, correct?

2 A. (Harrison) When you said "some adjustments", the way
3 that -- it did not adjust the prices for free
4 allowances. It had provisions for free allowances in
5 the legislation.

6 Q. So, it had some provision for free allowances. There
7 was -- you then extrapolated from that an analysis of
8 what you thought would apply to Merrimack Station?

9 A. (Harrison) Yes, we did.

10 Q. Okay.

11 A. (Kaufman) Based on the formulas provided.

12 Q. And, that percentage was that you applied a 50 percent
13 discount and a 25 percent discount?

14 A. (Harrison) It's really not quite the way to look at it.
15 The way to look at it is that PSNH would -- that the
16 Waxman-Markey Bill would have required that all
17 emitters cover their CO2 emissions. So, that's what
18 they would have to do. But what it also said was that
19 "we will allow" -- "we will allocate allowances for
20 free under various formulas." So, we didn't discount
21 the price. We included the full price. But, when we
22 were figuring out the cost to PSNH going forward, we
23 simply netted out the free allowances that they would
24 get. And, that's because --

[WITNESS PANEL: Harrison~Kaufman]

1 Q. That's my question. What I'm trying to get at is, what
2 did you do to decide what free allowances they would
3 get under a bill that was pending and never passed?
4 What did you do? Did you apply a percentage
5 calculation? Did you come up with a number?

6 A. (Harrison) The Waxman-Markey provisions were very
7 similar to those that were in a Senate bill, which is
8 the Lieberman-Warner Bill, that was -- and some of you
9 may or may not be familiar with all of these
10 legislative proposals. But, in the 2008-2009 period,
11 the major Senate, and I actually advised some Senate
12 staffer as they were developing these bills, but the
13 major Senate proposal was developed by Senators
14 Lieberman and Warner. And, Representatives Waxman and
15 Markey developed a very, very similar bill in the House
16 of Representatives. And, there was a great deal of
17 discussion about "free allocation" at this time. And,
18 this was exactly the topic that I met with Senate
19 staffers and discussed.

20 And, so, what was going on was that
21 people were developing formulas for what these
22 allocations would be. And, the formulas in the
23 Waxman-Markey Bill and the Lieberman-Warner Bill were
24 very similar. They provided allocations primarily to

1 coal-fired generators. And, so, what we could do is we
2 could look at what those provisions were and make
3 judgments about what was likely to be the going-forward
4 cost to PSNH or other utilities of their CO2 emissions
5 in the years from 2013 to 2027.

6 Q. Okay. So, just so we can move on, what you did was you
7 took one bill that was pending, and we can agree that
8 there were many bills pending before Congress at that
9 time, right?

10 A. (Harrison) No, I don't think we can agree. I think
11 we -- as I said, from my vantage point, the major
12 legislative proposals were the two ones that we
13 referenced.

14 Q. And, were those the only two bills pending before
15 Congress at that time?

16 A. (Harrison) Well, I'm not sure exactly what was
17 "pending". But -- there were various proposals, but
18 these were, I think most people who followed the
19 discussions, recognized that these were the major
20 legislative proposals in the Senate and the House at
21 the time.

22 Q. Okay. So, my question was, were there more than --
23 were there many bills proposed in Congress to deal with
24 CO2 regulations? "Yes" or "no"? Were there --

[WITNESS PANEL: Harrison~Kaufman]

1 A. (Harrison) Yes. There were several.

2 Q. Okay. Thank you. And, this was one that was proposed?

3 And, just "yes" or "no"? This was one bill that --

4 A. (Harrison) This was one that was proposed, correct.

5 Q. Okay. And, based on that, at some point you testified

6 before Congress, and I'm assuming that was in the

7 Summer of 2009?

8 A. (Harrison) I don't think I said "I testified before

9 Congress."

10 Q. You said you "provided assistance to Congress".

11 A. (Harrison) I said that what I did is "I met with the

12 Senate staffers" who were developing the various cap

13 and trade proposals.

14 Q. Okay. And, when did you do that?

15 A. (Harrison) I don't recall. I think it was in around

16 2006 or 2007.

17 Q. So, in 2006 or 2007 you met with a senator about the

18 Waxman-Markey Bill that was pending in 2009?

19 A. (Harrison) I don't think I said -- I said "I met with

20 the Senate staffers" to develop -- who were in the

21 process of developing various cap and trade proposals.

22 Q. All right. So, what you did was you took formulas that

23 you learned about through your testifying and you

24 applied that to the Waxman-Markey Bill, and you did

[WITNESS PANEL: Harrison~Kaufman]

1 that analysis very recently, right, in 2014?

2 MR. NEEDLEMAN: I'll object to the form
3 of the question.

4 CMSR. HONIGBERG: Yes. The form of the
5 question does have a problem, because I don't think that
6 was their testimony. I think Dr. Kaufman said that "the
7 formulas were in the legislation" that they looked at.

8 WITNESS HARRISON: That's right.

9 BY MS. FRIGNOCA:

10 Q. Are you familiar with the CO2 price forecast that
11 Synapse publishes on a regular basis?

12 A. (Harrison) Well, I actually just -- I am now familiar
13 with the 2008 forecast, yes.

14 Q. So, prior to being involved in this case, you were not
15 familiar with the Synapse forecasts at all?

16 A. (Harrison) I think I had heard of them, but I had not
17 looked through them.

18 Q. Mr. Kaufman, were you familiar with those forecasts?

19 A. (Kaufman) It depends what you mean by "familiar". I'm
20 sure I had seen them before.

21 Q. Dr. Harrison, you testified that, as early as 2006, you
22 were talking to senators about carbon legislation,
23 similar to the Waxman-Markey Bill, correct?

24 A. (Harrison) In terms of the cap and trade proposal, yes.

{DE 11-250} [Day 6/Late Afternoon Session ONLY] {10-22-14}

1 Q. And, you would agree that, by 2009, Congress was
2 concerned about climate change?

3 A. (Harrison) I don't know how to answer that. I think --

4 Q. Let me go back. Let me rephrase the question. By
5 2009, we know that there were many bills pending. And,
6 viewing circumstances from that time frame, it seemed
7 likely that there would be some form of carbon
8 legislation passed, correct?

9 MR. NEEDLEMAN: I'll object to the
10 question. It's calling for speculation.

11 MS. FRIGNOCA: That's part of
12 forecasting.

13 CMSR. HONIGBERG: You can answer, if you
14 understand the question.

15 **BY THE WITNESS:**

16 A. (Harrison) Well, I'm not sure I completely understand
17 the question. What I can say is that, over the course
18 of a number of years, there was a discussion in
19 Congress about various CO2 cap and trade programs.
20 And, the period of 2008 and 2009, I would say I would
21 characterize it as a period of great uncertainty. And,
22 not just there was uncertainties about whether a bill
23 would be passed, but there were also quite a bit of
24 uncertainties about what the provisions of the bill

[WITNESS PANEL: Harrison~Kaufman]

1 are. And, what is clear, if you look at these, is that
2 there's a lot of details or specifics about what the
3 levels of the caps are, what are the allowable offsets
4 that are provided, whether there are safety valves or
5 other kinds of measures in the bill.

6 So, it's a little bit misleading to say
7 lots of -- to talk of "a cap and trade proposal",
8 because there are a lot of individual elements that go
9 into either a legislative proposal or a cap and trade
10 proposal.

11 BY MS. FRIGNOCA:

12 Q. I am going to move on. One of the other factors that
13 was important to consider would be looking at costs
14 associated complying with the renewed NPDES Permit, if
15 we're looking at the time frame of early-2009. Would
16 you agree with that?

17 A. (Harrison) Yes.

18 Q. And, that one of the biggest costs associated with that
19 would be for a cooling water intake tower?

20 A. (Harrison) That is correct.

21 Q. And, did you, in your analysis, come up with a dollar
22 figure that you thought was reasonable to assume for a
23 cooling water intake tower?

24 A. (Harrison) Yes. Just to be clear, that was in our --

1 in what we refer to as our "High Environmental
2 Compliance Case".

3 Q. Yes. What was the dollar figure that you came up with?

4 A. (Harrison) I don't recall. I think that we had
5 estimates for capital costs, and then I think we may --
6 I think we also had operating and maintenance costs
7 associated with the cooling tower. But I don't recall
8 right now the precise numbers.

9 Q. Is that somewhere in your testimony?

10 A. (Harrison) I don't think it is. I think what we have
11 is, in the chart that shows the total cost, we have
12 a -- one of the figures includes those costs.

13 A. (Kaufman) And, we did provide it as part of the
14 underlying information to our report.

15 MS. CHAMBERLIN: Is there a page number
16 of the chart or somewhere we can reference it?

17 CMSR. HONIGBERG: We're going to wait
18 for Ms. Frignoca, for the next question, that may -- we
19 may get there, Ms. Chamberlin, I'm not sure.

20 MS. FRIGNOCA: I wasn't looking at
21 something specific, no.

22 SP. CMSR. IACOPINO: Doctor, do you know
23 what attachment to your testimony the chart you're talking
24 about is?

[WITNESS PANEL: Harrison~Kaufman]

1 WITNESS HARRISON: Yes. It would be
2 Attachments 13 and 14.

3 SP. CMSR. IACOPINO: Thank you. And,
4 those start at Page Bates 401.

5 (Atty. Fabish and Atty. Frignoca
6 distributing documents.)

7 CMSR. HONIGBERG: Off the record.

8 (Brief off-the-record discussion
9 ensued.)

10 CMSR. HONIGBERG: Why don't we go back
11 on the record. You can explain what has been distributed.
12 All right. Go ahead, Ms. Frignoca.

13 MS. FRIGNOCA: Okay. So, I'm
14 distributing a document that we will mark as "Exhibit
15 127". And, this is a very lengthy document, of which only
16 a small portion is relevant. To comply with Commission
17 rules, I have provided three full copies, one as an
18 official exhibit and one to each of the Commissioners.
19 And, I have a fourth copy that I can give to PSNH, if they
20 would like. For everyone else, I provided an excerpted
21 copy. And, I can provide a link to the complete document,
22 if people wish to have a complete copy.

23 CMSR. HONIGBERG: Everyone understand
24 that?

[WITNESS PANEL: Harrison~Kaufman]

1 MR. NEEDLEMAN: Yes.

2 (The document, as described, was
3 herewith marked as **Exhibit 127** for
4 identification.)

5 CMSR. HONIGBERG: Go ahead.

6 BY MS. FRIGNOCA:

7 Q. Drs. Harrison and Kaufman, I'm showing you what's been
8 marked as "Exhibit 127". And, this document is
9 entitled "Response to United States Environmental
10 Protection Agency CWA Section 308 Letter, PNS [PSNH?]
11 Merrimack Station Units 1 and 2, Bow, New Hampshire".
12 Did I read that correctly?

13 A. (Harrison) Yes.

14 Q. And, the date of this is November 2007?

15 A. (Harrison) Yes.

16 Q. And, if you were refer to this document, Section 32 --
17 or, Page 32, I'm sorry, --

18 A. (Harrison) Uh-huh.

19 Q. -- would you agree that this is a section where PSNH is
20 providing a response to the EPA regarding draft towers
21 for closed-loop cooling on both units at Merrimack
22 Station?

23 A. (Harrison) Yes.

24 Q. And, turning to Page 43 of this document, would you

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1 agree that this is a section where PSNH is looking at
2 the costs associated with the cooling towers?

3 A. (Harrison) On Page 43, is that -- you mean you're
4 referring to what's in the box?

5 Q. I'm sorry. Beginning on Page 41.

6 A. (Kaufman) Could you re-ask the question.

7 Q. Sure. I'm just simply asking that, in this response to
8 the EPA, does the Company provide cost estimates
9 regarding the costs that would be involved in
10 converting Merrimack Stations Units 1 and 2 to
11 closed-loop condenser cooling?

12 A. (Harrison) Yes. That's correct.

13 Q. And, if you turn to Page 43, there is a little block
14 right above the word "6" -- right above the number
15 "6.2.2". And that, according to this document, as of
16 2007, the cost of converting Merrimack Station to
17 closed-loop cooling would be "59,215" -- "\$59,215,900"?

18 A. (Harrison) Yes.

19 Q. And that, with lost generating capacity during
20 implementation, the total cost of the conversion would
21 be "\$67,980,500"?

22 A. Yes. We see that.

23 Q. Okay. And, would you agree that it seemed pretty
24 likely, given the pending NPDES Permit, that PSNH would

[WITNESS PANEL: Harrison~Kaufman]

1 be required to build a cooling water tower?

2 MR. NEEDLEMAN: Objection.

3 CMSR. HONIGBERG: Wait.

4 WITNESS HARRISON: Yes.

5 CMSR. HONIGBERG: What's the grounds for
6 the objection?

7 MR. NEEDLEMAN: Asking for speculation
8 about whether or not a cooling tower would be necessary
9 here. I don't think that's their area of expertise.

10 CMSR. HONIGBERG: Ms. Frignoca.

11 MS. FRIGNOCA: I think that they're
12 economists, and they have made a number of assumptions.
13 And, one of the assumptions that they have made is that
14 cooling water towers would be required in their High Case
15 assumption, and not in their Low Case assumption. And,
16 I'm trying to determine that basis.

17 MR. NEEDLEMAN: Well, I think there's a
18 distinct difference between making assumptions for
19 purposes of conducting an economic analysis and offering
20 opinions about whether it's "likely" that a particular
21 environmental control technology would be necessary.

22 MS. FRIGNOCA: I can ask a different
23 question.

24 CMSR. HONIGBERG: Go ahead.

1 BY MS. FRIGNOCA:

2 Q. Based on your attorney's representation, is it fair to
3 say that you just made assumptions for purposes of
4 economic analysis and are expressing no opinion whether
5 a cooling water tower would be likely or not likely at
6 Merrimack Station?

7 A. (Harrison) That's correct.

8 Q. Okay. Would you please refer to Attachment 12 of your
9 testimony. And, that is Bates stamp Page 400. And, I
10 would also ask you to pull up, so we can go back and
11 forth between them, Attachment 14a and b, which are at
12 Bates stamp 403 and 404. Do you have the exhibits?

13 A. (Harrison) We do have them. Yes.

14 Q. Okay. So, my first question for you is, looking at
15 Attachment 14a and b, you have a capacity factor listed
16 of "83 percent", and that capacity factor remains
17 constant throughout all 12 scenarios, correct?

18 A. (Harrison) That's correct.

19 Q. And, that capacity factor is based on an average of the
20 2003 to 2007 historical data, correct?

21 A. (Harrison) That's correct.

22 Q. And, my question is, by 2009, with gas prices dropping
23 and coal becoming more of a marginal fuel -- well, you
24 would agree that, by 2009, gas prices were dropping,

1 correct?

2 A. (Harrison) When you say "gas prices are dropping", do
3 you mean the actual gas prices?

4 Q. Yes. For purchasing energy. That the -- the gas
5 prices that set the market.

6 A. (Harrison) Had dropped from mid-2008 to 2009?

7 Q. Yes.

8 A. (Harrison) Yes.

9 Q. And, you would agree that coal was becoming more of a
10 marginal fuel, meaning that coal plants were running
11 less as baseload facilities in New England?

12 A. (Harrison) No, I think that's -- I think it's better to
13 think in terms of the complexities of what was going
14 on, in terms of projections that were being made at the
15 time. I think it was more complicated than that, than
16 that suggests.

17 Q. Okay. So, the market was changing and the role of coal
18 plants were changing in the market?

19 A. (Harrison) I don't quite know how to respond to that.
20 What -- in terms of the analysis that we did, what was
21 really relevant was what was going on with projected --
22 all the factors that influence the cost of operating
23 coal and natural gas in our comparisons. So, you can
24 look at -- you can look at what was happening under

[WITNESS PANEL: Harrison~Kaufman]

1 some elements and see it was going in one direction,
2 and others in another direction. So, I think, frankly,
3 that's why I find the question a little bit hard --

4 Q. All right.

5 A. (Harrison) -- to understand, because --

6 Q. Let me just ask --

7 A. (Harrison) -- the purpose of this analysis was to --

8 CMSR. HONIGBERG: No, Dr. Harrison. Let
9 her ask another question.

10 WITNESS HARRISON: Sure.

11 MS. FRIGNOCA: Let me just ask another
12 question.

13 BY MS. FRIGNOCA:

14 Q. Your 83 percent capacity factor is based solely on an
15 average of historic data from 2003 to 2007, correct?

16 A. (Harrison) That's correct.

17 Q. Okay. And, now, if I'm looking at Exhibits 14a and b,
18 you do your analysis from 2013 to 2027. And, I'm
19 assuming you choose that time frame because that's the
20 useful life of the Scrubber?

21 A. (Harrison) That's correct.

22 Q. And, under the net present values, you have listed the
23 Scrubber Project Case and compared it first to a
24 natural gas scenario, and then to the market purchase

1 case that you developed, right?

2 A. (Harrison) That's correct.

3 Q. And, if I look at Attachment 12, that's a summary of
4 your analysis, right? With the "Summer of 2008" on top
5 and the "Summer [Spring?] of 2009" on the bottom?

6 A. (Harrison) Correct.

7 Q. So, Attachment 12 is kind of like a summary of the four
8 exhibits that follow. So, if I look at your charts,
9 the cost of building a gas plant, compared to
10 installing the Scrubber, without challenging any of
11 your assumptions regarding capacity or environmental
12 costs, in all but one of the six scenarios installing
13 the Scrubber is more economic than building a natural
14 gas plant, right?

15 A. (Kaufman) Which six scenarios are you looking at?

16 Q. I'm looking at Exhibits 14a and 14b, and as summarized
17 on Attachment 12. You have -- what I would do is look
18 at -- am I reading that correctly?

19 A. (Kaufman) I was just confused, because I thought there
20 was -- there's 12 scenarios in Spring 2009, versus a
21 natural gas plant.

22 Q. Of those 12 scenarios, you find that in only one
23 instance would it be more economic to build a natural
24 gas plant than to install the Scrubber, correct?

1 A. (Harrison) That is correct.

2 Q. And, then, if we look at versus the market purchases,
3 again, without challenging your capacity factor or any
4 of your assumptions, in four out of the six scenarios
5 you find it would be more economic to purchase energy
6 than to build the Scrubber, correct?

7 A. (Harrison) Yes, just to be very clear, when you say
8 "more economic", lower cost.

9 Q. So, it would be lower cost to purchase --

10 A. (Harrison) That's correct.

11 Q. -- energy than to build the Scrubber. And, under the
12 market purchase scenario, the only two situations in
13 which the Scrubber would be more economic would be in a
14 situation where PSNH did not have to build a cooling
15 water tower or did not have to pay more for CO₂,
16 according to your chart?

17 A. (Kaufman) So, we did include a CO₂ price in both cases.

18 A. (Harrison) Yes.

19 Q. But you didn't -- you included just continuing RGGI. I
20 guess what I'm talking about is, the only two scenarios
21 in which you found it would be more economic to build a
22 Scrubber than to purchase energy in the market would be
23 the two scenarios where you did not add in any carbon
24 pricing based on the EIA analysis of the Waxman-Markey

1 Bill and your adjustments to that, and you did not
2 factor in any costs associated to the cooling water
3 intake tower?

4 A. (Harrison) I think you're just trying to describe the
5 scenario. So, in that case, we have six scenarios,
6 because, of course, it doesn't include the different
7 assumptions about building -- the cost of building a
8 natural gas facility. So, in this particular case,
9 it's the -- the two key sets of assumptions had to do
10 with electricity prices, natural gas prices, and fuel
11 prices, and environmental costs.

12 Q. So -- yes. But let me ask the question a different
13 way, since I'm not --

14 A. (Harrison) Yes.

15 Q. -- getting an answer to it. Which means, maybe I
16 should rephrase it. The only two scenarios in which
17 you found that it would cost less to install the
18 Scrubber than to purchase -- market purchase the energy
19 would be where there was the Low Case, which, according
20 to you, includes the minor expected costs associated
21 with other environmental regulations. And, those are
22 defined on your chart to just include -- to just
23 include CO2 allowance prices from NYMEX futures for
24 RGGI. You did not include any cooling water costs or

[WITNESS PANEL: Harrison~Kaufman]

1 any other costs associated with complying with renewal
2 of the NPDES Permit, correct?

3 A. (Harrison) I believe that's correct. I can't remember
4 whether we had any --

5 A. (Kaufman) We had the costs of existing controls for
6 their NPDES Permit.

7 A. (Harrison) Yes. I think that there were some costs
8 related to 316(b). But the high cost was the -- the
9 high environmental cost was the case in which cooling
10 tower was assumed.

11 MS. FRIGNOCA: I have no other
12 questions.

13 CMSR. HONIGBERG: Mr. Fabish, do you
14 have any questions?

15 MR. FABISH: No.

16 CMSR. HONIGBERG: Is there somebody here
17 who can finish in 20 minutes? Ms. Chamberlin.

18 MS. CHAMBERLIN: Thank you. Good
19 afternoon, good evening.

20 CMSR. HONIGBERG: Just make sure your
21 microphone is on.

22 BY MS. CHAMBERLIN:

23 Q. One follow-up question that I had, to make sure I
24 understood your chart. On Bates 401 -- and, I'm Susan

[WITNESS PANEL: Harrison~Kaufman]

1 Chamberlin, Consumer Advocate for residential
2 ratepayers. Is your estimate of the cooling water
3 intake tower, or whatever you would call it, was it
4 \$115 million in the High Case, is that correct, if
5 you're looking on the chart?

6 A. (Kaufman) Oh, I see. Are you looking at "Additional
7 Environmental O&M"?

8 Q. I am. I am. Is that --

9 A. (Kaufman) So, no. Sorry. So, this is going to be a
10 net present value of all of the additional
11 environmental O&M. So, the O&M associated with cooling
12 towers would be a part of that number.

13 Q. Okay. So, all additional environmental O&M at the
14 highest scenario is 115 million?

15 A. (Kaufman) That's a net present value of the additional
16 O&M in the high scenario over 15 years.

17 Q. Okay. Thank you. NERA did not conduct any economic
18 analysis for PSNH in 2008, correct?

19 A. (Harrison) That's correct.

20 Q. And, NERA did not conduct any economic analysis for
21 PSNH in 2009?

22 A. (Harrison) That's correct.

23 Q. So, the scenarios in your 2013 study played no role in
24 PSNH's decisions regarding construction of the Scrubber

1 Project?

2 A. (Harrison) I presume not, no. They weren't available,
3 of course.

4 Q. Good. Now, on Bates 307. Are you there?

5 A. (Harrison) I don't have Bates pages on mine. So, it's
6 23, is that right?

7 Q. Twenty-three. Yes. You list the data that PSNH
8 provided to you for your analysis, is that correct?

9 A. (Harrison) That's correct.

10 Q. And, you did not independently verify the accuracy of
11 this data, is that correct?

12 A. (Harrison) Well, not in some sense, in the sense that
13 most of these we weren't, you know, they were from --
14 they were relevant to Merrimack Station. But we, you
15 know, recognized, from having done similar analyses,
16 that these seemed sensible.

17 Q. So, PSNH said "here's the data, and you use that data
18 in your assumptions", correct?

19 A. (Harrison) That is correct.

20 Q. And, you didn't -- you looked at it, it looked okay,
21 but you didn't do an independent analysis on the
22 specific assumption -- the specific data that PSNH
23 provided?

24 A. (Harrison) No, we did not.

[WITNESS PANEL: Harrison~Kaufman]

1 Q. And, that's true for each of the cost items listed
2 there?

3 A. (Harrison) Yes. That's correct.

4 Q. If the information provided by PSNH is inaccurate, for
5 whatever reason, it would affect the accuracy of your
6 analysis?

7 A. (Harrison) Well, I think it would -- maybe one way of
8 looking at it is it would affect the actual calculation
9 of some of the numbers. And, then, you'd have to look
10 at whether there was -- it is likely to affect the
11 overall result, in terms of we found that the Scrubber
12 Project was the least expensive than some options, and
13 not the least expensive than other options. So, I
14 guess, in theory, these, of course, the numbers would
15 change as some of the inputs changed. But some of
16 them, as we found when we did some sensitivity cases
17 with the different scenarios we looked at, some
18 assumptions were more important than others.

19 MS. CHAMBERLIN: Thank you. That's all
20 I have.

21 CMSR. HONIGBERG: I understand that Mr.
22 Patch or Ms. Goldwasser may have an extended questioning.
23 Does Staff have any questions?

24 MS. AMIDON: Yes, we do. We can get

[WITNESS PANEL: Harrison~Kaufman]

1 started. I don't know if we'll finish.

2 CMSR. HONIGBERG: Why don't we start
3 with you.

4 MS. AMIDON: Okay. And, just with your
5 permission, I'm going to have Mr. Frantz also asking some
6 questions of these witnesses.

7 CMSR. HONIGBERG: That's fine with me.
8 I assume no one has a problem with that?

9 (No verbal response)

10 CMSR. HONIGBERG: Okay. Go ahead.

11 MS. AMIDON: Okay. Thank you. Good
12 afternoon. My name is Suzanne Amidon. I'm a Staff
13 attorney for the Commission Staff in this docket. Thank
14 you for hanging in there late this afternoon.

15 BY MS. AMIDON:

16 Q. I just wanted to start with a few questions about your
17 testimony. Beginning at your testimony that's Page 6
18 or Bates 290. And, the question that was asked at
19 Question Number 10, you were asked to "provide a brief
20 summary of your analysis". And, in the first paragraph
21 of the answer, you say you "developed 12 scenarios for
22 each of two Analysis Dates." Now, you said the
23 Analysis Dates were "mid-2008"?

24 A. (Harrison) That was one of them, yes.

{DE 11-250} [Day 6/Late Afternoon Session ONLY] {10-22-14}

1 Q. Can you be any more specific? Give me a range of
2 months?

3 A. (Harrison) Well, most of the information was in the
4 period from June, June and July. I don't remember
5 specifically. Maybe there was some data that was
6 outside that range.

7 Q. Okay. So, there could be some information that's
8 outside that range. And, then, the second period was
9 "early-2009". Could you explain to me what you mean by
10 "early-2009"?

11 A. (Harrison) Well, again, with some -- there is some
12 uncertainty, but it was around the March/April, you
13 know, February/March, February/March/April.

14 Q. Okay. Thank you. And, I'm sure you know I'm not an
15 economist. So, I'm kind of asking you sort of the
16 plodding lawyer questions. In that same paragraph you
17 say you considered "12 scenarios across three
18 dimensions". And, I always thought that maybe there
19 was more than three. But, anyway, it's "expected
20 future energy market prices, including natural gas,
21 coal and electricity"; "expected future costs to comply
22 with environmental regulations, notably for CO2"; and
23 then "expected capital costs of a new combined cycle
24 natural gas plant." So, in this context of

[WITNESS PANEL: Harrison~Kaufman]

1 environmental compliance, did you consider any of the
2 economic incentives that were provided for PSNH in the
3 statute for SO2 allowances under the statute, assuming
4 that they were able to get the Scrubber installed and
5 operating by a date certain, they were entitled to
6 certain SO2 allowances. Did you take that into
7 account?

8 A. (Harrison) We did include SO2 allow -- SO2 costs. But
9 I don't remember an adjustment for -- an adjustment
10 based on having the Scrubber in place. Obviously, the
11 Scrubber would cut down on their SO2 emissions, so that
12 would be an automatic -- that would have to have an
13 effect on their SO2 costs.

14 Q. Did they give you any information on this? On what
15 they expected at that time, mid-2008 or early-2009, to
16 be the costs associated or the value associated with
17 those allowances?

18 A. (Harrison) Well, this was an independent analysis. So,
19 we actually developed our assessments of what the
20 likely SO2 costs would be.

21 Q. So, you developed your own forecast for the SO2
22 allowances?

23 A. (Harrison) Yes. We included SO2 costs --

24 Q. Is that fair to say?

[WITNESS PANEL: Harrison~Kaufman]

1 A. (Harrison) -- SO2 costs in our assessments, yes.

2 A. (Kaufman) Based on the futures market prices at the
3 time.

4 Q. And, what were your -- what were your view of where SO2
5 allowance prices were going mid-2008? Up? Down?
6 Staying the same?

7 A. (Harrison) Well, as Dr. Kaufman said, we didn't use our
8 judgment, we used the market's judgment. So, we looked
9 at futures prices. And, obviously, at that point,
10 futures prices were showing costs that were
11 historically low.

12 Q. And, did -- and, when you did that same analysis in
13 early-2009, were they even lower still?

14 A. (Harrison) I believe they were lower in 2009. The
15 futures prices were lower in 2009 and 2008, yes.

16 Q. So, you did make adjustments based on the difference
17 between what you saw in mid-2008 and then 2009?

18 A. (Harrison) Yes. So, these two analyses were separate
19 analyses. We did a separate set of analyses for
20 mid-2008 and a separate analysis for 2009.

21 Q. Thank you. When you -- you refer in your testimony,
22 and I see this several times, "low cost option for
23 ratepayers", "lower cost for its", that is PSNH
24 customers, and "low cost option to ratepayers". And,

1 that's the terminology you like to use in this regard.
2 So, when you developed the lowest cost option for
3 ratepayers, what did you use as a forecast for sales in
4 each of these two different periods?

5 A. (Harrison) By "sales", do you mean "what is the
6 generation at Merrimack that's assumed in these
7 calculations?"

8 Q. Well, what -- well, the value -- well, maybe you can
9 describe them to me, if you did any calculation on a
10 kilowatt-hour basis of what the value was to ratepayers
11 in this lower cost -- lowest cost option. Did you
12 determine on a kilowatt-hour basis? And, if so, what
13 sales forecast did you use?

14 A. (Harrison) Now, I think maybe what you're getting at is
15 what are the -- in the summary, I said that we were
16 looking at the going-forward costs at Merrimack versus
17 alternatives. So, the going-forward costs for
18 Merrimack were based on projections of their generation
19 over that period. So, we took their total generation.
20 And, as we said, it's based on a historical capacity
21 factor and forecast that generation. And, that was --
22 it was the cost associated with that generation that we
23 were including in the Merrimack analysis.

24 Q. So, you did get down to analyzing what the sales

1 forecast of PSNH and the, you know, the volume of
2 default service customers who would be paying for those
3 different scenarios? Am I making myself clear? I may
4 not. It's kind of late in the day.

5 A. (Harrison) Yes, I'm sorry. Not so clear. I think that
6 what I'm trying to suggest is that, to make it very
7 clear, is we looked at the going-forward generation of
8 the Merrimack Station. And, we asked ourselves "what
9 are the costs associated with providing that generation
10 over the period from 2013 to 2027?"

11 Q. And, just for the record, you chose the 2013 to 2027
12 years for what purpose? What was the reason for your
13 choosing that year -- those years?

14 A. (Harrison) I think it was when the Scrubber was
15 presumed to be put in place, and then at the end of the
16 useful life of the Scrubber was the beginning and
17 ending point.

18 Q. Now, in your testimony on your Page 9, Bates 293, I'm
19 just trying to see if I can understand this. I get the
20 impression from the nature of the Question Number 14 on
21 that page that you, Dr. Harrison and Dr. Kaufman,
22 prefer to use the most contemporaneous information that
23 you have available when you conducted your analysis, is
24 that correct?

1 A. (Harrison) That's correct.

2 Q. So, and I believe it's on Page 10 and 11 when you talk
3 about some of the uncertainty in the economy in
4 late-2008, early-2009. And, you posed some different
5 questions that you, I guess, were compelled to consider
6 in your analysis, is that fair to say?

7 A. (Harrison) That question I don't understand.

8 Q. Well, for example, you have these questions on Page 11,
9 at Line 9, "when and how would the economy recover",
10 "would an eventual rebound in the economy as well as
11 supply increases due to fracking reverse the trend of
12 increasing natural gas prices that was seen up until
13 mid-2008?" Or, you know, "Or, did the higher natural
14 gas prices experienced in mid-2008 represent a "new
15 normal" that would re-emerge after the economy
16 recovered?" Are these questions that you had to
17 consider in doing your analysis of going from mid-2008
18 to early-2009?

19 A. (Harrison) Well, just to be clear, this discussion was
20 really intended to represent the nature of the
21 uncertainties. So, it wasn't -- it was sort of the
22 types of uncertainties that were in the minds or were
23 relevant to the economic circumstances, but also to the
24 energy markets at the time. So, what we really

1 were looking -- we were looking at market information
2 that we actually wound up using, but this was just
3 rhetorically trying to give the flavor of the nature of
4 the uncertainties.

5 Q. Yes. That's exactly what I wanted to know. Thank you.
6 So, when you went to do the analysis for that second
7 time period, did you look at updated natural gas
8 forecasts that were contemporaneous with the
9 February/March/April 2009 time frame?

10 A. (Harrison) Yes, we did. But, just to be clear, I think
11 we described some of the sources, just to be clear. In
12 terms of the natural gas and electricity and CO2
13 prices, one of the things that we emphasized is that we
14 needed to be consistent. So, we couldn't just look
15 at -- we didn't want to look at any forecasts, we
16 wanted to look at forecasts that were consistent with
17 the different scenarios that we were developing.

18 Q. I'm not sure I understand that answer.

19 A. (Harrison) Well, maybe I can put it a little bit
20 differently. When we looked at -- we had developed the
21 uncertainties, the nature of the uncertainties. And,
22 so, we described those as being, for example, CO2
23 costs, and uncertainty on the other factors that
24 influence electricity prices and natural gas prices.

1 So, one of the scenarios that we had was a situation
2 where there would be a national cap and trade program.
3 So, we wanted to make sure that, when we looked at the
4 electricity prices and natural gas prices, we
5 incorporated the effects of high CO2 -- of the CO2
6 prices when we developed those particular prices. So,
7 that's a sense in which the consistency. And,
8 similarly, if we're looking at prices that don't assume
9 that there's a national cap and trade program, we
10 wanted to have prices that did not include the CO2
11 program. So -- and, you can see, if you look at our
12 results or the prices, that CO2 prices do influence
13 natural gas prices and electricity prices. So, it
14 wasn't just a nicety. It was empirically important to
15 have those consistent set of prices.

16 Q. Well, okay. My question is, did you look at updated
17 natural gas price forecasts for the
18 February/March/April time period in 2009, "yes" or
19 "no"?

20 A. (Harrison) We used -- yes, we used contemporaneous
21 prices at that time.

22 Q. The forecasts?

23 A. (Harrison) In our forecasts, yes.

24 Q. Okay. So, you did look at them.

[WITNESS PANEL: Harrison~Kaufman]

1 CMSR. HONIGBERG: It sounds like it
2 might be a place to stop.

3 MS. AMIDON: I'm fine with that. Thank
4 you.

5 CMSR. HONIGBERG: All right. We'll come
6 back tomorrow morning, 9:00, finish up. Let's go off the
7 record and talk what else, what we're going to do
8 tomorrow, and whether there's any chance of us finishing
9 tomorrow.

10 (Off-the-record discussion ensued.)

11 CMSR. HONIGBERG: Back on the record.
12 We have decided to come back at 8:30 tomorrow morning, and
13 go as long as we reasonably can tomorrow to see how close
14 we can come. All right. Thank you all very much.

15 **(Whereupon the hearing was adjourned at**
16 **5:33 p.m., and the hearing to resume on**
17 **October 23, 2014, commencing at 8:30**
18 **a.m.)**

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