

**STATE OF NORTH CAROLINA  
UTILITIES COMMISSION  
RALEIGH**

DOCKET NO. E-7, SUB 1146

In the Matter of  
Application of Duke Energy Carolinas, )  
LLC, for Adjustment of Rates and Charges )  
Applicable to Electric Utility Service in )  
North Carolina )

**TESTIMONY OF EDWARD D. KEE**

**ON BEHALF OF  
APPLE INC., FACEBOOK, INC. AND GOOGLE LLC  
(THE “TECH CUSTOMERS”)**

January 23, 2018

**I. INTRODUCTION**

**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. My name is Edward D. Kee and my business address is 1255 23rd Street, NW, Washington, DC 20037.

**Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

A. Since May of 2014, I have been an Affiliated Expert with NERA Economic Consulting. Prior to this, I was a Vice President at NERA Economic Consulting with a focus on nuclear economics. I am also the Chief Executive Officer of Nuclear Economics Consulting Group, a firm that I founded in 2014.

**Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.**

A. I hold a Bachelor of Science Degree in Systems Engineering (with Distinction) from the U.S. Naval Academy and a Master of Business Administration (MBA) degree from Harvard University. Prior to 2014, I held senior consulting positions at NERA Economic Consulting; CRA International; PA Consulting Group; Putnam, Hayes & Bartlett; and McKinsey & Company. Before becoming a consultant, I was a nuclear power plant engineer, qualifying as chief engineering officer on Nimitz-class nuclear aircraft carriers, and a merchant power plant developer.

1           **Q.     HAVE YOU EVER TESTIFIED BEFORE THIS COMMISSION?**

2           A.     No.

3           **Q.     PLEASE   DESCRIBE   YOUR   CONSULTING   EXPERIENCE**  
4           **RELEVANT TO THIS DOCKET.**

5           A.     My consulting work is focused on providing strategic and economic advice  
6                   to companies and governments on nuclear power and electricity industry  
7                   issues. In this capacity and in the course of more than 30 years in the  
8                   industry I have regularly reviewed and advised companies and governments  
9                   on issues related to existing and new nuclear power plants, including the  
10                  cost of nuclear power plants and of nuclear electricity, the value of nuclear  
11                  electricity, the regulation of nuclear power, and assessment of nuclear  
12                  power projects. In addition, based on this experience, I have testified as an  
13                  expert witness in regulatory and judicial proceedings and arbitrations in the  
14                  United States and internationally involving nuclear issues. A current  
15                  detailed Curriculum Vitae is attached as Exhibit EDK-1.

16          **Q.     ON WHOSE BEHALF ARE YOU TESTIFYING?**

17          A.     I am testifying on behalf of Apple Inc., Facebook, Inc., and Google LLC  
18                  (collectively, the “Tech Customers”).

19          **Q.     WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

20          A.     The Tech Customers retained me to evaluate the application of Duke Energy  
21                  Carolinas, LLC (“DEC”) to increase its rates for retail electric service in

1 North Carolina to reflect a regulatory asset for the deferral of costs  
2 associated with the Lee nuclear project incurred through the effective date  
3 of the requested rate increase. More specifically, I provide an assessment  
4 of the costs incurred and activities undertaken by DEC in connection with  
5 its proposed Lee nuclear project, particularly focusing on how those costs  
6 and activities align with the prior orders of this Commission relating to the  
7 Lee nuclear project.

8 **II. SUMMARY OF RECOMMENDATIONS**  
9 **AND CONCLUSIONS**

10 **Q. CAN YOU SUMMARIZE YOUR RECOMMENDATIONS AND**  
11 **CONCLUSIONS?**

12 A. Yes. The Commission's orders in Docket No. E-7, Sub 819, adopting "not-  
13 to-exceed" spending caps for the Lee nuclear project provide controlling  
14 guidance for significant portions of the costs that DEC seeks to recover. As  
15 a starting point, DEC should not be permitted to recover more than its actual  
16 spending (including AFUDC) corresponding to the recovery periods set out  
17 in each order, subject to the applicable not-to-exceed caps (which DEC  
18 substantially exceeded in the post-2010 recovery period). Further, as to  
19 costs arising in the post-2010 recovery period, the Commission's 2011  
20 Order plainly authorizes recovery only of costs necessary to maintain the  
21 "status quo." An examination of the costs claimed by DEC shows that many  
22 of the costs DEC seeks to recover from ratepayers for this period are costs

1 not related to maintaining the status quo and, therefore, they should not be  
2 recovered.

3 **Q. WHAT ABOUT COSTS INCURRED IN PRIOR PERIODS?**

4 A. DEC appears not to have exceeded the applicable caps for the period  
5 January 1, 2007, to December 31, 2007, covered by the Commission's  
6 Order Issuing Declaratory Ruling ("2007 Order") or the period January 1,  
7 2008, to December 31, 2009, covered by the Commission's Order  
8 Approving Decision to Incur Project Development Costs ("2008 Order").  
9 DEC did not seek prior authorization for expenditures for 2010, and its  
10 request for retroactive approval of its 2010 expenses was rejected by the  
11 Commission; given this, it seems clear that recovery was not contemplated  
12 by the Commission's Order Approving Decision to Incur Limited  
13 Additional Project Development Costs ("2011 Order").

14 **III. BACKGROUND**

15 **Q. WHAT IS THE LEE NUCLEAR PROJECT?**

16 A. The Lee nuclear project is a new power plant DEC originally proposed to  
17 construct in Cherokee County, South Carolina. DEC filed a Combined  
18 Construction and Operation License (COL) application with the Nuclear  
19 Regulatory Commission ("NRC") in 2007, seeking NRC authorization to  
20 construct and operate the Lee nuclear power plant. As was decided for most  
21 of the other nuclear power plants for which COL applications were filed  
22 with the NRC in the last decade, DEC has decided not to construct the Lee

1 nuclear project. In August 2017, DEC publicly announced its intention to  
2 cancel the Lee nuclear project despite obtaining NRC approval of the Lee  
3 nuclear project COL application in December 2016.

4 **Q. ARE YOU FAMILIAR WITH DEC'S FILINGS IN DOCKET NO.**  
5 **E-7, SUB 819, AND THE THREE ORDERS ISSUED BY THE**  
6 **COMMISSION IN RESPONSE?**

7 A. Yes. Those orders bear directly on the appropriateness of DEC's request to  
8 recover the costs it incurred for the Lee nuclear project in this rate  
9 proceeding. I further understand that DEC's August 25, 2017, request for  
10 approval of its decision to cancel the Lee nuclear project in Docket E-7,  
11 Sub 819, has been consolidated with this rate proceeding for decision.

12 **Q. WHAT WAS DEC SEEKING IN THE DOCKET E-7, SUB 819**  
13 **PROCEEDINGS?**

14 A. My understanding is that DEC was seeking a general determination that it  
15 was appropriate to incur some level of costs in order to keep open the  
16 possibility of constructing a new nuclear plant as a generation resource  
17 option. DEC was seeking to avoid a situation where it took action and  
18 incurred costs related to developing a nuclear power resource option, and  
19 one or more intervenors subsequently argued that it was not reasonable or  
20 prudent for DEC to consider nuclear and begin to develop it as a resource  
21 option. In addition, DEC sought some assurance that the North Carolina  
22 allocable portion of nuclear project development costs would be eligible for

1 recovery in connection with a general rate proceeding if the Commission  
2 made a future determination that such costs were reasonably and prudently  
3 incurred. DEC was not seeking authority to construct a nuclear power plant;  
4 it was not seeking approval of any specific site or plans; and it was not  
5 seeking approval of any specific expenditures. Rather, it was seeking a  
6 general indication from the Commission that it was on the right track and  
7 that, ultimately, its nuclear project resource option development costs  
8 would be eligible for recovery in connection with a general rate proceeding.

9 **Q. WOULD YOU PLEASE STATE YOUR UNDERSTANDING OF THE**  
10 **COMMISSION'S ORDERS IN THESE PRIOR PROCEEDINGS?**

11 A. Yes. The Commission issued three orders in Docket No. E-7, Sub 819,  
12 setting out specific not-to-exceed spending caps associated with DEC's  
13 requests for approval to incur nuclear project development costs.

14 The first order was a declaratory ruling that was issued on March 20, 2007.  
15 It is referred to hereinafter as the 2007 Order. In this order, the Commission  
16 ruled that it was appropriate in general for DEC to pursue preliminary siting,  
17 design and licensing of the proposed "Lee Nuclear Station," and to incur  
18 costs not to exceed the North Carolina allocable portion of DEC's total  
19 system costs of \$125 million, limited to the period through December 31,  
20 2007. As to the ultimate recovery of those costs, the Commission held as  
21 follows:

1 To the extent the Commission finds, in a future general  
2 rate case proceeding, the specific activities involved in,  
3 and the costs of pursuing such Development Work to be  
4 prudent and reasonable (whether or not the Lee Nuclear  
5 Station is constructed), DEC may recover in rates the  
6 North Carolina allocable portion of DEC's share of such  
7 costs at the time(s) and in the manner determined to be  
8 appropriate by the Commission, and otherwise as allowed  
9 by North Carolina law.

10 *Id.*, at pp. 22-23.

11 The second order was issued June 11, 2008, pursuant to the then-newly  
12 enacted G.S. 62-110.7. It is referred to hereinafter as the 2008 Order. In  
13 this Order, the Commission approved DEC's decision to incur additional  
14 project development costs and imposed a not-to-exceed cap of the North  
15 Carolina allocable share of total system costs of \$160 million, limited to the  
16 period January 1, 2008, through December 31, 2009. Again, the  
17 Commission made clear that approval of the \$160 million cap was not  
18 approval of any particular activities being undertaken or any particular costs  
19 being incurred during that period of time. *See* Ordering Paragraph 2. No  
20 specific activities or costs were approved, and all activities and expenditures  
21 were to be subject to later determinations as to their prudence and  
22 reasonableness.

23 The third order was issued on August 5, 2011, and is referred to hereinafter  
24 as the 2011 Order. This order arose from DEC's request for approval to  
25 incur an additional \$229 million of project development costs from January  
26 1, 2010, to December 31, 2013. DEC indicated that the total cumulative



1 amount would be \$459 million (including AFUDC) through December 31,  
2 2013, which DEC stated would “help ensure Lee Nuclear Station remains  
3 on schedule to serve customer needs in the 2021 timeframe.” *See* Amended  
4 Application of Duke Energy Carolinas, LLC for Approval of Decision to  
5 Incur Nuclear Generation Project Development Costs, Docket No. E-7, Sub  
6 819 (Nov. 15, 2010), at 2. DEC later changed the amount of additional  
7 project development cost for which approval was sought to \$287 million.  
8 *See* Amended Application of Duke Energy Carolinas, LLC for Approval of  
9 Decision to Incur Nuclear Generation Project Development Costs, Docket  
10 No. E-7, Sub 819 (Dec. 6, 2010), at 1. DEC also changed the total  
11 cumulative project development cost estimate to \$455 million. *See*  
12 Amended Application of Duke Energy Carolinas, LLC for Approval of  
13 Decision to Incur Nuclear Generation Project Development Costs, Docket  
14 No. E-7, Sub 819 (Apr. 5, 2011), at 2.

15 The Commission’s 2011 Order held that:

16 [I]n light of Duke’s position that it will not proceed with  
17 construction absent legislation allowing recovery of  
18 CWIP financing costs outside a general rate case, and the  
19 fact that no such legislation was then pending before the  
20 General Assembly, it is not appropriate to approve DEC’s  
21 application at this time. (2011 Order at 20; also at 22)

22 In addition, the 2011 Order stated that “it is not appropriate in this  
23 proceeding, as requested in Duke’s application, to approve a total  
24 cumulative amount of nuclear project development costs.” *Id.* at 21,  
25 Finding of Fact No. 10. Instead, the approval granted by the 2011 Order

1 was “limited to Duke’s decision to incur only those nuclear project  
2 development costs that must be incurred to maintain the status quo with  
3 respect to the Lee Nuclear Station, including Duke’s COL application at the  
4 NRC” (*see id.* at 22, Ordering Paragraph 1), and the Commission’s approval  
5 was limited to costs incurred on or after January 1, 2011, subject to a not-  
6 to-exceed cap of the North Carolina allocable portion of \$120 million. *See*  
7 *id.* at 22, Ordering Paragraph 2.

8 Consistent with its prior orders, the Commission specifically found in the  
9 2011 Order that the \$120 million not-to-exceed cap was not approval to  
10 spend up to the North Carolina allocable portion of that amount, nor was it  
11 approval of any specific type or amount of nuclear project development  
12 costs. Instead, all activities and expenditures were made subject to later  
13 determinations as to their prudence and reasonableness. *See id.* at 22,  
14 Ordering Paragraph 3. To drive home the point, the Commission stated that  
15 DEC was “on notice” that the Commission’s limited approval could not be  
16 interpreted as making it probable at that time that the recovery of any  
17 specific actual costs would be allowed. *See id.* at 23, Ordering Paragraph 6.

18 **Q. HAVE YOU PREPARED A TABULAR SUMMARY OF THESE**  
19 **REQUESTS FROM DEC AND OF THE COMMISSION ORDERS?**

20 A. Yes, Table 1 provides this summary.

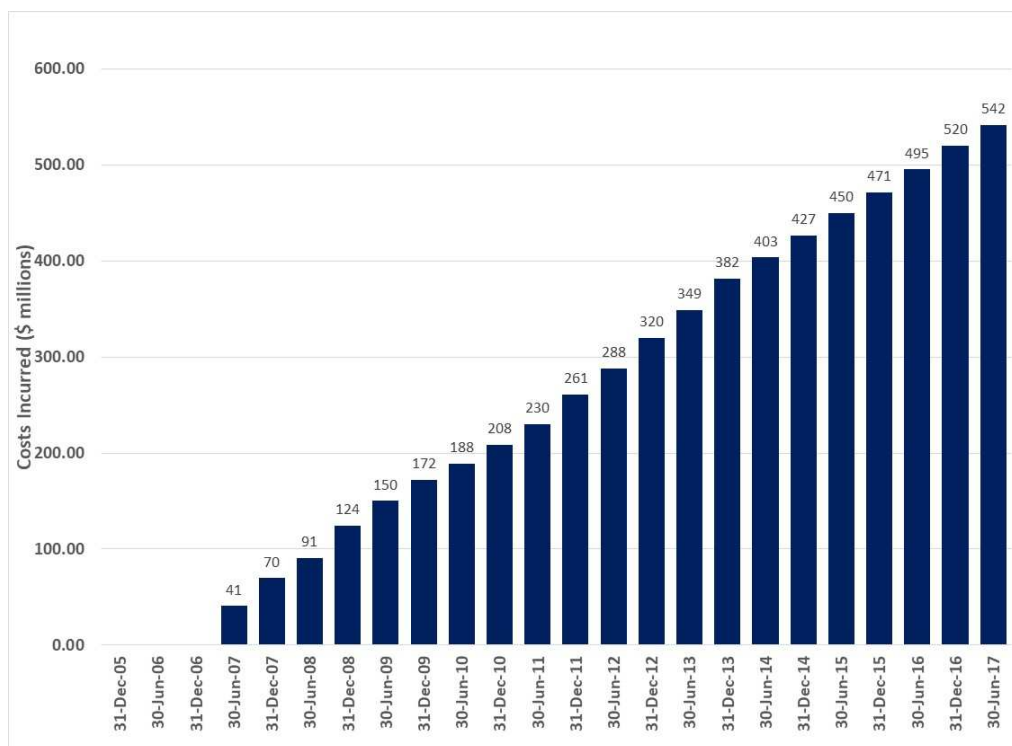
21

**Table 1 – Commission Orders and DEC applications related to Lee nuclear project**

<b>DEC Filing / Order</b>	<b>Summary</b>
Application for Authority to recover Nuclear Generation Development Expenses, September 20, 2006	DEC requested that the Commission issue an Order finding that activity to “ensure the availability of nuclear generation” is prudent and that the prudently incurred costs may be recovered in a future rate case. DEC estimated that “as much as \$125 million” could be spent before a Certificate of Public Convenience and Necessity (CPCN) is granted.
Order Issuing Declaratory Ruling, March 20, 2007	DEC granted authority to incur costs through December 31, 2007 not to exceed the North Carolina allocable portion of Duke’s share of \$125 million.
Application for Approval of Decision to Incur Continued Nuclear Generation Project Development Costs, December 7, 2007	DEC stated that about \$70 million had been incurred through December 31, 2007, and requested approval to incur additional costs of up to \$160 million during the period from January 1, 2008 through December 31, 2009.
Order Approving Decision to Incur Project Development Costs, June 11, 2008	DEC authorized to incur additional costs between January 1, 2008, and December 31, 2009, up to a North Carolina allocable share of total development costs of \$160 million
Application for Approval of Decision to Incur Nuclear Generation Project Development Costs, November 15, 2010	DEC requests approval to incur an additional \$229 million in costs from January 1, 2010, through December 31, 2013. Based on DEC reporting that \$172 million in costs were incurred through December 31, 2009; the total amount requested was \$459 million.
Order Approving Decision to Incur Limited Additional Project Development Costs, August 5, 2011	Commission rejects DEC’s request for cumulative approval and limits DEC to only those costs that must be incurred to maintain the status quo, up to a maximum of the North Carolina allocable portion of \$120 million, on or after January 1, 2011.

1           **Q.     WHAT COSTS HAS DEC REPORTED AS HAVING BEEN**  
2                       **INCURRED IN CONNECTION WITH THE LEE NUCLEAR**  
3                       **PROJECT?**

4           A.     Based on DEC’s semi-annual filings in Docket No. E-7, Sub 819, the  
5                       cumulative total costs, including AFUDC, incurred by DEC related to the  
6                       Lee nuclear project are shown in Figure 1 below.

**Figure 1 - DEC reported costs incurred on Lee nuclear project**

1       **Q.     WHAT ARE THE KEY ASPECTS OF THE COMMISSION’S**  
 2       **ORDERS SUMMARIZED ABOVE WITH RESPECT TO YOUR**  
 3       **TESTIMONY?**

4       **A.**   The Commission consistently ruled in each of the three orders that its  
 5       findings and conclusions with respect to DEC’s applications did not  
 6       constitute approval to engage in any specific project development activities  
 7       nor to incur costs for these activities. The 2011 Order explicitly stated that  
 8       “[n]o specific costs or activities have ever been approved in these  
 9       proceedings, and all activities and expenditures will be subject to later  
 10      determinations as to their reasonableness and prudence.” *See* 2011 Order  
 11      at 21. In addition, the 2008 Order and 2011 Order each put DEC on notice

1           that approval of DEC's decision to incur project development costs could  
2           not be interpreted as making it probable that the recovery of any specific  
3           actual costs would be allowed.

4           **Q.    HOW DID THE COMMISSION'S 2011 ORDER DIFFER FROM**  
5           **THE PRIOR ORDERS?**

6           A.    The 2011 Order did not approve DEC's application and instead imposed  
7           limitations on DEC's spending as a result of DEC's testimony during the  
8           hearing that it would not proceed with construction of the Lee nuclear  
9           project absent a CWIP financing statute being enacted in North Carolina.  
10          Rather than approving DEC's request for an additional \$287 million (now  
11          \$283 million after DEC adjustments) from January 1, 2010, through  
12          December 31, 2013, the 2011 Order rejected the request and limited its  
13          decision to only those nuclear project development costs that must be  
14          incurred to maintain the status quo.

15          **Q.    WHAT IS THE SIGNIFICANCE OF THE REFERENCE TO**  
16          **MAINTAINING THE "STATUS QUO" IN THE 2011 ORDER?**

17          A.    This is the critical language in the 2011 Order. My understanding is that  
18          the Commission's use of the phrase "maintain the status quo" was intended  
19          to reflect the Commission's finding that DEC did not intend to proceed with  
20          construction absent legislation that has not been enacted and that, as a result,  
21          the Lee nuclear project had become merely a potential resource option to be  
22          pursued when and if such CWIP legislation were enacted. The Lee nuclear

1 project was not an approved generation project or even a generation project  
2 for which a CPCN application had been filed as of the time of the 2011  
3 Order (or filed at any time between then and now). The Commission, by  
4 using this term, makes a distinction between (a) activities necessary to  
5 preserve the work that had already been done on the Lee nuclear project  
6 option, including activity related to the COL application with the NRC (i.e.,  
7 continuing the existing state of things); and (b) activities that went beyond  
8 the minimum necessary to preserve the status quo, including activities to  
9 obtain NRC approval of the Lee nuclear project COL application and  
10 activities related to preparations for the actual construction and operation of  
11 the Lee nuclear project. The first set of activities falls within the scope of  
12 the Commission's general authorization in the 2011 Order; the second set  
13 does not. The Commission's use of the term "status quo" suggests that the  
14 only decisions to incur costs and the activities associated therewith were  
15 those minimal activities necessary for the project to stay in place and the  
16 status of the NRC COL application be maintained as of 2011. This  
17 interpretation is confirmed by the order's emphasis on DEC's testimony that  
18 it had no intention to construct the project unless and until CWIP legislation  
19 was enacted in North Carolina—and no evidence was presented regarding  
20 the feasibility or likelihood of such legislation being enacted. In this regard,  
21 the 2011 Order appears not to have approved the incurrence of costs  
22 associated with additional work to obtain NRC approval of the Lee nuclear

1 project COL application, given the fact that DEC had no intention to  
2 construct the plant.

3 **Q. DID DEC LIMIT ITS SPENDING TO THE NOT-TO-EXCEED CAP**  
4 **SET BY THE COMMISSION IN THE 2011 ORDER?**

5 A. No. Despite the limitations imposed in the Commission's 2011 Order, DEC  
6 continued to incur costs for activities related to the Lee nuclear project  
7 beyond those needed to maintain the status quo and even to the point of  
8 exceeding the not-to-exceed cap on spending established by the  
9 Commission. The costs incurred on or after January 1, 2011, are \$333  
10 million, which brings the total system cost incurred, including AFUDC, as  
11 of June 30, 2017, to \$542 million. *See* Direct Testimony of DEC Witness  
12 Fallon at page 4, line 12.

13 **IV. DEC REQUEST TO RECOVER LEE NUCLEAR**  
14 **PROJECT COSTS**

15 **Q. WHAT ARE THE TOTAL COSTS THAT DEC SEEKS TO**  
16 **RECOVER FOR THE LEE NUCLEAR PROJECT?**

17 A. The total amount DEC is seeking to recover is "approximately \$542 million  
18 through June 30, 2017" in total system costs for the Lee nuclear project. *See*  
19 Direct Testimony of DEC Witness Fallon at page 4, line 12. The share of  
20 this total system costs to be recovered from DEC's North Carolina retail  
21 customers, as of the time it filed its application for a rate increase, is \$353.2  
22 million. *See* Direct Testimony of DEC Witness Fallon at page 5, lines 2-3.

1           **Q.     WHICH COSTS ARE THE FOCUS OF YOUR TESTIMONY?**

2           A.     My testimony is focused on those costs that were incurred by DEC on the  
3                   Lee nuclear project during 2007, 2008, 2009, 2010, and between  
4                   January 1, 2011, and June 30, 2017.

5           **Q.     WHAT IS YOUR POSITION REGARDING THE AMOUNTS, IF**  
6                   **ANY, THAT DEC SHOULD BE PERMITTED TO RECOVER IN**  
7                   **THIS PROCEEDING FOR PERIODS UP TO DECEMBER 31, 2009?**

8           A.     For the period January 1, 2007, to December 31, 2007, the period  
9                   represented by the 2007 Order, DEC should be permitted to recover no more  
10                  than the North Carolina allocable share of its actual spending (including  
11                  AFUDC), to the extent that this actual spending (including AFUDC) does  
12                  not exceed \$125 million in total system costs. Similarly, for the period  
13                  January 1, 2008, to December 31, 2009, the period represented by the 2008  
14                  Order, DEC should be permitted to recover no more than the North Carolina  
15                  allocable share of actual spending (including AFUDC), to the extent that  
16                  this actual spending (including AFUDC) does not exceed \$160 million in  
17                  total system costs.

18                Based on the semi-annual reports filed by DEC, the actual, unadjusted  
19                expenditures in these time periods were \$69,444,571 and \$102,358,408  
20                respectively, including AFUDC. The maximum that DEC should be  
21                permitted to recover for the period January 1, 2007 to December 31, 2009,



1                   therefore, is the North Carolina allocable share of \$172,002,979, including  
2                   AFUDC.

3           **Q.    WHAT IS YOUR POSITION REGARDING THE AMOUNTS, IF**  
4           **ANY, DEC SHOULD BE PERMITTED TO RECOVER IN THIS**  
5           **PROCEEDING FOR 2010?**

6           A.    DEC should not be permitted to recover any costs incurred during 2010, as  
7           no prior authorization of its decision to incur costs was sought for  
8           expenditures in that period, and DEC's request for retroactive approval for  
9           that period was denied in the 2011 Order.

10          **Q.    WHAT IS YOUR POSITION REGARDING THE AMOUNTS, IF**  
11          **ANY, DEC SHOULD BE PERMITTED TO RECOVER IN THIS**  
12          **PROCEEDING FOR THE PERIOD FROM JANUARY 1, 2011, TO**  
13          **JUNE 30, 2017?**

14          A.    DEC should not be permitted to recover any costs incurred after January 1,  
15          2011, that are not associated with the maintenance of the "status quo," as  
16          such costs were not reasonably and prudently incurred and, in any event,  
17          are outside the Commission's determination.

18          **Q.    IS IT POSSIBLE TO ACCURATELY IDENTIFY WHICH COSTS**  
19          **DEC INCURRED TO "MAINTAIN THE STATUS QUO" FOR THE**  
20          **LEE NUCLEAR PROJECT?**

1           A.    No. It is not possible to accurately identify those costs incurred in  
2                   connection with maintenance of the status quo as DEC either misunderstood  
3                   or disregarded the limitations of the 2011 Order and has not produced  
4                   records corresponding to this limitation on the project development costs  
5                   incurred by DEC in this period. As a result, I believe there are two  
6                   regulatory outcomes that are reasonable under these circumstances:

7                   (1) The Commission may wish to deny recovery of all costs incurred by  
8                   DEC on the Lee nuclear project on or after January 1, 2011. The basis of  
9                   such a decision would reflect the failure of DEC to prove that the activities  
10                  undertaken after January 1, 2011, were required to maintain the status quo.

11                  (2) The Commission may wish to allow DEC to recover only those costs  
12                  directly related to COL application approval. Based on my review of the  
13                  cost information produced by DEC (as discussed below), I conclude that a  
14                  maximum of \$73,111,397, without AFUDC, was spent on Type 1 activities  
15                  between January 1, 2011, and June 30, 2017. While I do not agree that  
16                  maintaining the status quo included DEC's prosecuting the COL application  
17                  to approval, to the extent these Type 1 activity costs do not exceed the not-  
18                  to-exceed cap, these costs could be considered a reasonable approximation  
19                  of the costs necessary to maintain "status quo." If this latter course were to  
20                  be taken by the Commission, DEC could be allowed to recover the North  
21                  Carolina allocable share of \$73,111,397.

1 If the Commission does not adopt either of these two regulatory outcomes,  
2 it should only allow DEC to recover costs up to the not-to-exceed cap in the  
3 2011 Order, the North Carolina allocable share of \$120 million (including  
4 AFUDC) for the period after January 1, 2011.

5 **V. DEC ACTIVITY ON OR AFTER JANUARY 1, 2011**

6 **Q. WHY IS JANUARY 1, 2011, A RELEVANT DATE?**

7 A. This is the date after which the Commission, in the 2011 Order, limited its  
8 approval of DEC's decision to incur to only those costs that had to be  
9 incurred to maintain the status quo, and subjected even that limited approval  
10 to a not-to-exceed cap.

11 **Q. WHAT ACTIVITIES DID DEC UNDERTAKE RELATED TO THE**  
12 **LEE NUCLEAR PROJECT?**

13 A. According to the semi-annual reports submitted by DEC in Docket E-7,  
14 Sub 819, and the testimony of DEC witness Fallon at pages 29-33 and in  
15 the table on page 28, DEC engaged in multiple activities related to the Lee  
16 nuclear project, including "COLA Preparation;" "NRC Review and Hearing  
17 Fees;" "Land and Right-of-Way Purchases;" "Pre-construction and Site  
18 Preparation;" "Supply Chain, Construction Planning, and Detailed  
19 Engineering;" "Operational Planning;" and "Post COL." These activities  
20 can be grouped into two types.

21

1           **Q.     WHAT ARE THESE TWO TYPES OF ACTIVITY?**

2           A.     The first type (Type 1) of activity is related to the COL application for the  
3                   Lee nuclear project under review by the NRC, and the second type (Type 2)  
4                   of activity is related to preparation for the eventual construction and  
5                   operation of the of the Lee nuclear project.

6           **Q.     WHAT SPECIFIC ACTIVITIES ARE IN TYPE 1?**

7           A.     The Type 1 activities include “COLA Preparation;” “NRC Review and  
8                   Hearing Fees;” and “Post COL.” These are related to the NRC review of the  
9                   Lee COL application.

10          **Q.     DO DEC’S RECORDS ALLOW YOU TO DRAW A DISTINCTION**  
11               **BETWEEN THOSE TYPE I ACTIVITIES THAT WERE RELATED**  
12               **TO MAINTAINING THE STATUS QUO OF THE COL**  
13               **APPLICATION AND THOSE ACTIVITIES THAT WERE TAKEN**  
14               **TO PERFECT THE APPLICATION?**

15          A.     No. The data DEC has put in the record and the data that I have been  
16                   provided in discovery do not permit me to draw these distinctions. As  
17                   discussed above, the Commission’s 2011 Order did not contemplate  
18                   recovery of expenditures to complete NRC review and approval of the Lee  
19                   nuclear project COL application. For present purposes I have grouped all  
20                   Type I costs together but, in reality, some portion of these costs are not  
21                   recoverable under the 2011 Order.

1           **Q.     WHAT SPECIFIC ACTIVITIES ARE IN TYPE 2?**

2           A.     The Type 2 activities include “Land and Right-of-Way Purchases;” “Pre-  
3                   construction and Site Preparation;” “Supply Chain, Construction Planning,  
4                   and Detailed Engineering;” and “Operational Planning.”

5           **Q.     WERE TYPE 2 ACTIVITIES REQUIRED TO MAINTAIN THE**  
6                   **STATUS QUO OF THE LEE COL APPLICATION?**

7           A.     It is important to consider Type 2 activities in two phases. In the first phase,  
8                   prior to January 1, 2011, some of the Type 2 activities and the costs for  
9                   undertaking these activities were required as a part of preparing, and filing,  
10                  the Lee nuclear project COL application in 2007 and pursuing the  
11                  application thereafter. *See* DEC Response to Tech Customers Data Request  
12                  No. 4-22 (attached as Exhibit EDK-2). In the second phase, on or after  
13                  January 1, 2011, the Type 2 activities were, at most, indirectly related to the  
14                  NRC COL review process, but were undertaken in preparation for the  
15                  eventual construction and operation of the Lee nuclear project.

16          **Q.     DOES DEC PROVIDE A DETAILED DESCRIPTION OF THESE**  
17                  **TYPE 2 ACTIVITIES?**

18          A.     Yes. The semi-annual reports by DEC on the Lee nuclear project spending  
19                  include a description of each of the categories of activity and costs.

**Discussion of Each Cost Category**

**Q. HAVE YOU EXAMINED EACH OF THE TYPE 2 COST/ACTIVITY CATEGORIES?**

A. Yes.

**Q. WHAT ACTIVITIES DOES THE “LAND AND RIGHT-OF-WAY PURCHASES” CATEGORY INCLUDE?**

A. Based on the DEC August 2017 semi-annual report, this category includes:

[T]he purchase of land required for the Lee site and rail right-of-ways (sic). [This] Category also includes cost of purchasing additional land for a supplemental cooling pond in event of severe drought, as well as costs for surveying the selected transmission right-of-way.

This category included activities related to “Site Evaluation” that were included in reports prior to August 2011. According to the August 2011 DEC filing, “With work complete and its overall small cost impact, the ‘Site Evaluation’ task has been incorporated into the ‘Land and Right of Way’ task.”

**Q. WERE THE ACTIVITIES AND COSTS INCURRED FOR “LAND AND RIGHT-OF-WAY PURCHASES” CATEGORY DURING THE PERIOD FROM JANUARY 1, 2011, TO JUNE 30, 2017, REQUIRED TO MAINTAIN THE STATUS QUO OF THE COL APPLICATION?**

A. There is no indication of this in the DEC filings. The DEC response to Tech Customers Data Request No. 4-22 states that DEC “had to own the land” in

1 order to proceed with the Lee nuclear project, but DEC has failed to show  
2 that activity in this period was required for NRC COL review, much less  
3 approval. My assessment is that the activities and costs incurred for the  
4 “Land and Right-Of-Way Purchases” category during the period from  
5 January 1, 2011, to June 30, 2017, were primarily related to preparation for  
6 the eventual construction and operation of the Lee nuclear project, not to  
7 the NRC COL application review process.

8 **Q. WHAT ACTIVITIES DOES THE “PRE-CONSTRUCTION AND**  
9 **SITE PREPARATION” CATEGORY INCLUDE?**

10 A. Based on DEC’s August 2017 semi-annual report, this category includes:

11 [S]ite activities to both maintain the site and prepare the site  
12 for construction. Site preparation activities included:  
13 dewatering and cleanup of the excavated area, site  
14 remediation activities required to identify and properly  
15 dispose of hazardous wastes, and costs associated with the  
16 demolition and removal of unusable structures. Necessary  
17 maintenance of existing rail bed and required Make-up  
18 Pond B spillway repair were completed. Engineering of  
19 offsite infrastructure for potable water, sewer, and rail spur;  
20 and, geotechnical evaluations (needed for engineering)  
21 have been completed. Engineering for bringing  
22 communications to the site is also included in this category.  
23 Engineering of necessary traffic improvements was brought  
24 to 85% completion by December 2013. Ongoing and  
25 continuing activities include: site security, utilities and  
26 miscellaneous site maintenance.

27 **Q. WERE THE ACTIVITIES AND COSTS INCURRED FOR**  
28 **ACTIVITIES IN THE “PRE-CONSTRUCTION AND SITE**  
29 **PREPARATION” CATEGORY DURING THE PERIOD FROM**

**JANUARY 1, 2011, TO JUNE 30, 2017, REQUIRED TO MAINTAIN  
THE STATUS QUO OF THE COL APPLICATION?**

A. There is no indication of this in the DEC filings. The DEC response to Tech Customers Data Request No. 4-22 states: “Cherokee nuclear unit structure demolition and removal activities were necessary to provide access to the Cherokee nuclear foundation. The Cherokee nuclear foundation was then tested and characterized as a suitable foundation for the Lee nuclear units. A description of the foundation testing and characterization was included as part of the Lee COL application.” The Lee nuclear project COL application was filed in 2007. My assessment is that the activities and costs incurred for the “Pre-construction and Site Preparation” category during the period from January 1, 2011, to June 30, 2017, were primarily related to preparation for the eventual construction and operation of the Lee nuclear project, not to the NRC COL application review process.

**Q. WHAT ACTIVITIES DOES THE “SUPPLY CHAIN,  
CONSTRUCTION PLANNING AND ENGINEERING” CATEGORY  
INCLUDE?**

A. Based on DEC’s August 2017 semi-annual report, this category includes:

[A]ctivities associated with working with the supplier to negotiate an Engineering, Procurement and Construction (EPC) agreement. Negotiations in 2008 did not result in an executed contract. Conceptual site specific (sic) engineering and construction planning activities necessary to develop a complete project definition are included in this category. Continuing construction planning activities serve to further develop construction plans and keep the construction plans



1 in line with latest engineering. Detailed site specific (sic)  
2 engineering began in January 2011 and was brought to 70%  
3 completion in December 2013. Commercial building design  
4 activities started in June 2012. Design of the first six  
5 commercial buildings was completed in December 2013.

6 **Q. WERE THE ACTIVITIES AND COSTS INCURRED FOR “SUPPLY**  
7 **CHAIN, CONSTRUCTION PLANNING AND ENGINEERING”**  
8 **CATEGORY DURING THE PERIOD FROM JANUARY 1, 2011, TO**  
9 **JUNE 30, 2017, REQUIRED TO MAINTAIN THE STATUS QUO OF**  
10 **THE COL APPLICATION?**

11 A. There is no indication of this in the DEC filings. The DEC response to Tech  
12 Customers Data Request No. 4-22 states: “Engineering and design of the  
13 Lee site specific systems were inputs to the Lee site specific FSAR (Final  
14 Safety Analysis Report) which was updated annually as part of the COL  
15 application.” The Lee nuclear project COL application was filed in 2007,  
16 and this DEC response does not indicate how much of the activity in this  
17 category during the period from January 1, 2011, to June 30, 2017 was  
18 required for the COL application review. My assessment is that the  
19 activities and costs incurred for “Supply Chain, Construction Planning and  
20 Engineering” category during the period from January 1, 2011, to June 30,  
21 2017, were primarily related to preparation for the eventual construction  
22 and operation of the Lee nuclear project, not to the NRC COL application  
23 review process.

1           **Q.     WHAT ACTIVITIES DOES THE “OPERATIONAL PLANNING”**  
2           **CATEGORY INCLUDE?**

3           A.     Again, based on DEC’s August 2017 semi-annual report, the “operational  
4           planning” category includes:

5                     [A]ctivities associated with operator and plant staff training,  
6                     including costs associated with the Knowledge and Abilities  
7                     Catalog, required for operator license examinations for  
8                     AP1000 plants, and the standardization of the nomenclature  
9                     in the Westinghouse Master Equipment List (MEL).  
10                    Continuing activities include: supporting operations  
11                    program development, such as Quality Assurance (QA)  
12                    Program, and the review of approximately 500 procedures.  
13                    The training materials, operational programs, and operating  
14                    procedures are all being developed in concert with other  
15                    AP1000 utilities within the APOG framework. The  
16                    Operational Planning category also includes generation of  
17                    administrative procedures that must be in place upon receipt  
18                    of COL from NRC.

19          **Q.     WERE THE ACTIVITIES AND COSTS INCURRED FOR**  
20          **“OPERATIONAL PLANNING” CATEGORY DURING THE**  
21          **PERIOD FROM JANUARY 1, 2011, TO JUNE 30, 2017, REQUIRED**  
22          **TO MAINTAIN THE STATUS QUO OF THE COL APPLICATION?**

23          A.     There is no indication of this in the DEC filings. The DEC response to Tech  
24          Customers Data Request No. 4-22 states: “Development of the Lee Nuclear  
25          Emergency Plan was accomplished as part of this spending category. The  
26          Emergency Plan was part of the Lee COL application.” My assessment is  
27          that the activities and costs incurred for “Operational Planning” category  
28          during the period from January 1, 2011, to June 30, 2017, were only related

1 to preparation for the eventual construction and operation of the Lee nuclear  
2 project, not to the NRC COL application review process.

3 **Q. DID DEC'S DESCRIPTIONS OF THESE COST CATEGORIES**  
4 **CHANGE OVER TIME?**

5 A. Yes. I have used the category descriptions from the August 2017 DEC  
6 semi-annual filing. The descriptions used in DEC's semiannual reports over  
7 the period from January 1, 2011, to June 30, 2017, are similar, but they are  
8 not identical. My review of all DEC filings during this period show that the  
9 descriptions in later filings included additional details and status updates for  
10 the same activities. Also, the "Site Evaluation" category was included as a  
11 separate category in early reports, but was, as discussed above, rolled into  
12 the "Land and Right-of-Way Purchases" category in August 2011. The  
13 "Post COL" category was added in 2017. These minor changes to activity  
14 category descriptions do not change my analysis or conclusions.

15 **Costs by Activity Type**

16 **Q. HOW MUCH DID DEC SPEND ON THE TYPE 1 AND TYPE 2**  
17 **ACTIVITIES?**

18 A. Using the data provided by DEC's witness Fallon at page 28, the total  
19 amount spent on these activities through June 30, 2017, divided into the two  
20 types of costs I discussed above, is shown in Table 2 below. This Table  
21 also shows the total amount for AFUDC, which DEC has reported as a

1 separate item (i.e., all AFUDC for all cost categories), rather than reporting  
2 each cost category with the AFUDC for that category included, as was done  
3 in DEC reports prior to January 1, 2010.

**Table 2 – DEC Amounts Expended through June 30, 2017**

<b>Category of Cost</b>	<b>Dollars Expended through June 30, 2017 on System-Wide Basis</b>
<b>Type 1 - COL Review</b>	<b>\$154 million</b>
COLA Preparation	\$28 million
NRC Review and Hearing Fees	\$125 million
Post COL	\$1 million
<b>Type 2 – Preparation for construction and operation</b>	<b>\$156 million</b>
Land and Right-of-Way Purchases	\$45 million
Pre-construction and Site Preparation	\$47 million
Supply Chain, Construction Planning, and Detailed Engineering	\$57 million
Operational Planning	\$7 million
<b>AFUDC (for all activities)</b>	<b>\$232 million</b>

4 **Q. HOW MUCH OF THE TOTAL AMOUNTS IN TABLE 2 DID DEC**  
5 **EXPEND IN THE PERIOD BETWEEN JANUARY 1, 2011, AND**  
6 **JUNE 30, 2017?**

- 1           A.       Using the amounts in the DEC report to the Commission on August 1,  
 2                   2011,<sup>1</sup> I prepared Table 3 to show the amounts spent by DEC by type of  
 3                   activity during the relevant period.

**Table 3 – DEC Amounts Expended between December 31, 2011, and June 30, 2017**

Category of Cost	Dollars Expended on System-Wide Basis		
	Through June 30, 2017 <i>[Col a]</i>	Through January 1, 2011 <i>[Col b]</i>	On or after January 1, 2011 <i>[Col a minus Col b]</i>
<b>Type 1 - COL Review</b>	<b>\$154 million</b>	<b>\$81 million</b>	<b>\$73 million</b>
COLA Preparation	\$28 million	\$27 million	\$1 million
NRC Review and Hearing Fees	\$125 million	\$54 million	\$71 million
Post COL	\$1 million	\$0 million	\$1 million
<b>Type 2 – Preparation for construction and operation</b>	<b>\$156 million</b>	<b>\$89 million</b>	<b>\$67 million</b>
Land and Right-of-Way Purchases	\$45 million	\$43 million	\$2 million
Pre-construction and Site Preparation	\$47 million	\$22 million	\$25 million
Supply Chain, Construction Planning, and Detailed Engineering	\$57 million	\$22 million	\$35 million
Operational Planning	\$7 million	\$2 million	\$5 million
<b>AFUDC</b>	<b>\$232 million</b>	<b>\$39 million</b>	<b>\$193 million</b>
<b>TOTAL</b>	<b>\$542 Million</b>	<b>\$208 million</b>	<b>\$333 million</b>

<sup>1</sup> Duke Energy Carolinas' Report of Nuclear Development Activities and Expenditures for the period January 1, 2011, through June 30, 2011, Docket No. E-7, Sub 819 (Aug. 1, 2011).

1           **Q.     WHAT CONCLUSIONS DO YOU REACH BASED ON TABLE 3?**

2           A.     The total amount spent on or after January 1, 2011, \$333 million, is much  
3                   greater than the \$120 million not-to-exceed cap in the 2011 Order.

4           **Q.     WHAT DOES DEC SAY ABOUT THE AMOUNTS SPENT DURING**  
5                   **THIS PERIOD?**

6           A.     DEC witness Fallon appears to be taking the position that DEC would have  
7                   had to suspend “the pursuit of the COL” to avoid exceeding the not-to-  
8                   exceed cap, which he refers to as “the preauthorization amount.” Mr. Fallon  
9                   states:

10                           To suspend the pursuit of the COL with the NRC because  
11                           the preauthorization amount had been reached would have  
12                           eliminated the benefit of DE Carolina’s efforts to decrease  
13                           the long lead time for new nuclear plant construction by  
14                           forfeiting DE Carolina’s place ‘in line’ for its COLA review  
15                           when it had already completed a significant portion of the  
16                           requirements necessary to obtain a COL.<sup>2</sup>

17           **Q.     AS TO MR. FALLON’S STATEMENT, DO YOU BELIEVE IT IS**  
18                   **APPROPRIATE TO REFER TO THE COMMISSION’S NOT-TO-**  
19                   **EXCEED CAP AS A “PREAUTHORIZATION AMOUNT”?**

20           A.     No. Based on my review of the Commission’s 2011 Order, it is clear that  
21                   the Commission did not set a “preauthorization amount” related to spending  
22                   by DEC on the Lee nuclear project. Instead, the Commission put a not-to-

---

<sup>2</sup> Page 21, lines 7-13, Fallon Testimony filed on August 25, 2017.

1           exceed cap on total costs incurred on or after January 1, 2011, and stated  
2           that approval of a not-to-exceed cap was not approval to spend up to the  
3           amount of the cap. The Commission further stated that no specific activities  
4           or costs were approved and that all activities and expenditures will be  
5           subject to later determinations as to prudence and reasonableness.

6           **Q.    MORE FUNDAMENTALLY, WHAT IS YOUR REACTION TO**  
7           **DEC’S EXPLANATION OF ITS DECISION TO DISREGARD THE**  
8           **COMMISSION’S SPENDING CAPS?**

9           A.    It is difficult for me to square Mr. Fallon’s explanation with the language  
10           of the 2011 Order. First, the Commission only authorized maintenance of  
11           the status quo—which necessarily entails suspension of activities other than  
12           those necessary to keep the application alive (or, alternatively, engaging in  
13           those activities without an expectation of receiving compensation for them  
14           from ratepayers). It appears from Mr. Fallon’s statement that DEC  
15           disagreed with the Order’s restrictions, but I do not believe that any such  
16           disagreement would be a sound regulatory basis for disregarding the  
17           directive of the order. Second, Mr. Fallon’s statement appears to assume  
18           that all activities undertaken and costs incurred by DEC during the post-  
19           2010 period were required as a part of DEC’s effort to maintain the “status  
20           quo” with respect the Lee COL application. As

1           A.     Table 3 shows, only a maximum of \$73 million without AFUDC (estimated  
2                   to be \$164 million with AFUDC<sup>3</sup>) was spent on Type 1 activities (i.e., NRC  
3                   review of the Lee COL application). Even accepting, for the sake of  
4                   argument that DEC's interpretation of maintaining the "status quo" is  
5                   correct, DEC could have reduced or eliminated the spending on Type 2  
6                   activities (i.e., preparation for construction and operation of the Lee nuclear  
7                   project) with limited or no impact on the NRC COL review process.  
8                   Finally, there were multiple ways for DEC to modify the NRC licensing  
9                   approach to maintain the 2011 COL application status quo with lower costs.

10          **Q.     IS THERE ANY VALIDITY TO DEC'S CLAIM THAT IT WOULD**  
11                   **HAVE FORFEITED ITS PLACE 'IN LINE' FOR ITS COL**  
12                   **APPLICATION REVIEW AS A RESULT OF LOWER SPENDING**  
13                   **ON THE LEE NUCLEAR PROJECT?**

14          A.     No. As a starting point, the NRC does not have a formal queue process for  
15                   COL applications. DEC concedes this in its response to data requests. *See*  
16                   DEC Response to Tech Customers Data Requests 4-12, 4-14, and 4-19  
17                   (attached as Exhibit EDK-3). If one assumes that DEC's reference to the  
18                   "line" for NRC COL reviews was a shorthand reference to the potential for  
19                   delay should the NRC put the Lee application aside to work on another, the

---

<sup>3</sup> The DEC reporting approach since June 30, 2010, has only presented AFUDC as a single amount that covers all categories of costs. This amount is based on my independent estimate of category-specific AFUDC amounts.



1 reality was that the Lee nuclear project was near the bottom of the stack of  
2 applications anyway. Approval of the Lee COL application was received in  
3 December 2016, after most other (i.e., 15 of 18) COL applications had been  
4 approved, suspended or withdrawn. Only two COL applications (i.e., North  
5 Anna 3 and Turkey Point 6&7) remained under review by the NRC after  
6 the Lee COL application was approved. DEC's expenditures on Type 1  
7 activities cannot be justified on the basis of a need to maintain a "place in  
8 line" for the Lee nuclear project in the NRC COL review process.

9 **Q. COULD DEC HAVE REDUCED SPENDING ON TYPE 1**  
10 **ACTIVITIES FOR THE LEE COL APPLICATION?**

11 A. Yes. The Lee nuclear project COL application status quo as of 2011 could  
12 have been maintained without much, or all, of this spending. DEC could  
13 have taken several approaches to reduce this spending, including suspension  
14 of the Lee nuclear project COL application.

15 **Q. WHAT ABOUT DELAYS IN RECEIVING AN APPROVED COL**  
16 **APPLICATION?**

17 A. As the above discussion shows, the "place in line" argument is not valid.  
18 While a reduction of spending on the Type 1 activities (i.e., NRC COL  
19 review activities) might have delayed Lee COL approval, DEC presents no  
20 evidence for the existence or extent of any delays that might have resulted  
21 from a reduction of spending on Type 1 activities. Given the reality that the  
22 Lee nuclear project was not approved until December 2016 and that this

1 date appears to be unrelated to any DEC actions related to the Lee nuclear  
2 project, the value of additional spending to ensure that the Lee nuclear  
3 project received a COL approval without delay is limited.

4 **Q. WHAT IS THE STATUS OF THE APPROVED LEE NUCLEAR**  
5 **PROJECT COL APPLICATION?**

6 A. DEC has “banked” the approved Lee nuclear project COL application for  
7 use in the future if and when the Lee nuclear project is actually built.

8 **Q. WHAT DOES IT MEAN TO “BANK” AN APPROVED COL**  
9 **APPLICATION?**

10 A. “Banking” an approved COL application means that the approved COL  
11 application is held (i.e., “banked”) until later, rather than proceeding to  
12 nuclear construction soon after COL approval is granted (e.g., as in the  
13 Vogtle or Summer nuclear projects) The NRC rules (see  
14 <https://www.nrc.gov/reactors/new-reactors/col.html>) state that an approved  
15 COL is valid for 40 years from the date of approval, with the potential to  
16 renew the COL for an additional 20 years. During the period after the COL  
17 is approved, however, issues may arise that will require a modification of  
18 the approved COL and will require a new review of the modified COL. The  
19 most important of these is a change in reactor design, either due to changes  
20 to the standard reactor design that was referenced in the COL application or  
21 due to changing to a new reactor design.

1           **Q.     WHAT WILL BE REQUIRED TO USE THE APPROVED / BANKED**  
2           **LEE COL IN THE FUTURE?**

3           A.     DEC received approval for the Lee COL application in December 2016.  
4                 This approved COL application reflects NRC approval for a combination of  
5                 the nuclear power plant site and the nuclear power plant reactor design. The  
6                 Lee COL refers to Revision 19 of the AP1000 standard reactor design. *See*  
7                 <https://www.nrc.gov/reactors/new-reactors/col/lee.html>. Assuming the Lee  
8                 nuclear project were to become viable again in the future, the approved /  
9                 banked COL application would likely be updated to reflect any updates to  
10                the AP1000 reactor design after Revision 19. The first-of-a-kind AP1000  
11                projects in the U.S. (i.e., the Vogtle 3 and 4 units) are not expected to be  
12                placed into commercial operation until after 2020 and the construction and  
13                testing process that will take place prior to commercial operation will likely  
14                lead to additional changes to the reactor design, resulting in one or more  
15                Revisions to the approved design that will replace Revision 19 referenced  
16                in the Lee nuclear project approved COL application. The AP1000 reactor  
17                design may no longer be available at the time DEC seeks to use the  
18                approved / banked Lee COL application. This might happen because newer  
19                and improved reactor designs replace the AP1000 reactor design or because  
20                the vendor, Westinghouse, is no longer offering this reactor design. In the  
21                absence of the AP1000 reactor design, DEC would be required to modify  
22                the approved / banked Lee COL to refer to a different approved standard  
23                reactor design and the NRC would have to review the modified COL

1 application before DEC could proceed to nuclear power plant construction.  
2 The likely need to modify the approved / banked Lee COL application,  
3 followed by NRC review of the modifications, reduces the value of the  
4 approved / banked Lee COL application. The additional time and cost to  
5 use the approved / banked Lee COL application in the future also negates  
6 DEC's purported efforts to "decrease the long lead time for new nuclear  
7 plant construction" in obtaining the 2016 approval of the Lee COL  
8 application.

9 **Q. COULD DEC HAVE SUSPENDED THE COL APPLICATION**  
10 **REVIEW FOR THE LEE NUCLEAR PROJECT?**

11 A. Yes. Like multiple other COL applications submitted by other companies,  
12 including the Shearon Harris COL application submitted by Duke Energy  
13 Progress, LLC, the Lee COL application could have been suspended. Such  
14 a suspension would have stopped or greatly reduced the spending on Type 1  
15 activities (i.e., NRC review activities) by DEC, consistent with maintaining  
16 the 2011 status quo for the Lee nuclear project.

17 **Q. HOW WOULD SUSPENSION OF THE LEE COL APPLICATION**  
18 **WORK?**

19 A. The activity and spending by DEC up to the point when the Lee COL  
20 application review was suspended would remain in place until DEC  
21 restarted NRC review of the application in the future. If, at the time that  
22 DEC were to restart the review of the suspended Lee COL application, the

1 situation with respect to the nuclear power plant site or the selected reactor  
2 design had changed, the suspended Lee COL application could be modified  
3 prior to the restart of NRC review. Importantly, costs DEC incurred in the  
4 period up to December 2016 to complete the Lee COL application review  
5 could have been deferred to a future date when (a) there was a clearer view  
6 as to viability of actually building the plant; (b) the NRC review could be  
7 restarted and completed; and (c) the details of a suspended Lee COL  
8 application could be modified to reflect the then current site factors and  
9 reactor design details prior to restarting NRC review

10 **Q. WOULD SUSPENSION OF THE LEE COL REVIEW HAVE**  
11 **CHANGED DEC SPENDING?**

12 A. Timely suspension of the Lee COL application would have allowed DEC to  
13 maintain the status quo of the COL application as of 2011 by stopping  
14 spending on NRC review of the Lee COL application review after 2011.  
15 This would also have delayed the costs of obtaining NRC approval of the  
16 Lee COL application until a future date when the Lee nuclear project was  
17 viable.

18 **Q. WOULD SUSPENSION OF THE LEE COL REVIEW HAVE**  
19 **LOWERED COSTS COMPARED TO UPDATING THE APPROVED**  
20 **/ BANKED COL WHEN USED?**

21 A. Yes. If and when the Lee nuclear project is actually built, some items in the  
22 Lee COL application (both in in a suspended Lee COL application and in

1 the approved / banked December 2016 COL application) likely would  
2 change. The suspended Lee COL would be modified prior to restarting  
3 NRC review and the approved / banked December 2016 COL would be  
4 modified prior to starting construction with another review by the NRC.  
5 Thus, suspension would have avoided duplication of NRC review of some  
6 issues (i.e., once in the process to gain the 2016 Lee COL application  
7 approval, then again when the approved / banked Lee COL application was  
8 modified and re-reviewed prior to construction). Suspending the Lee COL  
9 application could have been the low-cost alternative if DEC had made a  
10 timely suspension decision.

11 **Q. WERE OTHER OPTIONS AVAILABLE TO DEC TO LOWER THE**  
12 **COSTS RELATED TO THE LEE NRC LICENSING PROCESS?**

13 A. Yes. One such option would have involved DEC withdrawing the Lee COL  
14 application and using selected information from the filed Lee COL  
15 application in an Early Site Permit (ESP) application filing. An approved  
16 ESP application does not include a reactor design selection. The costs to  
17 obtain an approved ESP application are lower than the cost to obtain a COL  
18 application because there is no NRC reactor design review associated with  
19 the ESP application. An approved ESP application can also be banked. See  
20 <https://www.nrc.gov/reactors/new-reactors/esp.html>. An approved / banked  
21 ESP application could then be used with an approved Reactor Design  
22 Certification at a future date to obtain an approved COL application.

1 Exelon, in its Victoria County Project in Texas, used this approach. In 2009,  
2 Exelon decided to pursue an ESP application for the Victoria Country site,  
3 replacing the COL application (filed in September 2008 and withdrawn in  
4 June 2010).<sup>4</sup> The ESP approach involved less near-term cost and allowed  
5 flexibility in selecting a reactor vendor in the future. An ESP approach  
6 would have allowed DEC to pursue the Lee nuclear project at some point in  
7 the future using an approved and updated reactor design. DEC never filed  
8 an application for a certificate of public convenience and necessity for the  
9 Lee project and, therefore, always ran the risk that the design included in its  
10 license would become outdated well before construction was underway.

## 11 **VI. NILS DIAZ TESTIMONY**

12 **Q. DID YOU REVIEW THE TESTIMONY FILED IN THIS DOCKET**  
13 **BY NILS DIAZ ON AUGUST 25, 2017?**

14 A. Yes.

15 **Q. DOES DR. DIAZ DISCUSS THE TWO TYPES OF ACTIVITIES**  
16 **AND SPENDING PRESENTED IN YOUR TESTIMONY?**

17 A. No. Dr. Diaz does not distinguish between the Type 1 activities (i.e., those  
18 required for the NRC review of the Lee COL application) and the Type 2  
19 activities (i.e., those related to Lee construction preparation). Like DEC

---

<sup>4</sup> See July 1, 2009 letter from Exelon to the NRC at  
<https://www.nrc.gov/docs/ML0918/ML091890753.pdf>.

1 witness Fallon, Diaz appears either to assume that all activities and costs  
2 were necessary to obtain COL approval or that the Lee Type 2 costs (i.e.,  
3 those for construction preparation) were needed if the Lee nuclear project  
4 were to be built in the near future.

5 **Q. DOES DR. DIAZ DISCUSS THE 2011 COMMISSION ORDER AND**  
6 **WHETHER DEC COULD HAVE OBTAINED THE LEE COL**  
7 **APPLICATION APPROVAL WITHOUT EXCEEDING THE NOT-**  
8 **TO-EXCEED CAP AMOUNT?**

9 A. No.

10 **Q. DOES DR. DIAZ DISCUSS THE POTENTIAL FOR SUSPENDING**  
11 **THE LEE COL APPLICATION?**

12 A. Yes. He covers this in on page 33, lines 1 to 11. Dr. Diaz concludes that  
13 there are several disadvantages to this approach, including: “[T]he difficulty  
14 and cost related to suspending the COLA, the effort and cost of re-starting  
15 it when potentially facing changes to the overall regulatory framework, and  
16 losing a dedicated expert management and staff group at the NRC cognizant  
17 of the Lee Nuclear Project. Moreover, the main disadvantage would be not  
18 having a readily-executable license to construct and operate the Lee Nuclear  
19 Project at the time most favorable for DE Carolinas customers.” Dr. Diaz  
20 appears to consider the implications of Lee COL suspension in a world  
21 where the approved Lee nuclear project is built in the near future (i.e., when  
22 the regulatory framework is unchanged, and the dedicated DEC project



1 team is in place). In the actual world, in which the Lee nuclear project would  
2 not be built for some time (and indeed was not intended to be built absent  
3 nonexistent legislation), construction of the Lee nuclear project would be  
4 years in the future, during which time multiple factors would change that  
5 would require modifications and the DEC project team would have had to  
6 be re-established anyway.

7 **Q. DOES DR. DIAZ DISCUSS THE NEED TO MODIFY AND RE-**  
8 **REVIEW THE APPROVED / BANKED LEE COL APPLICATION**  
9 **IN THE FUTURE?**

10 A. Yes. On page 24, line 17, to page 25, line 15, Dr. Diaz discusses the changes  
11 to the AP1000 certified design referenced in the Lee COL application. His  
12 discussion notes in some detail the fact that the Lee COL application was  
13 modified to reflect an update of the AP1000 design from Revision 16 (i.e.,  
14 as referenced in the 2008 Lee COL application) to the AP1000 Revision 19  
15 in 2011. Dr. Diaz also describes on page 30, lines 3 to 18, the impact of  
16 design errors in AP1000 Revision 19. In addition to the changes to the  
17 AP1000 standard design, Dr. Diaz also describes a number of other factors  
18 that changed during the review of the Lee COL application, including the  
19 status of Yucca Mountain, the Waste Confidence Rule, the Fukushima Dai-  
20 ichi accident, and Seismic source characteristics. These and other things  
21 will likely change during the period between the December 2016 Lee COL  
22 application approval and the date when DEC would actually build the Lee

1 nuclear project. These changes to the approved / banked December 2016  
2 Lee COL application would require additional time and costs to file  
3 modifications to the approved COL and to gain NRC approval.

4 **Q. DOES DR. DIAZ RECOGNIZE THAT THE AP1000 REACTOR**  
5 **DESIGN MAY NOT BE AVAILABLE IN THE FUTURE?**

6 A. Yes. Dr. Diaz suggests that this is a possibility, but does not discuss what  
7 the impact on the Lee nuclear project will be. On page 35, lines 1 to 17,  
8 Dr. Diaz discusses how the bankruptcy of Westinghouse and the outcome  
9 of the Summer and Vogtle nuclear projects will have an impact on the  
10 details of the AP1000 reactor design and on the availability of this design  
11 in the future. While Dr. Diaz states that “Westinghouse expects to continue  
12 to provide AP1000 design and engineering support,” he notes that  
13 Westinghouse will not have a role in nuclear construction. For multiple  
14 reasons, the AP1000 reactor design may not be an option for DEC at the  
15 point in the future (e.g., during the 40 to 60 years during which the COL is  
16 banked) when the Lee nuclear project may become viable, requiring the  
17 approved / banked Lee COL to be extensively modified to refer to a  
18 different reactor design and submitted for another round of NRC review.

19 **Q. DOES DR. DIAZ OVERSTATE THE VALUE OF THE APPROVED**  
20 **LEE COL APPLICATION?**

21 A. Yes. Dr. Diaz refers to the Lee COL as a “readily-executable license to  
22 construct and operate the Lee Nuclear Project at the time most favorable for

1 DE Carolinas customers [page 33, lines 9-11]” and as a “readily available  
2 asset for DE Carolinas [page 33, line 17].” He also states that, “The value  
3 of DE Carolinas’ COL includes its intrinsic importance in the capability of  
4 deploying a nuclear power plant when most beneficial for a licensed life of  
5 forty years, with the possibility of additional license renewals [page 33,  
6 lines 14-16].” Dr. Diaz wrongly assumes that construction of the Lee  
7 nuclear project could begin immediately at any point during the 60 years  
8 after December 2016. In reality, the more time that passes between the Lee  
9 COL approval date in December 2016 and the time when a decision to  
10 proceed to construction is made, the more time and money will be needed  
11 to modify the COL (e.g., to refer to a different reactor design) and obtain  
12 NRC approvals for these modifications. Dr. Diaz also assumes that a future  
13 DEC decision to build a nuclear power plant will include the Lee nuclear  
14 project. If DEC were to decide to build at a different site, the approved /  
15 banked Lee COL application would have little value.

## 16 **VII. CONCLUSIONS**

### 17 **Q. WHAT ARE YOUR CONCLUSIONS?**

18 **A.** My conclusions are as follows:

- 19 1. DEC should only be allowed to recover the North Carolina allocable  
20 share of actual costs, including AFUDC, incurred in the period up  
21 to December 31, 2009, if those actual costs were less than the not-  
22 to-exceed limits in the 2007 Order and the 2008 Order. Based upon  
23 DEC’s filings, this is a total of the North Carolina allocable share of  
24 \$172,002,979, including AFUDC.

- 1                   2.     DEC's costs incurred in 2010 were not covered by any Commission  
2                   order and, therefore, are not recoverable.
- 3                   3.     DEC should only be allowed to recover costs on the Lee nuclear  
4                   project between December 31, 2011, and June 30, 2017, if those  
5                   costs were clearly required to maintain the status quo and if those  
6                   costs did not exceed the not-to-exceed cap of the North Carolina  
7                   allocable share of \$120 million, including AFUDC. Given DEC's  
8                   failure to submit evidence which would allow the Commission to  
9                   verify "status quo" expenditures, I see two primary options for the  
10                  Commission related to these costs consistent with its 2011 Order:
- 11                 a.     Deny recovery of any costs incurred on or after January 1,  
12                 2011, reflecting the failure of DEC to demonstrate that any  
13                 activities in this period were required to maintain the status  
14                 quo; or
- 15                 b.     Allow only the Type 1 costs during this period, the North  
16                 Carolina allocable share of \$73,111,397 without AFUDC,  
17                 reflecting the view that only the activities directly related to  
18                 NRC review of the Lee nuclear project COL were required  
19                 to maintain the status quo.
- 20                         Regardless, the Commission should disallow any recovery above  
21                         the North Carolina allocable share of the \$120 million not-to-exceed  
22                         cap, including AFUDC.

23           **Q.     DOES THIS CONCLUDE YOUR TESTIMONY?**

24           A.     Yes.

## EDWARD KEE

Mr. Kee is an expert on nuclear power economics.

Mr. Kee provides strategic and economic advice to companies and governments on nuclear power and electricity industry issues. He has testified as an expert witness in US and international legal and arbitration cases.

He is the CEO and principal consultant at Nuclear Economics Consulting Group (NECG) and an Affiliated Expert at NERA Economic Consulting.

Prior to starting NECG, Mr. Kee held senior consulting positions at NERA Economic Consulting, CRA International, PA Consulting Group, Putnam, Hayes & Bartlett, and McKinsey & Company. He was a merchant power plant developer and a nuclear power plant engineer (qualified as chief engineering officer on Nimitz-class nuclear aircraft carriers) before becoming a consultant.

Mr. Kee has authored numerous articles on nuclear power and the electricity industry in publications including *World Nuclear News*, *Nuclear Engineering International*, *ANS Nuclear News*, *Nuclear Power International*, *Bulletin of the Atomic Scientists*, *The Electricity Journal*, and *Public Utilities Fortnightly*.

Mr. Kee holds an MBA from Harvard University and a BS in Systems Engineering (Distinction; Trident Scholar; Colt's Award) from the US Naval Academy.

## Education

### **Harvard University**

MBA, focus on finance, 1985

### **US Naval Academy**

BS, Systems Engineering, 1978 (Distinction; Trident Scholar)

## Professional Experience

### **Nuclear Economics Consulting Group (NECG)**

2014-present CEO & Principal Consultant

### **NERA Economic Consulting**

2014-present Affiliated Expert

### **NERA Economic Consulting**

2009-2014 Vice President

### **CRA International**

2006-2009 Vice President

### **PA Consulting Group**

2001-2006 Member of Management Group

### **PHB Hagler Bailly**

1998-2000 Senior Vice President & Managing Director of Australian subsidiary

### **Putnam, Hayes & Bartlett**

1993-1998 Vice President & Managing Director of Australian subsidiary (from 1996)

### **Charles River Associates**

1990-1993 Senior Consultant

### **McKinsey & Co.**

1987-1989 Associate

### **Catalyst Energy Corporation**

1985-1987 Development Principal and CEO of merchant power plant subsidiary

### **US Navy**

1978-1983 Nuclear Engineering Officer

## **Nuclear power**

### **Client engagements**

Confidential client – engaged by potential buyer of Westinghouse Electric Company to provide nuclear power industry due diligence advice, including preparation of several nuclear power due diligence reports, review of legal and financial due diligence efforts, participation in site visits inside and outside USA, and meetings with client bid team.

Confidential client – engaged to assist a country with the restart of its nuclear power sector development efforts. Examined earlier nuclear power industry development plans, strategy, and documents; assisted in revising these plans to meet new nuclear industry approach; and assisted in legal formation of new nuclear power holding company.

Confidential client – retained to provide assessment of nuclear power digital instrumentation and control market.

US Department of Energy – retained in 2017 to undertake an analysis of economic issues facing U.S. operating nuclear power plants that may lead to early retirement, resulted in report published in Sep 2017.

South Australian Parliament – retained by the South Australian Joint Parliamentary Committee on Findings of the Nuclear Fuel Cycle Royal Commission to review the Commercial Model for a South Australian high-level waste/spent nuclear fuel repository project.

Confidential client – retained by leading U.S. non-utility power company to provide a board briefing on U.S. nuclear power plant economics and issues related to early retirements of nuclear power plants.

US Department of Energy – retained in 2016 to undertake an analysis of economic issues facing U.S. operating nuclear power plants that may lead to early retirement, resulted in report published in Sep 2016.

G20/B20 2016 – retained by State Power Investment Corporation of China to provide research and draft recommendations for 2016 B20 Infrastructure Working Group on the nuclear power industry.

IFNEC Reliable Nuclear Fuel Services Working Group – retained by U.S. DOE to develop initial draft interview guide questions for countries considering a dual track (i.e., national repository and multinational repository) approach for future high-level nuclear waste and spent nuclear fuel disposition.

American Nuclear Society – member of Special Committee on Nuclear in the States, a committee focused on how to address economic issues and early retirement of U.S. nuclear power plants; principal author of the ANS Toolkit (see <http://nuclearconnect.org/wp-content/uploads/2016/02/ANS-NIS-Toolkit-V2.pdf>).

Ontario Independent Electricity System Operator (IESO) – part of NERA team that reviewed the Amended Bruce Power Refurbishment and Implementation Agreement and provided a Fairness Opinion to IESO.

[Confidential client] - conducted a detailed study of global nuclear power plant projects for major financial institution; study was focused on new nuclear project cost increases and schedule delays, existing nuclear plant performance and operating costs, and future trends for nuclear project business models

Emirates Nuclear Energy Corporation – conducted a detailed study of recent nuclear power plant projects in the global market; study was focused on factors causing of project cost increases and schedule delays

[Confidential client] – provided advice on nuclear industry risks to a major financial institution in connection with its current and planned participation in financing activity for nuclear industry clients and projects.

Itochu – provided advice on nuclear project risks, including business risks linked to innovative nuclear project business model, to a company that is preparing to develop, own, and operate a new nuclear power plant in Turkey.

Centrus Energy (formerly USEC or U.S. Enrichment Corporation) – provided analysis of market impact of placing new Advanced Centrifuge Project into commercial operation with focus on competition in the global uranium enrichment industry; NERA report released to public.

King Abdullah City for Atomic and Renewable Energy (K.A.CARE) – part of Oliver Wyman team providing advice on Saudi Arabia's planned nuclear power fleet investment and on the K.A.CARE strategy.

US Department of Energy – provided analysis of regulatory and market risks of proposed new US nuclear power plants in support of the US DOE nuclear loan guarantee program.

Singapore – assisted the Singapore Ministry of Trade and Industry in a pre-feasibility study on nuclear energy. NERA's role focused on examining the viability of nuclear energy as a potential long-term fuel source, in the context of Singapore's electricity market structure, projected electricity demand, and lack of indigenous generation fuel resources.

TNB (Tenaga Nasional Berhad) – assisted Malaysian electric utility TNB develop a long-term strategy and roadmap for Malaysian nuclear power.

CPS Energy – assisted CPS Energy on due diligence, Board review, and Public Consultation process related to participation in South Texas Project Unit 3 & 4 merchant nuclear power plant.

J.P. Morgan – valuation and appraisal of leasehold interests in a US nuclear power plant.



Eskom – provided business due diligence advice to Eskom related to the 2008 Nuclear One procurement process; provided an independent report to Management Committee and Board.

City of San Antonio – provided advice to the Mayor, City Council, and City staff on issues related to CPS Energy’s participation in the South Texas Project nuclear plant expansion.

Constellation Energy Group – assisted Constellation in Calvert Cliffs 3 nuclear power plant development, compared projected power costs across technologies, and analyzed projected economic impact of new nuclear plant on existing non-nuclear generation portfolio.

Illinois Power – provided advice related to the status of the Clinton nuclear power plant and whether to restart, retire, or sell the plant; assisted in the sale process.

US Department of Energy – provided strategic advice on US government tritium production options including linear accelerators, existing commercial reactors, and a new DOE reactor that would burn MOX fuel derived from surplus weapons program plutonium.

Westinghouse Electric – consulting expert and case manager for extensive litigation engagement during which expert witness testimony on damages and related issues was developed and presented in a series of lawsuits brought by electric utilities seeking damages from Westinghouse related to nuclear power plant steam generator tube degradation.

Pacific Gas & Electric – provided analysis and advice in the settlement of the Diablo Canyon nuclear plant rate case and the potential acquisition of the Sacramento Municipal Utility District, owner of the Rancho Seco nuclear power plant.

### **Testimony in regulatory, judicial, and other proceedings**

[Confidential clients] – retained as consulting/testifying expert in multiple active international arbitration and litigation cases involving nuclear power.

Before the Tax Court of Canada as expert on uranium industry and markets in *Cameco Corporation v. HMQ*; case involves transfer pricing, international corporate structure, uranium markets, and related issues for a uranium producer with involvement in the Megatons to Megawatts HEU deal; case is active. (Retained by Canadian Department of Justice)

Before US District Court for the District of Vermont in the matter of *Entergy Vermont Yankee, et al, v. Peter Shumlin, in his official capacity as Governor of the State of Vermont, et al*, Civil Action No. 11-CV-99; filed declaration in support of preliminary injunction motion in April 2011, filed reply declarations in May 2011, testified at preliminary injunction hearing in June 2011 and at main trial in Sep 2011. Testified as expert on economic benefits of continued operation, electricity market impacts, and related matters in preliminary injunction hearing and trial related to state laws prohibiting Vermont

Yankee Nuclear Power Station from operating past original NRC license expiration despite an approved 20-year NRC license renewal (retained by Entergy)

Before the European Commission Merger Registry, analysis of whether a UK nuclear industry transaction might constitute a potential abuse of market power; filed expert report with the European Commission merger office on competition issues related to a proposed major transaction in the UK nuclear industry, October 2008. (Retained by Confidential client)

Before the International Court for Settlement of Investment Disputes (ICSID), Mr. Kee testified on ownership, nuclear operation, nuclear safety and related issues at the Krško nuclear plant. Testified in ICSID arbitration proceeding between the Croatian utility HEP and the Government of Slovenia related to ownership and operation of the Krško nuclear power plant. ICSID Case No. ARB/05/24, December 2007. (Retained by Hrvatska Elektroprivreda)

Before the State of Rhode Island, Division of Public Utilities and Carriers, on the extent to which payment obligations under an unconditional take-or-pay power purchase agreement with a nuclear power plant were the financial equivalent of debt obligations; Pascoag Fire District (Rhode Island municipal utility), Docket No. D-91-10, May 1992. (Retained by Pascoag Fire District)

### **Publications and media coverage**

“A market fix for nuclear,” article on US nuclear power situation, Nuclear Engineering International magazine, December 2017.

“Economic and Market Challenges Facing the U.S. Nuclear Commercial Fleet – Cost and Revenue Study,” INL/EXT-17-42944, U.S. DOE/ESSAI report, September 2017

“Here’s Why the US Nuclear Industry is in Jeopardy,” Mr. Kee is quoted in this article in Seeker.com, 24 Feb 2017.

“Financial woes of Westinghouse parent company worry US nuclear industry,” Mr. Kee quoted in this article in Nucleonics Week, 9 February 2017

“Economic and Market Challenges Facing the U.S. Nuclear Commercial Fleet,” INL/EXT-16-39951, U.S. DOE/ESSAI report, September 2016

“Can our need for a carbon-free future override our fears of nuclear energy?” Mr. Kee is quoted in this article by Debbie Carlson in the Guardian US Edition, 12 September 2016

“Exelon’s purchase of FitzPatrick likely to boost profitability, analysts say,” Mr. Kee is quoted in this article in Nucleonics Week, 11 August 2016

“Market failure and nuclear power;” Bulletin of Atomic Scientists, 4 August 2016

“Carbon pricing not enough to help nuclear power;” World Nuclear News, Viewpoint article, 8 June 2016

“The U.S. Energy Sector: Structure, Policy, and Recent Developments;” co-author (with Paul Murphy of Gowlings and Lindsay Hall of Milbank Tweed) of this chapter in a forthcoming book titled “Energy Law and Energy Infrastructure Development for a Low-Carbon World,” Cambridge University Press, 2016

“Will Cheap Natural Gas Box Out Investments in Advanced Coal and Nuclear Energy?” Mr. Kee is quoted on economics of nuclear power in the U.S. and in the world; article by Ken Silverstein in *Forbes*; 23 November 2015

“Merchant Nuclear Power;” NECG Knowledge Partner Paper; Middle East Nuclear Power Briefing 2015; Abu Dhabi, 13-14 October 2015

“Merchant Nuclear Power;” NECG Knowledge Partner Paper; 4<sup>th</sup> Annual Nuclear Energy Development Summit; Istanbul, 4 October 2015

“Saudi Arabia’s Nuclear Plans May Be Hobbled by U.S. Law;” Mr. Kee is quoted in this article in Fuel Cycle Week, 20 August 2015

“Decision Time looms for Saudi Arabia on nuclear power;” Mr. Kee is quoted in this article on the Saudi Arabian nuclear power programme, Arabian Business, 18 August 2015

“Cheap natural gas might doom new FERMI nuke plant;” Mr. Kee is quoted in this article in the Detroit Free Press, 23 February 2015

“Can nuclear succeed in liberalized power markets?” World Nuclear News, 4 February 2015

“US nuclear industry in decline” Nuclear Engineering International, 28 January 2015

“Project by project update [for US nuclear]: COL licenses under review” Nuclear Engineering International, 28 January 2015

“IEA U.S. Energy Policy Review – Lessons for nuclear power” Knowledge Partner for 3rd Asian Nuclear Power Briefing 2015, Hanoi, 22-23 January 2015

“Role of Government in Nuclear” Knowledge Partner for 3rd Annual Nuclear Energy Development Summit, Budapest, Hungary, 2-4 October 2014

“Rescuing U.S. Merchant Nuclear Power: Advancing National Security, Economic, Energy, and Environmental Imperatives;” with Elise Zoli; *The Electricity Journal*, (Apr 2014)

“2014 – Asian Nuclear Power Outlook;” Knowledge Partner paper for The Future of Nuclear Power in Asia conference; Tokyo, Japan; 17-18 February 2014

“Natural gas glut crimps nuclear power;” Mr. Kee is quoted in this article on electricity market issues related to the early retirement of the Kewaunee merchant nuclear power plant for economic reasons; *The Christian Science Monitor* - *CSMonitor.com*; (8 May 2013)

“Rush to Natural Gas Has Coal-Fired Utilities Seeing Red;” Mr. Kee is quoted in this article on the impact of unconventional (shale) natural gas supplies on the US electricity industry; *Wall Street Journal*; (24 Jan 2013)

“US NRC order could delay decision on new nuclear reactor licensing;” Mr. Kee is quoted on the likely impact on US nuclear industry because of an NRC decision to defer COL and License renewal decisions while addressing issues raised by Appeals Court decision striking down the NRC Waste Confidence Rule; *Platt’s* (20 Aug 2012)

“US Nuclear Industry's Fate Rests with Southern Company,” Mr. Kee is quoted on the importance to the nuclear power industry of the Vogtle expansion nuclear power project, *Moneynews*, Thompson/Reuters (15 Feb 2012)

“Miners See Mixed Effects in Frail Economy, Falling Dollar;” Mr. Kee is quoted on global uranium markets and prices; *Fuel Cycle Week*, Vol. 10, No. 437 (11 Aug 2011)

“If Indian Point Closes, Plenty of Challenges;” Mr. Kee is quoted on the impact on regional electricity markets if the Indian Point nuclear power plant were to be closed; *New York Times* (13 Jul 2011)

“U.S. May Build Five New Nuclear Reactors by 2020, New Energy Finance Says;” Mr. Kee is quoted on the impact of natural gas prices on nuclear power and renewable energy projects; report on Bloomberg New Energy Finance Summit; Bloomberg; (4 April 2011)

“Asia’s Nuclear Energy Boom has Potential to be America’s First Wave;” Nuclear Town Hall Newsmakers; Mr. Kee is interviewed by William Tucker (13 Jan 2011)

“Duke to Buy Progress Energy for \$13.7 Billion;” Mr. Kee is quoted on the merger’s potential impact on new nuclear build projects; *New York Times – Deal Book* (10 Jan 2011)

“Asia to lead the shift to Nuclear Power;” IQPC interview of Mr. Kee in advance of the Nuclear Energy Asia conference scheduled for Hong Kong in Dec (Sep 2010)

“Why new build won’t happen here;” Mr. Kee is quoted on electricity market and other hurdles facing US merchant nuclear projects; *Fuel Cycle Week*, Vol. 9, No. 393 (8 Sep 2010)

“A look ahead at some fuel issues for 2010,” Mr. Kee is interviewed on nuclear fuel markets and related issues; *ANS Nuclear News*, (Feb 2010)

“Korean Group's UAE Victory Surprises Few Nuke Insiders;” Mr. Kee is quoted on nuclear industrial development, nuclear industrial capacity, and nuclear build experience in South Korea; *Fuel Cycle Week*, Vol. 9, No. 358 (6 Jan 2010)

“Timing Uncertain for Federal Nuclear Loan Guarantees,” Mr. Kee is interviewed on DOE loan guarantee process, *Power Engineering International* (Jan 2010)

“Nuclear Development Snapshots” summary of Eastern European nuclear activities, with Glenn George, in Platt’s *Energy in East Europe*, Issue 177 (20 Nov 2009)

“DOE Loan [Guarantees]: chicken or egg?” in *Nuclear Engineering International* (Sep 2009)

“First Wave or Second Wave?” article on first-mover strategy for new nuclear power projects in the US in *Nuclear Power International* (Jun 2009)

“State Support is Key: New nuclear power plants may need significant government support” in *Nuclear Engineering International* (Jan 2009)

“Nuclear Fuel Future” in *Public Utilities Fortnightly* (Feb 2008)

“Nuclear Fuel: A New Market Dynamic” in *The Electricity Journal* (Dec 2007)

“[Nuclear] Loan Guarantees under EPAct” with Robert Mudge, in *Energy Law Journal*, Vol.28: 2 (Fall 2007)

“Nuclear Fuel Market Faces Challenges” three-part article in *The Desk* (19 Oct, 26 Oct, and 9 Nov 2007)

“New Nukes;” Mr. Kee is quoted on the likely cost of new nuclear power plants in this article on new nuclear power projects in Florida; *Florida Trend*; (1 Mar 2006)

“[Nuclear] Plant Extinction Exaggerated” in *Public Utilities Fortnightly* (1 Jan 1993)

### **Speeches and presentations**

“Global Nuclear Market Economic Dynamics,” Technical Track 18A, PowerGen International, Las Vegas, 6 December 2017

“Early retirement of nuclear power – market failure, failing markets, and the nuclear power industry,” NEI International Uranium Fuel Seminar, Seattle, 24 October 2017

“The Future of U.S. Nuclear Power,” 2017 EIA Energy Conference, Washington DC, 26 June 2017

“Dispelling Nuclear Myths,” 2017 American Nuclear Society National Student Conference, Pittsburgh, 8 April 2017

“Market and economic assessment of nuclear power – focus on Canada and USA,” Briefing for Gowlings attorneys and clients, Toronto, 28 February 2017

“U.S. Nuclear Economic Challenges;” presentation on market failure and nuclear power plant early retirements at 2016 Nuclear Power International; Orlando, FL; 13 December 2016

“U.S. Nuclear Power Overview;” presentation on U.S. nuclear power industry with focus on market failure and nuclear power plant early retirements at 2016 GenForum at PowerGen International; Orlando, FL; 12 December 2016

“Improving the economics of nuclear power;” presentation on the magnitude of the gap between market revenue and operating costs for U.S. nuclear power plants; Global America Business Institute (GABI); Washington, DC; 6 October 2016

“Market Failure & Nuclear Power;” presentation on failure of U.S. electricity market approach to support nuclear power; Global America Business Institute (GABI); Washington, DC; 28 June 2016

“Impact of Carbon Pricing on nuclear power projects;” IFNEC Nuclear Financing Conference, Paris, 12 May 2016

Role of expert advisor to Energy Minister in two nuclear role-playing exercises; IFNEC Nuclear Financing Conference, Paris, 12 May 2016

Debate on economic basis of proposed Saudi nuclear power program; Nonproliferation Policy Education Center (NPEC); Washington DC, 5 May 2016

“World experience with nuclear power and electricity reform;” 49<sup>th</sup> Annual Japan Atomic Industrial Forum Conference, Tokyo, 12 April 2016

Panelist in “Views from the Financial Community” session at the CINTAC – Global Nuclear Energy Financing Workshop; Washington, DC; 11 March 2016

“Part 1: Why nuclear power plants are closing,” and “Part 2: How to prevent nuclear power plant closings;” *To close or not to close* Mega Session, Nuclear Power International, Las Vegas, NV, 8 December 2015

“The economic consequences of new models;” Mr. Kee was a panelist in this session at the Utilities in a Time of Change conference sponsored by the Public Utilities Fortnightly; Scottsdale, AZ, 18 November 2015

“Nuclear Energy: The Federal and State Approach to Compliance with the Clean Power Plan (CPP);” Mr. Kee participated as a panelist in the General Chair’s Special Session, American Nuclear Society 2015 Winter Meeting, Washington, DC 10 November 2015

“Disrupting the Nuclear Industry;” Mr. Kee participated in a panel during the Harvard Business School 2015 Energy Symposium; Boston, MA, 17 October 2015

“Nuclear Revenue Certainty;” presentation at Middle East Nuclear Power Briefing 2015; Abu Dhabi, 13-14 October 2015.

“Nuclear Power and the electricity industry;” Presentation for the opening session of the NEI International Uranium Fuel Seminar; Beaver Creek, CO; 5 October 2015

“Nuclear Power Economics and Markets;” Opening address at the IBC Decommissioning of Nuclear Reactors & Materials conference on Miami, Florida, 29 September 2014

“Rescuing U.S. Merchant Nuclear Power;” Panelist at American Nuclear Society Utility Working Conference 2014 on Amelia Island, Florida, 11 August 2014

“Nuclear Energy Around the Globe: Strengths, Weaknesses, Opportunities, Threats;” Panelist on nuclear power business models; Panel Discussion at the Nuclear Energy Assembly (NEI Annual Conference); Scottsdale, Arizona; 21 May 2014

“Economic Impact of Japanese nuclear shutdown;” with Hiroaki Ishigaki; The Future of Nuclear Power in Asia conference; Tokyo, Japan; 17-18 February 2014

“Role of Nuclear Energy in Global Energy Markets;” Nuclear Energy Development Summit 2013, Eastern Europe, Turkey, and Middle East; Istanbul, Turkey; 21 November 2013

“Financing Issues Associated with the Development of an Embarking Nuclear Power Program;” Economics and electricity market expert panelist; IFNEC Finance, Regulatory, Energy Planning Authority Workshop, Abu Dhabi, UAE, 22 October 2013

“Global perspective on nuclear energy and the implications for Europe;” presentation at 2<sup>nd</sup> European Nuclear Power Briefing 2013, Budapest, Hungary, 22-25 September 2013

K.A.CARE - Saudi Sustainable Energy Symposium moderator; presented introductory session on nuclear power plant localization and moderated 3 panels on nuclear power topics, Riyadh, Saudi Arabia, 24 April 2013

“Emerging Nuclear Power Programs,” Panel Chairman, Mega-Session IV, Nuclear Power International, Orlando, FL, 11 Dec 2012



“Global Nuclear Power,” panelist in the Infocast “Reshaping of the Nuclear Industry Post-Fukushima” online seminar; 8 Nov 2012

“Global Nuclear Power,” presentation on drivers of future nuclear power plant development at the *World Energy in 2040* conference sponsored by Capital Alliance, M&A International, and Fulbright & Jaworski; Dallas, TX; 25 Oct 2012

“Issues and Challenges for Merchant Nuclear Projects,” presentation at US NRC Public Meeting on *Financial Qualifications for Merchant Nuclear Plant Combined License Applicants*; Rockville, MD; 11 Oct 2012.

“Economics of Nuclear Projects,” Marsh Nuclear Insurance, US Nuclear Energy Center of Excellence, Annual Risk Management Seminar; Ponte Vedra Beach, FL; 19 Sep 2012

“Issues and Challenges for Merchant Nuclear Projects,” Presentation at the World Nuclear Association 37<sup>th</sup> Annual Symposium; London; 13-14 Sep 2012

“Utility Perspectives on Drivers for Adoption of SMR Technology,” and “Financeability of SMR Technology,” led panel discussions at the Commercializing Small Modular Reactors for Domestic and International Markets 2012 conference; Washington, DC; 18-19 Jul 2012

“International SMR Programs and Markets,” presentation at the Small Modular Reactors and International Markets Executive Forum 2012; Washington, DC; 17 Jul 2012

“Economic implications of a major event on global nuclear power industry;” Utilities Service Alliance (USA) Executive Summit 2012; Colorado Springs; 13 Jun 2012

“A View of Nuclear Growth at Home and Abroad,” speaker in this session at the US Nuclear Energy Institute - Nuclear Energy Assembly 2012; Charlotte, North Carolina; 21-23 May 2012

International Framework for Nuclear Energy Cooperation (IFNEC) Finance Workshop; expert panelist for nuclear plant financing scenarios; Lancaster House, London, 9-10 May 2012

“Future of Nuclear Energy,” participant in panel discussion on Aftermath of Fukushima Dai-ichi Accident, George Washington University, 16 Mar 2012

“Nuclear Energy – Is there a Future?” 39th Annual Public Utilities Research Center Conference; University of Florida, 15 Feb 2012

“Alternatives for Spent/Used Fuel,” Nuclear Safety Post-Fukushima conference, Washington, DC, 6 Dec 2011

“Small Modular Reactors – Financial Perspectives,” American Nuclear Society (ANS) Winter Meeting 2011, SMR Business Case session, Washington, DC, 1 Nov 2011



“New Nuclear Build Strategy - where do we go from here?” Panel Chairman, Nuclear Energy Insider, 3rd Annual Nuclear Construction Summit, Charlotte, NC, 26 Oct 2011

“Global Nuclear Power Developments after Fukushima;” Australian Energy User Association, EUAA Annual Conference (by video conference), Melbourne, Australia, 19 Oct 2011

“Global Nuclear Power Developments after Fukushima,” Goldman Sachs utility sector institutional investors, New York City, NY, 17 Oct 2011

Bloomberg TV, Street Smart, Mr. Kee was interviewed on a segment focused on small reactors, 23 Sep 2011

“Economics of nuclear power in Utah;” panelist in a forum on the proposed Blue Castle nuclear power project at the Sutherland Institute, Salt Lake City, UT, 19 Jul 2011

“Fukushima and Nuclear Power: Can we live without it?” panelist in online seminar sponsored by the Energy Collective, 29 Jun 2011

“Small Reactor Economics,” Nuclear Power Europe conference (presented by NERA colleague due to schedule conflicts); Milan, 8 Jun 2011

“Nuclear: Fukushima - the Aftermath;” Thought Leader at 2011 Bloomberg New Energy Finance Summit; participated in opening panel discussing the impact of Fukushima on the nuclear power markets; New York, 4 April 2011

“International Small Modular Reactor Programs and Markets;” Panel Chairman at the Building the Value Chain for Commercializing Small Modular Reactors 2011 conference; Washington, DC, 28 Mar 2011

“Global nuclear power – China leads the way,” presented at American Nuclear Society meeting; Washington, DC, 15 Feb 2011

“Deploying Small Modular Reactors in the US,” chair and organizer of this Mega-Session panel at Nuclear Power International, Orlando FL; 14 Dec 2010

“Global nuclear power developments – Asia leads the way,” presented at Nuclear Energy Asia conference, Hong Kong, 7 Dec 2010

“Global Demand for Nuclear Energy and Risk Management Issues;” led a seminar on: (1) Global nuclear power markets, (2) Strategic issues for the nuclear power industry, (3) the role of government in the nuclear power industry, and (4) small reactor market assessment; JOI and JBIC Seminar, Tokyo, 24 Nov 2010

"DOE Nuclear Power Plant Loan Guarantees: Evaluating Regulatory & Market Risk," presented at the Marsh US Nuclear Energy Center of Excellence Annual Risk Management Seminar, Palm Beach, FL, 22 Sep 2010

"2010 Nuclear Power Briefing," presented to Goldman Sachs, Morgan Stanley, and institutional investors groups, New York City, 23 Mar 2010.

"Economics of Nuclear Power" Mega-Session presentation at the Nuclear Power International 2009 Conference, Las Vegas; 8 Dec 2009

"Global Nuclear Power," presented at the Goldman Sachs Ninth Annual Power & Utilities Investor Conference; New York City; 19 May 2009

"Nuclear Fleet Strategies," presented at the futurepower Conference, London, 5 Nov 2008

"Global Nuclear Power," presented at the Goldman Sachs Eighth Annual Power & Utilities Investor Conference; New York City; 13 May 2008

"Nuclear Renaissance," presented at the EUCI *Who will build generating baseload capacity?* Conference; Salt Lake City; 8 Mar 2007

"The Energy Policy Act of 2005—Nuclear Power Incentives," presentation to the Institute for Energy Economics of Japan, Washington, DC; 1 Dec 2005

"The Energy Policy Act of 2005," presentation on incentives for new nuclear power to the Virginia Industrial Energy User Group; Richmond, VA; 21 Sep 2005

"Economic Shut-Down of Nuclear Plants: Case Studies and Industry Outlook" presented at the Power-Gen 92 Conference; Orlando, FL; 17 Nov 1992

"Economics of Nuclear Plant License Renewal: A Framework for Decision-Making" presented at the Power-Gen 91 Conference; Tampa, FL; 5 Dec 1991

## Training Courses

IAEA Nuclear Financing Course; Argonne National Laboratory; Argonne, Illinois; 6-10 November 2017; taught three courses:

- "Nuclear Power and the Electricity Industry"
- "Power Purchase Agreements"
- "How Nuclear Projects Fail"

Mentor for Nuclear Innovation Bootcamp teams, August 2017; sponsored by Nuclear Innovation Alliance and the University of California at Berkeley.

INL MeV (Modeling, Experimentation, Validation) Summer School, Idaho Falls, ID, 26 July 2017; taught course on “Nuclear Plant Closure – Why U.S. nuclear power plants are retiring early and What can be done about it.”

Calpine Corporation, presentation to corporate Board on nuclear power industry, Houston, 9 Nov 2016

Mentor for Nuclear Innovation Bootcamp teams, August 2016; sponsored by Nuclear Innovation Alliance and the University of California at Berkeley.

Iowa State University; guest lecturer on nuclear power economics and the US electricity industry for Nuclear Engineering 430 (Nuclear Energy in Society) course; 19 April 2016.

IAEA Nuclear Financing Course; Argonne National Laboratory; Argonne, Illinois; 5-9 October 2015; taught three courses:

- “Nuclear Power and the Electricity Industry”
- “Power Purchase Agreements”
- “How Nuclear Projects Fail”

IAEA Interregional Nuclear Energy Information Workshop; Argonne National Laboratory; Argonne, Illinois; 3-6 August 2015; taught two courses:

- “Comparative cost structure of nuclear energy”
- “Impact of alternative electricity industry structures on nuclear power”

IAEA Nuclear Financing Course; Argonne National Laboratory; Argonne, Illinois; 6-10 October 2014; taught three courses:

- “Nuclear Power and the Electricity Industry”
- “Power Purchase Agreements”
- “How Nuclear Projects Fail”

## Commentaries

NECG Commentaries are available at [www.nuclear-economics.com/commentary](http://www.nuclear-economics.com/commentary) with Japanese translations at <http://www.jaif.or.jp/necg-commentary-series/>

Commentary #17 – “A better design for electricity markets,” guest post by Xavier Rollat 5 April 2017

Commentary #16 – “Peak Nuclear Power” 22 February 2017

Commentary #15 – “Existential Threat” 19 January 2017

Commentary #14 – “Market Failure & Nuclear Power” 24 June 2016

Commentary #13 – “June 2016 Update;” 14 June 2016

Commentary #12 – “Flexible Nuclear Power” 24 September 2015

Commentary #11 – “Nuclear power in summer / 17 things about nuclear power” 12 August 2015

Commentary #10 – “U.S. Government Role in merchant nuclear?” 7 July 2015

Commentary #9 – “Nuclear power surrender?” 14 May 2015

Commentary #8 – “Death of nuclear power – a foolish prediction” 1 May 2015

Commentary #6 – “U.S. state action on nuclear revenue certainty” 2 March 2015

Commentary #5 – “Revenue certainty” 9 February 2015

Commentary #4 – “Global Lessons from Vermont Yankee Closure” 1 Jan 2015

Commentary #3 – “Nuclear Base Load” 3 November 2014

Commentary #2 – “Nuclear Power & Short-Run Marginal Cost” 1 October 2014

Commentary #1 – “Nuclear Power Plants – Long-Term Assets in a Short-Term World” 31 August 2014

## **Private power and power purchase agreements**

### **Client Engagements**

Virginia Power – developed and implemented a major power purchase procurement auction process to evaluate offered power purchase agreements from IPPs, including assistance in procurement strategy, in soliciting and evaluating bids, and in negotiating agreements with winning bidders; provided independent assessment to state electricity regulator.

INESPAL – assisted INESPAL, the Spanish government-owned aluminum producer and manufacturer, to evaluate power supply options that included independent power producers, renewal of contracts with incumbent utilities, and other options.

### Testimony in regulatory, judicial, and other proceedings

Before 19<sup>th</sup> Judicial District Court, Parish of East Baton Rouge, State of Louisiana, on the shared savings power purchase agreement terms and financial outcomes in the matter of *Bernhard vs. Board of Supervisors, LSU*; Case No. 542,936; two sessions of deposition testimony completed; presented testimony before the Panel of Engineers in Dec 2009; case settled in early 2010. This case involved a contract dispute related to the shared savings power purchase agreement for a new cogeneration system installed at the main campus in Baton Rouge. (Retained by Louisiana State University)

Before the New Brunswick Energy and Utilities Board, on the state of electricity industry reform and restructuring in New Brunswick and the extent to which government-imposed power purchase/vesting contracts (including with the Point Lepreau nuclear plant) should be subject to regulatory oversight by the Energy and Utilities Board, June 2007. (Retained by NB Power)

Before the Energy and Utilities Board of New Brunswick, on the international experience with vesting contracts as electricity industry reform transition arrangements, Public Intervenor motion of 31 May 2007 on generator costs, June 2007. (Retained by NB Power)

Before the South Dakota Public Utilities Commission, on PURPA implementation in South Dakota, avoided cost levels, typical contract terms, wind project impact, and potential wind energy integration costs, Montana-Dakota Utilities, Docket EL04-016; Jan 2005. (Retained by MDU)

Before the US Federal Energy Regulatory Commission, on the likely effect of the Enron trading strategies on electricity market prices and long-term PPAs signed in the western region in 2000 and 2001, *Nevada Power Company, et al v. Duke Energy Trading & Marketing et al.*, Docket EL02-28, August 2002. (Retained by Enron)

Before the Supreme Court of New South Wales Commercial Division, Sydney, Australia; expert report and testimony at trial on issues related to Power Purchase and Hedge Agreement implementation and required security, *National Power Australia v. EnergyAustralia*; July 1998. (Retained by EnergyAustralia)

Before the US District Court, Western District of Washington, expert report and testimony on issues related to PURPA implementation, project compliance with FERC QF requirements, power purchase agreement implementation, and damages, *March Point Cogeneration Company v. Puget Sound Energy*, Case No. C95-1833R, October 1997. (Retained by Puget Sound Energy)

Before the Court of Common Pleas of Lehigh County, Pennsylvania, Civil Division, on whether irreparable harm to the seller of power would result if PP&L exercised certain rights under a power purchase agreement, *Pennsylvania Power & Light Company (PP&L) v. Schuylkill Energy Resources and Reading Anthracite Company*, File No. 95-C-2810; April 1996. (Retained by PP&L)

Before the Pennsylvania Public Utility Commission, on the pricing provisions in disputed power purchase agreements following a court decision that struck the use of coal proxy plant avoided costs and remanded the pricing issue to the Pennsylvania Public Utility Commission, Dockets P-870235, C-913318, P-910515, & C-913764, September 1995. (Retained by Pennsylvania Electric Company)

Before the Pennsylvania Public Utility Commission, on power purchase agreement terms related to the Harrisburg Steam Works rate case and the impact of changes to these terms; Dockets P-00950915 & R-00953346, September 1995. (Retained by PP&L)

Before the United States District Court, Southern District of New York, on the issues of non-utility generation project development and project feasibility in a dispute related to a power purchase agreement, *State Line Power Associates Limited Partnership v. Orange and Rockland Utilities*, 92 Civ. 5755, 1994. (Retained by Orange and Rockland Utilities)

Before the State of California, San Francisco Superior Court, on behalf of Pacific Gas & Electric Company on issues of non-utility project feasibility and extent of lost profit damages resulting from allegedly breached power purchase agreements; Power Producers Dispute Cases (Judicial Council Coordination Proceeding No. 2654; Contra Costa Superior Court No. C90-05398; San Francisco Superior Court No. 929-870), May 1994. (Retained by PG&E)

Before the State of California, Public Utilities Commission, on the use of regulatory-out, market-out, and termination provisions in the California Final Standard Offer 4 power purchase agreements; Final Standard Offer Number 4, Docket No. I.89-07-004, May 1992. (Retained by PG&E)

Before the State of Michigan, Circuit Court, Iron County, on the level of damages resulting from Indeck's alleged breach of a contract to develop an industrial cogeneration project, *AGA Corporation et al v. Indeck*, Case No. I-88-3985-CK, December 1990. (Retained by Indeck Energy)

## Publications

“Vesting Contracts: A Transition Tool;” article published in *The Electricity Journal*; July 2001

“Stranded Purchases? Non-Utility Power Contracts and Utility Industry Deregulation;” article in *PHB Insight*; November 1995

“Still a Lot to Learn About Power Sales;” in *Private Power Executive*; September/October 1993

“Bid Policies Overhauled;” with P. Fox-Penner, in *Cogeneration and Resource Recovery*; November/December 1990

## **Speeches and Presentations**

“Determination of Damages in Cogeneration Claims,” given at the *IGT Power Sales Contracts in the Industry Restructuring Environment* conference; Chicago; 28 Sept 1995

“Risk-Shifting and Hidden Costs in Purchasing Non-Utility Power,” presented at the Power-Gen 92 Conference; Orlando; 18 Nov 1992

“Designing Successful Bidding Programs,” faculty presentation for course on Competitive Bidding for Power Contracts; San Francisco - 7 Oct 1991 and New York City - 20 May 1991

“Independent Power Joint Ventures,” presented to the Management Exchange conference on IPP Contracts and Agreements; Washington, DC; 20 Jun 1990

## **Electricity industry reform and markets**

### **Client Engagements**

ECRA (Electricity & Co-generation Regulatory Authority of the Kingdom of Saudi Arabia) – part of NERA team evaluating Saudi Power Purchase Agreements (PPAs) and their potential impact on planned restructuring/reform of Saudi electricity industry.

CER (Commission for Energy Regulation), Republic of Ireland – led the PA Consulting Group team in a two-year engagement to conduct a review of interim electricity trading arrangements; to design a new Irish electricity market consistent with Irish and EU legislation; and to outline a comprehensive market power mitigation scheme.

Government of South Australia – Economic Advisor to the Government of South Australia in the reform, restructuring, and privatization of the former state-owned electricity industry. Assisted with the transition to the National Electricity Market; developed and implemented an approach to restructure the single incumbent government utility; developed and implemented a market power mitigation program involving vesting contracts; and assisted in several proceedings before the Australian Competition and Consumer Commission.

National Electricity Code Administrator, Australia – led the review of the integration of energy markets and network services that examined the extent to which full nodal spot pricing should be applied in the Australian National Electricity Market.

Edison Electric Institute – provided advice on liability assumed by transmission owners and market operators in a shift to FERC jurisdiction from state jurisdiction due to enhanced ability of end-use customers to seek compensation as a result of system outages.

National Electricity Market Management Company, Australia – developed and implemented inter-regional electricity market spot price locational hedge instruments and auctions.

Government of Queensland, Australia – provided advice to Treasury and Cabinet on reform of government-owned electricity companies, power purchase contracting, retail electricity competition, the development of the Papua New Guinea natural gas pipeline, and related energy industry issues.

Government of Victoria, Australia – provided advice to Treasury and Cabinet on security of supply, government intervention in the electricity spot market, electricity industry cross-ownership rules, and related electricity industry issues.

### **Testimony in regulatory, judicial, and other proceedings**

Before the US Federal Energy Regulatory Commission, detailed analysis of Death Star and other Enron trading strategies and market simulation modeling to estimate the impact of these Enron trading strategies on US Western power markets; proceeding related to activities in California and in western power markets in 2000 and 2001, *Enron Power Marketing, Inc.*, Docket EL03-180; May 2005. (Retained by Enron)

Before the Maharashtra State Electricity Regulatory Commission (MERC; India), on an appropriate method of allocating costs of Reliance Energy standby charges; April 2004. (Retained by Reliance Energy)

Before the US Federal Energy Regulatory Commission, a detailed analysis of Death Star and other Enron trading strategies and the impact of these Enron trading strategies on US Western power markets, *Enron Power Marketing, Inc.*, Docket EL02-114, February 2003. (Retained by Enron)

Before the US Federal Energy Regulatory Commission, detailed analysis of Death Star and other Enron trading strategies and the impact of these Enron trading strategies on US Western power markets, *Enron Power Marketing, Inc.*, Docket EL02-113, February 2003. (Retained by Enron)

Before the US District Court, Northern District of California, San Francisco, expert report on impact of FERC market price mitigation measures in California on California Power Exchange published prices, *Idaho Power Company v. Boston Properties*, Case No. C-01-1293, January 2002. (Retained by Boston Properties)

Before the Economic and Finance Committee of the South Australian Parliament, on electricity industry reform, privatization, and the use of vesting contracts as a transition mechanism, July 1998. (Retained by South Australian Treasury)

Before the Superior Court of the State of California, County of Imperial, on damages, geothermal power plant development and operational issues, and transmission agreement terms, *Red Hill Geothermal*



*Company, et al v. Irby Construction Company, et al.*, Case No. 74359, October 1996. (Retained by Irby, Hyundai Heavy Industries, and other defendants)

Before the United States District Court for the Northern District of Alabama, Southern Division; affidavit filed on the role of power marketing companies in the electric utility industry and on related contractual arrangements between the Tennessee Valley Authority and LG&E Power Marketing, *Alabama Power Company, et al v. Tennessee Valley Authority, et al.*, Civil Action No. CV-96-PT-0097-S, April 1996. (Retained by Alabama Power Company)

Before the New York Public Service Commission, on the fixed and variable costs of the Sithe/Independence power plant and whether retail sales by that plant constituted economic bypass, case No. 94-E-0136, July 1994. (Retained by on behalf of Niagara Mohawk Power Corporation)

### **Publications**

“Merchant Nuclear Power;” NECG Knowledge Partner Paper; 4<sup>th</sup> Annual Nuclear Energy Development Summit; Istanbul, 4 October 2015

“Cheap natural gas might doom new FERMI nuke plant;” Mr. Kee is quoted in this article in the Detroit Free Press, 23 February 2015

“Can nuclear succeed in liberalized power markets?” World Nuclear News, 4 February 2015

“Competition [in Ireland] to Flow from Single Market and Restructured Electricity Supply Board” in *Platt’s European Electricity Review*; June 2005

“Reaping the Benefits of Electricity Industry Reform: Defining and Limiting the Use of Price Controls” in *PA Viewpoint*; February 2005

“Margadh Aibhléise na hÉireann: A New Electricity Market for Ireland” in *The Electricity Journal*; January/February 2004

“Will Monti Pull the Plug on [Nuclear] State Aid?” in *Wall Street Journal Europe*; 15 December 2003

“An Emerald Market? A New Electricity Market for Ireland” in *Power Economics*; 5 December 2003

“Will There Be Trouble Ahead?” article assessing the future for the Australian electricity market in *Electricity International*; July 2002

“An Uncertain Path—Asian Electricity Reform in the Wake of the California Market Failure” with M. Crosetti and J. George of PA Consulting Group, in *Power Engineering International*; September 2001

“Vesting Contracts: A Transition Tool” in *The Electricity Journal*; July 2001

“Bush’s National Energy Policy” in *Power Economics*; July/August 2001

### **Speeches and Presentations**

“The economic consequences of new models;” Mr. Kee was a panelist in this session at the Utilities in a Time of Change conference sponsored by the Public Utilities Fortnightly; Scottsdale, AZ, 18 November 2015

“Nuclear Revenue Certainty;” presentation at Middle East Nuclear Power Briefing 2015; Abu Dhabi, 13-14 October 2015

“Nuclear Power and the electricity industry;” Presentation for the opening session of the NEI International Uranium Fuel Seminar; Beaver Creek, CO; 5 October 2015

“Economic Impact of Japanese nuclear shutdown;” with Hiroaki Ishigaki; The Future of Nuclear Power in Asia conference; Tokyo, Japan; 17-18 February 2014

“Implementing the New Irish Electricity Market,” with C. Mannion of CER; presented at the SMi Irish Energy conference; Dublin; 28 November 2003

“The Role of Retailers in the Spot Market,” presentation at the Association of Energy Service Professionals (AESP) Annual Meeting; Jacksonville, FL; 5 December 2001

“Texas Electricity Market: Opportunities for Competitive Energy Markets,” presented at Power Markets 2002: Energy Policy and its Impact on Energy Markets; Washington, DC; 16-17 October 2001.

“Super RTOs - How will FERC Win the West?” given at the Western Power Trading Forum; Stevenson, WA; 5 October 2001

“2001 US National Energy Policy,” presented at Energy Policy and the Electric Power Industry: Balancing Energy Needs and Environmental Concerns; held by the Energy & Mineral Law Foundation; Cincinnati, OH; 10-11 September 2001

“Market Power or Market Structure? – UK Electricity Market Review,” presented at the Electricity Supply Association of Australia Regulation Conference; Melbourne, Australia; 23 February 1999

“Electric Utility Restructuring: Long- & Short-Term Impact on the Natural Gas Industry,” presented at IGT: The Outlook for Natural Gas; Houston, TX; 11 September 1995

“Independent Power, Over-Capacity and Disallowances: A New Regulatory Compact?” given at the Electricity Generation for the 21st Century Conference; Denver, CO; 25 June 1993

“Carbon Taxes: Impact on the Electric Utility Industry,” presented to the Edison Electric Institute Taxation Committee; New Orleans, LA; 10 November 1992

“Strategies for an Evolving Generation Industry,” presented at the EEI/AGA Financial Planning for Public Utilities Conference; Chicago, IL; 18 May 1992

“Recovery of Indirect Costs of Transmission Services: Case Studies,” presented to the Edison Electric Institute; Washington, DC; February 1991

“Electric Utility Planning: Integrating Demand-Side Options,” presented to the Edison Electric Institute; Washington, DC; Aug 1990.

### **Speeches and Presentations - Australian electricity markets (selected items only)**

“Ownership and Risk Management: The Case for Privatization,” presented at the Queensland Power & Gas Conference; Brisbane, Queensland; 24 May 2000

“The US Experience with Nodal Pricing” & “The NZ Experience with Nodal Pricing,” presented at the National Electricity Code Administrator (NECA) Forum on the Scope for Integrating the Energy Market and Network Services; Sydney, New South Wales; 22 November 1999

“International Experience in Nodal Pricing: Focus on Market Power,” given at the IBC Nodal Pricing One-Day Update; Sydney, New South Wales; 14 March 2000

“Integrating Energy Markets and Network Services,” presented to the Victorian government, South Australian government, Queensland government, National Generator Forum, Australian Cogeneration Association, and Electricity Retailers Association; Australia; December 1999

“Draft Regulatory Test for New Interconnectors and Network Augmentations,” presented to Commissioners and Staff of the Australian Competition and Consumer Commission (ACCC); Canberra, Australian Capital Territory; 21 October 1999

“Electricity Supply Industry Reform,” seminar for NSW Democrat Members of Parliament; Sydney, New South Wales; 9 September 1999

“South Australian Vesting Contracts,” presentation to Commissioners and Staff of Australian Competition and Consumer Commission; Sydney, New South Wales; 25 June 1999

“Economic Purchasing and the PNG Pipeline,” presented to the Infrastructure and Economic Policy Committee, Queensland Premier and Cabinet offsite meeting; Toowoomba, Queensland; 9 May 1999

“Competition Policy and the Electricity Supply Industry,” given at the Australian Labor Party Member of Parliament Seminar; Melbourne, Victoria; 16 February 1998

## **Electricity industry strategy**

### **Client Engagements**

Consolidated Edison – retained as consulting expert in a civil litigation case arising from the failed merger between two utility companies on issues related to risk management policies and practices.

Trans-Elect – retained by Trans-Elect to assist in the acquisition of transmission companies, in the context of a wider strategy and implementation assistance for this pure-play transmission company.

National Electricity Market Management Company, Australia – provided advice related to NEMMCO’s strategic planning and risk management process.

DNIB (De Nationale Investeringsbank Asia Ltd), Australia – provided advice to DNIB about their participation in the lending consortia to newly privatized gas and electricity retail and distribution companies and generating companies.

Fuji Electric – investigated commercial feasibility of fuel cells in the US market to determine configuration and cost necessary for successful market penetration and analyzed product research and development results to identify likely long-term pricing, working in US and Japan.

Dominion Energy – conducted a strategic review of utility non-regulated power subsidiary with focus on investment decision-making process.

KP&L/KG&E merger – provided consulting advice and testimony support in connection with FERC merger approval.

Edison Electric Institute – prepared analysis of economic impact of proposed carbon taxes for EEI, with focus on electric utility industry and electricity prices.

### **Publications**

“Regulated Businesses: Maximizing Shareholder Value through Active Management” in *PA Viewpoint*; January 2003

“Privatization and Deregulation - Moving from Monopolies to Markets” in *PA Viewpoint*; January 2002

“Pumped Hydro: The Solution?” in *Cogeneration and Resource Recovery*; November/December 1990

“Strategies for an Evolving Generation Industry” in *Public Utilities Fortnightly*; 27 September 1990

“Small Cogeneration Economics: A Risk Management Approach” in *Cogeneration Journal*; March 1987

**Duke Energy Carolinas  
Response to  
Tech Customers  
Data Request No. Tech Customers 4-22**

**Docket No. E-7, Sub 1146**

**Date of Request: December 19, 2017  
Date of Response: January 11, 2018**

☐

**CONFIDENTIAL**

☒

**NOT CONFIDENTIAL**

***Confidential Responses are provided pursuant to Confidentiality Agreement***

The attached response to Tech Customers Data Request No. 4-22, was provided to me by the following individual(s): Erik G. Wagner, Manager, Nuclear Engineering, and was provided to Tech Customers under my supervision.

John Burnett  
Deputy General Counsel  
Duke Energy Carolinas

Tech Customers  
Data Request No. 4  
DEC Docket No. E-7, Sub 1146  
Item No. 4-22  
Page 1 of 1

Tech Customers 4-22

**Request:**

Please explain if and how the DEC activities and spending on non-NRC activities (i.e., “Land and Right of Way purchase,” “Pre-construction and Site preparation,” “Supply Chain, Construction Planning, and Detailed Engineering,” and “Operational Planning”) were required for NRC COL application reviews.

**Response:**

Please see the following examples of non-NRC spending and activities that were required to support the Lee NRC COL application review.

**Land and Right of Way Purchase:** The Lee COL is very specifically and technically linked to the physical land at the Lee site. The Company had to own the land to proceed with the work described below under Pre-construction and Site Preparation.

**Pre-construction and Site Preparation:** Cherokee nuclear unit structure demolition and removal activities were necessary to provide access to the Cherokee nuclear foundation. The Cherokee nuclear foundation was then tested and characterized as a suitable foundation for the Lee nuclear units. A description of the foundation testing and characterization was included as part of the Lee COL application.

**Supply Chain, Construction Planning and Detailed Engineering:** Engineering and design of the Lee site specific systems were inputs to the Lee site specific FSAR (Final Safety Analysis Report) which was updated annually as part of the COL application.

**Operational Planning:** Development of the Lee Nuclear Emergency Plan was accomplished as part of this spending category. The Emergency Plan was part of the Lee COL application.

**Duke Energy Carolinas  
Response to  
Tech Customers  
Data Request No. Tech Customers 4-12**

**Docket No. E-7, Sub 1146**

**Date of Request: December 19, 2017  
Date of Response: December 29, 2017**

☐

**CONFIDENTIAL**

☒

**NOT CONFIDENTIAL**

***Confidential Responses are provided pursuant to Confidentiality Agreement***

The attached response to Tech Customers Data Request No. 4-12, was provided to me by the following individual(s): Erik G. Wagner, Manager, Nuclear Engineering, and was provided to Tech Customers under my supervision.

Heather Smith  
Deputy General Counsel  
Duke Energy Carolinas



Tech Customers  
Data Request No. 4  
DEC Docket No. E-7, Sub 1146  
Item No. 4-12  
Page 1 of 1

Tech Customers 4-12

**Request:**

What is the basis of the statement that DEC would have forfeited is “place ‘in line’” for COLA review if it had suspended its pursuit of the COLA? Please identify all facts and provide copies of all documents supporting this assertion.

**Response:**

While there are not necessarily documents which support this statement, there are many generally accepted facts which provide support for its validity. Specifically, like any organization, the NRC has limited resources. Supporting the licenses of lead AP1000 plants under construction is known to have been a significant resource challenge for the NRC. If the Lee COLA had been suspended, by process, the NRC would have stopped its review of the Lee COLA. Thus, it is logical to assume that upon suspension, any NRC resources that had been supporting the Lee COLA would be shifted to other agency priorities. It is also reasonable to assume that, if the Lee COLA was subsequently re-activated after a suspension, there would have been a delay of unknown duration associated with the re-assignment of NRC resources to the application review.

**Duke Energy Carolinas  
Response to  
Tech Customers  
Data Request No. Tech Customers 4-14**

**Docket No. E-7, Sub 1146**

**Date of Request: December 19, 2017  
Date of Response: December 29, 2017**

☐

**CONFIDENTIAL**

☒

**NOT CONFIDENTIAL**

***Confidential Responses are provided pursuant to Confidentiality Agreement***

The attached response to Tech Customers Data Request No. 4-14, was provided to me by the following individual(s): Erik G. Wagner, Manager, Nuclear Engineering, and was provided to Tech Customers under my supervision.

Heather Smith  
Deputy General Counsel  
Duke Energy Carolinas

Tech Customers  
Data Request No. 4  
DEC Docket No. E-7, Sub 1146  
Item No. 4-14  
Page 1 of 1

Tech Customers 4-14

**Request:**

Were COL applications for different reactor types (e.g., EPR, ESBWR, ABWR) in separate “queues”?

**Response:**

There was no formal queue. COL applications for the AP1000 and other new reactor designs are reviewed by the NRC Office of New Reactors. Information on COL applications under review can be publicly located at <https://www.nrc.gov/reactors/new-reactors.html>.

**Duke Energy Carolinas  
Response to  
Tech Customers  
Data Request No. Tech Customers 4-19**

**Docket No. E-7, Sub 1146**

**Date of Request: December 19, 2017  
Date of Response: January 11, 2018**

☐

**CONFIDENTIAL**

☒

**NOT CONFIDENTIAL**

***Confidential Responses are provided pursuant to Confidentiality Agreement***

The attached response to Tech Customers Data Request No. 4-19, was provided to me by the following individual(s): Erik G. Wagner, Manager, Nuclear Engineering, and was provided to Tech Customers under my supervision.

John Burnett  
Deputy General Counsel  
Duke Energy Carolinas

Tech Customers  
Data Request No. 4  
DEC Docket No. E-7, Sub 1146  
Item No. 4-19  
Page 1 of 1

Tech Customers 4-19

**Request:**

DEC witness Fallon at page 21, lines 7-13, of his Direct Testimony states: “To suspend the pursuit of the COL with the NRC because the preauthorization amount had been reached would have eliminated the benefit of DE Carolina’s efforts to decrease the long lead time for new nuclear plant construction by forfeiting DE Carolina’s place ‘in line’ for its COLA review when it had already completed a significant portion of the requirements necessary to obtain a COL.” Please explain the DEC theory that there was an NRC COL application review queue, provide any documents that support that theory.

**Response:**

Please see the attached documents. As stated in Tech Customers 4-12, 4-13 and 4-14, there was no formal queue. Supporting the licenses of lead AP1000 plants under construction is known to have been a significant resource challenge for the NRC. If the Lee COLA had been suspended, by process, the NRC would have stopped its review of the Lee COLA. Thus, it is logical to assume that upon suspension, any NRC resources that had been supporting the Lee COLA would be shifted to other agency priorities. It is also reasonable to assume that, if the Lee COLA was subsequently re-activated after a suspension, there would have been a delay of unknown duration associated with the re-assignment of NRC resources to the application review.

**[ATTACHMENTS OMITTED]**