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February 24, 2011

Renne C. Vance
Chief Clerk
NC Utilities Commission
4325 Mail Service Center
Raleigh, NC 27699-4325

FILED
FEB 28 2011
Clerk's Office
N.C. Utilities Commission

Re: Docket No. E-7, Sub 819

Dear Ms. Vance:

Please find for filing the original and 30 copies of the Direct Testimony of Peter A. Bradford for the Public Advocacy Groups. I am filing an additional copy to be stamped "filed" and return to me in the enclosed envelope. ✓

Thank you for your attention to this matter.

Sincerely,



John D. Runkle
Counsel for the Public Advocacy Groups

cc. Service List – via email

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STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 819

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Clerk's Office
N.C. Utilities Commission

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

Revised Application of Duke Energy)	DIRECT TESTIMONY OF
Carolinas, LLC, for Approval of Decision to)	PETER A. BRADFORD
Incur Nuclear Generation Project)	FOR THE PUBLIC
Development Costs)	ADVOCACY GROUPS

1 **Q. PLEASE STATE YOUR NAME, ADDRESS AND CURRENT POSITION.**

2 A. My name is Peter A. Bradford. My business address is PO Box 497, Peru,
3 Vermont, 05152. I am an adjunct professor at Vermont Law School – where
4 I teach a course entitled Nuclear Power and Public Policy. I am also
5 president of Bradford Brook Associates.

6 **Q. PLEASE STATE YOUR EXPERIENCE IN THE FIELD OF UTILITY**
7 **REGULATION.**

8 A. I have chaired the public utility regulatory commissions in Maine (1974-5
9 and 1982-87) and New York (1987-95). I was also a commissioner on the
10 U.S. Nuclear Regulatory Commission (1977-82). Since 1995, I have taught
11 *several courses related to energy policy, utility regulation and nuclear power*
12 *at Yale and at Vermont Law School as well as in seminar programs at the*
13 *Institute of Public Utilities and elsewhere. I have also worked with the*
14 *Regulatory Assistance Project and have testified before numerous state*
15 *utility regulatory commissions.*

16 I have consulted in several countries – including China, India, Russia and
17 Indonesia – on issues pertaining to utility regulation and to nuclear power.

18 I was a member of the National Association of Utility Regulatory
19 Commissioners (NARUC) from 1971 until 1995 and served as its president
20 in 1987. I served on the Electric, Gas and Communications Committees as
21 well as on the Subcommittees on Nuclear Waste and Nuclear Economics. I
22 was also the liaison between the Nuclear Regulatory Commission and

1 NARUC and have testified before the U.S. Congress at least 50 times on
2 issues relating to nuclear power.

3 My complete resume is attached as Exhibit A.

4 **Q. PLEASE DISCUSS YOUR EXPERIENCE IN REGULATING NUCLEAR**
5 **POWER AT THE STATE LEVEL.**

6 A. As a regulator in New York and Maine, I chaired commissions deciding
7 cases involving rate implications and prudence concerning the Seabrook I
8 plant in Maine as well as the Shoreham and Nine Mile Point II plants in New
9 York. I chaired the New York and Maine commissions when those states
10 disengaged from the Shoreham and Seabrook plants in ways that resulted
11 in adequate power supplies, improved economic development and electric
12 rate impacts lower than would otherwise have occurred. We also decided
13 several proceedings allocating the costs of cancelled plants. I also
14 reviewed proposals to spread the cost of cleaning up the Three Mile Island
15 accident across all nuclear power plants.

16 More recently, I participated in the 2005 National Research Council of the
17 National Academy of Sciences panel evaluating the alternatives to
18 continued operation of the Indian Point nuclear units in New York. I was also
19 a member of the 2007 Keystone Center Nuclear Power Joint Fact Finding
20 project, which identified points of agreement among a broad range of
21 constituencies, including nuclear power plant owners and builders, on
22 issues relating to nuclear power costs and the role of nuclear power in
23 combating climate change. I served as a member and as chair of Vermont's

1 Public Oversight Panel for the Reliability Audit of the Vermont Yankee
2 nuclear power plant. I am one of Vermont's two representatives on the
3 Texas-Vermont Low Level Waste Disposal Compact Commission.

4 In other countries, I have participated in evaluating new nuclear units as
5 an option in Ukraine for the European Bank for Reconstruction and
6 Development, in evaluating new nuclear power and decommissioning costs
7 in Armenia and in evaluating the regulatory structure that would oversee the
8 operating of the Mochovce nuclear plant in Slovakia.

9 **Q. PLEASE STATE THE MAIN POINTS THAT YOU WILL MAKE IN**
10 **YOUR TESTIMONY.**

11 **A. My testimony advises the North Carolina Utilities Commission not to grant**
12 **Duke Energy Carolina's application for approval of the decision to incur**
13 **another \$267 million in nuclear generation project development costs**
14 **between now and the end of 2013. I point out that the fundamental reasons**
15 **the Duke Energy put forth to justify the Lee project several years ago have**
16 **been substantially undermined by the events of the last three years.**
17 **Exposing North Carolina customers to costs amounting to additional**
18 **hundreds of dollars per family cannot be justified. Instead, the Commission**
19 **should rely on ratemaking approaches that restore the traditional balance of**
20 **risk between lenders and customers, under which risks are assumed by the**
21 **companies and financial institutions best able to assess and manage them.**

1 **Q. HAVE YOU TESTIFIED PREVIOUSLY IN NORTH CAROLINA**
2 **REGARDING EARLY DETERMINATIONS OF PRUDENCE FOR THE**
3 **NORTH CAROLINA SHARE OF THE LEE STATION?**

4 A. Yes. I testified in this docket in April 2008.

5 **Q. WHAT CHANGES SINCE YOUR PREVIOUS TESTIMONY BEAR ON THE**
6 **DETERMINATIONS THAT THE NORTH CAROLINA UTILITIES**
7 **COMMISSION MUST MAKE IN THE CURRENT CASE.**

8 A. In 2008 many of the risks of charging the customers large sums of money
9 for a plant that would serve them – if at all – many years in the future were
10 clear in theory but not in fact. Now many of those risks have in fact come to
11 pass. *The harm to customers is both clearer and more likely than was the*
12 *case when I last testified. For example:*

13 (1) Duke Energy's need for the power from the Lee unit has declined
14 dramatically. In the 2008 proceeding, Duke Energy testified that it would
15 need 7000MW of new capacity by 2018 and 11,000 by 2027. In the current
16 proceeding, this need has shrunk to 2200MW by 2020 and 6000 by 2030
17 (Rogers testimony, pp. 5-6). Of course, even this reduced need figure is
18 subject to dispute.

19 (2) The projected in service date for the project has slipped three years,
20 from 2018 to 2021.

21 (3) Projected natural gas prices (and therefore the cost of combinations of
22 natural gas and renewable energy resources) are significantly lower than
23 was the case in 2008. Indeed, the U.S. Department of Energy's Energy

1 Information Administration (EIA) recently lowered its gas price forecast
2 through 2035, noting "The annual average natural gas wellhead price
3 remains under \$5 per thousand cubic feet through 2022, but it increases
4 thereafter because significantly more shale wells must be drilled to meet
5 growth in natural gas demand and offset declines in natural gas production
6 from other sources.....Natural gas wellhead prices (in 2009 dollars) reach
7 \$6.53 per thousand cubic feet in 2035, compared with \$8.19 in AEO2010
8 (Annual Energy Outlook Early Release Overview, December 16, 2010)." Of
9 course, 2008 natural gas prices and price forecasts were considerably
10 higher.

11 (4) The so-called U.S. "nuclear renaissance" is in shambles, with almost
12 all of the projects having encountered some combination of cost overruns,
13 major delays or outright cancellation. The statement in the Duke Energy
14 application (p. 4) that "interest in new nuclear generation has increased in
15 the United States over the past several years" is incorrect. Most of the
16 projects that were said to constitute the "renaissance" in 2008 have been
17 cancelled, suspended or greatly delayed. One of the primary reasons is the
18 cost increases; EIA recently increased its estimate of the cost of new
19 reactors by 37% just during 2010.

20 **Q. WHAT IS THE SIGNIFICANCE OF DUKE ENERGY'S REDUCED**
21 **DEMAND FORECASTS SINCE THE 2008 PROCEEDING?**

22 A. First, the reduced demand indicates that the customers need not be
23 financing units whose completion is a decade or more beyond the date that

1 customer bills begin to reflect these increased costs. Second, reduced
2 demand means that the value of future energy and capacity will be lower.
3 As a result, committing customers to pay for a particularly expensive source
4 of generation makes no sense. Even if one assumes a future requirement
5 to reduce carbon emissions in the electric sector, combinations of efficiency,
6 renewables and natural gas are highly likely to meet this requirement less
7 expensively than new nuclear reactors given the lower demand forecasts for
8 the next decade.

9 **Q. WHAT IS THE SIGNIFICANCE OF THE DELAY IN THE PROJECTED**
10 **COMPLETION DATE?**

11 A. First, this three-year delay in the projected completion long before
12 construction has even begun demonstrates that the nuclear industry
13 remains subject to unforeseen major delays. While Duke Energy has not
14 acknowledged any increase in the project costs, some increase is likely to
15 result from this slippage. Furthermore, the costs to the customers of
16 providing construction financing for the project will certainly increase,
17 because any point in time at which rates are lowered by the subsidy that
18 customers are providing has moved further into the future.

19 **Q. WHAT IS THE SIGNIFICANCE OF THE DRAMATIC DECLINE IN**
20 **NATURAL GAS PRICES?**

21 A. First, this decline illustrates one of the major risks of nuclear construction,
22 namely the likelihood that changes in electricity markets while the reactors
23 are being licensed and built will make them uneconomic (or even more

1 uneconomic) by the time they are completed or during their operating lives.
2 This risk has rendered new reactors unable to access private capital
3 wherever competitive power procurement and power markets have become
4 the preferred way of buying and pricing electricity generation.

5 Second, the gap between electricity generated from natural gas and new
6 nuclear generation has grown so much larger that new nuclear generation
7 coming online is unlikely to be cost-effective at all for many years and may
8 well not be cost-effective on a discounted present value basis over its entire
9 operating life.

10 Third, falling gas prices also improve the competitive posture of renewable
11 energy sources by allowing the combination of new renewables and existing
12 or new gas plants to operate on a basis that renders meaningless
13 distinctions between intermittent and baseload power generation.

14 Fourth, today's low natural gas prices undermine arguments that natural
15 gas price "volatility" provides a valid reason for raising electric rates to pay
16 for new nuclear power. While it is true that gas prices are more volatile than
17 nuclear operating costs (though not necessarily more volatile than nuclear
18 construction costs), paying a price higher than the high point in a volatile
19 range is not an economically sensible way to buy price stability. For
20 example, paying 12 cents per kWh for nuclear power would be a foolish way
21 to avoid buying gas-fired electricity that was expected to vary between four
22 and eight cents per kWh.

1 Finally, at today's forecasted gas prices, fuel diversity considerations are
2 unpersuasive justification for continued expenditure on the Lee units. Duke
3 Energy's energy mix today is less than ten percent natural gas, so diversity
4 concerns point toward increasing the gas share in any case. Nuclear output
5 will expand somewhat if the capacity increases, i.e., uprates, at existing
6 plants that are shown in Duke Energy's IRP are implemented, and this
7 expansion will be less costly than the Lee units.

8 **Q. WHAT IS THE SIGNIFICANCE OF THE COLLAPSE OF THE U.S.**
9 **"NUCLEAR RENAISSANCE" FOR THIS PROCEEDING?**

10 A. The companies across the country that were thought to be well on their way
11 to building new nuclear reactors in 2008 are reevaluating that commitment
12 in the face of declining demand, rising cost estimate, reduced cost
13 estimates for alternatives, the absence of a federal policy requiring reduced
14 green house gas emissions and the absence of additional federal subsidies
15 for new reactors, especially loan guarantees. By way of example,

16 (1) In Missouri, the Legislature in 2009 declined to enact legislation
17 permitting the charging of nuclear planning and construction costs to
18 customers until the plant came on line. The would-be builder cancelled the
19 plant.

20 (2) Exelon Corporation, the owner of the nation's largest reactor fleet last
21 year, withdrew its application to build two reactors in Texas, citing changed
22 economic conditions. Exelon CEO John Rowe told Bloomberg News, "We
23 think natural gas will stay cheap for a very long time. ... As long as natural

1 gas is anywhere near current price forecasts, you can't economically build a
2 merchant nuclear plant." The article continues, "Rowe said that the price of
3 natural gas would have to rise to \$8 per million British thermal units and
4 permits for emitting a ton of carbon dioxide would have to be \$25 to make
5 the power prices from new merchant reactors competitive with gas-fueled
6 plants ... Absent a price on carbon dioxide emissions, gas would have to
7 rise to \$9 or \$9.50 to make the reactors economically attractive". While Mr.
8 Rowe is talking about merchant nuclear plants, his point about relative costs
9 applies to all new reactors. The only difference between regulated reactors
10 and merchant plants is in the ability of regulators to make customers finance
11 the plants, a feature that does not improve the economics of new nuclear at
12 all.

13 (3) In November 2010, Constellation Energy withdrew from the
14 consortium planning to build the Calvert Cliffs reactors in Maryland.
15 Constellation's stated reason was that the federal government's effort to
16 make loan guarantee applicants pay a fee appropriate to the actual risk of
17 taxpayer loss made the project uneconomic.

18 Of course, the risk of taxpayer loss for a plant financed with the aid of
19 federal loan guarantees is roughly the same as that of customer loss in a
20 state where the financing costs are imposed on customers. However, the
21 financial exposure of individual customers is much greater because the
22 number of North Carolina customers is so much smaller than the number of
23 U.S. taxpayers.

1 Exelon's overall assessment of the relative economics of low carbon
2 options for providing electricity services underwent a dramatic change in
3 2010, with new nuclear becoming significantly more expensive than the
4 options that Exelon is actually pursuing. Exelon's assessment of the
5 relative economics of these options is shown in Appendix B to this
6 testimony.

7 (4) In Florida, a state where four new nonmerchant reactors have been
8 proposed under a legal framework that permits premature cost recovery
9 from customers of the type that Duke Energy seeks in North Carolina, all
10 four plants have announced multiyear delays and significant cost estimate
11 increases. Public discontent over the rate increases implemented and
12 proposed to date has led to the replacement of most of the Florida utilities
13 commission.

14 (5) Several months ago, NRG Energy announced that it would reduce
15 monthly expenditures on its proposed new reactors at the South Texas site
16 by more than 90%. Because Texas is a power market jurisdiction, NRG
17 cannot be assured of recovering its costs unless it can deliver power at a
18 price competitive with the alternatives. It apparently could not find investors
19 and lenders willing to take the risks that Duke Energy seeks to impose on its
20 customers through the action that it asks of the Commission in this
21 proceeding.

22 **Q. WHAT OTHER ISSUES SHOULD BE RESOLVED BEFORE THE**
23 **COMMISSION PERMITS NORTH CAROLINA CUSTOMERS TO BE**

**EXPOSED TO FURTHER RISK OF LOSS BY APPROVING THE
PRUDENCE OF ADDITIONAL EXPENDITURES ON THE LEE PROJECT?**

A. At this point, there is little chance that the Lee project can produce competitively priced electricity without (or even with) a federal loan guarantee, which it has no immediate prospect of receiving. In addition, a consolidation of nuclear projects in the Southeast, together with a reshuffling of the ownership interests, seems very likely. The proposed Duke/Progress merger is one potential pathway to this result. It is not at all clear that the Lee units will survive this process. If they do, it is also not clear that new owners will be required to shoulder a share of the cost burdens already assumed by the existing customers. This issue will raise serious fairness questions if some companies are permitted to charge large costs to captive customers only later to sell shares of the plant to buyers who will want to pay market based prices rather than make the captive customers whole.

**Q. IS THE LEE PROJECT LIKELY TO PROVIDE SIGNIFICANT NEW
EMPLOYMENT IN NORTH CAROLINA?**

A. The project is of course located in South Carolina, and many of the jobs it creates will be overseas. More importantly though, one must consider not just the nuclear jobs created but the negative impact on jobs in other sectors. The higher rates flowing from the actions requested in this proceeding will have a negative impact on employment in North Carolina's industrial and commercial sectors. Indeed, these customers are among the

1 leading challengers to further rate increases in Florida. In addition, the
2 commitment to new nuclear construction will reduce jobs in energy
3 efficiency and in other types of generation. No state ever improved its
4 economy by burdening it with electricity costs higher than those necessary
5 to meet customer demands efficiently and sustainably.

6 **Q. WHAT LESSONS CAN THE COMMISSION LEARN FROM THE EVENTS**
7 **OF THE THREE YEARS SINCE YOU LAST TESTIFIED BEFORE THE**
8 **NORTH CAROLINA COMMISSION AS TO THE PRUDENCE OF**
9 **INCURRING NUCLEAR PROJECT DEVELOPMENT COSTS FOR THE**
10 **LEE PROJECT?**

11 *A. The project has been delayed a year for every year that has passed since*
12 *the 2008 proceeding. Customers are no closer to seeing electricity from the*
13 *Lee station than they were then. However, they are tens of millions of*
14 *dollars poorer. Now, with far less justification than existed in 2008, Duke*
15 *Energy is asking the Commission to more than double customer exposure*
16 *to cost and risk. No plumber in North Carolina could hope to get away with*
17 *such a request on an ordinary construction project.*

18 In the 2008 proceeding, I indicated the types of risk that Duke Energy's
19 petition would shift onto the shoulders of its customers. These were "risk of
20 cost overruns, risk that the owners will not be able to meet schedules, risk
21 that the plant will operate poorly, risk that demand will be overestimated,
22 risk that other technologies will be available at lower costs". I also indicated
23 that Yucca Mountain would not be the repository for the spent fuel from the

1 Lee reactors. In the short space of three years, five of these six risks have
2 come home to roost, and of course the sixth – poor operation – is not yet a
3 possibility.

4 Finally, the Commission now has some experience with rate increase
5 requests flowing from its prudence determinations. It can judge for itself
6 whether it is really in a position to make detailed prudence determinations
7 on specific expenditures.

8 These developments all indicate the difficulties that the Commission faces
9 in assuring that North Carolina customers are protected from unreasonable
10 cost commitments if Duke Energy continues its current pursuit of the Lee
11 units. Cautious regulatory practice strongly supports denial of the
12 determination of prudence that Duke Energy is requesting in this case. Until
13 such time as additional loan guarantee funds are available and
14 consolidation of new reactor projects has occurred, extending a prudence
15 finding of the magnitude requested in this case virtually assures that Duke
16 Energy's North Carolina customers will pay more than their share of the
17 costs of a project that may well be cancelled or reorganized.

18 **Q. ARE ANY OF YOUR RECOMMENDATIONS FROM THE 2008**
19 **PROCEEDING PERTINENT TO THE DECISION THAT THE**
20 **COMMISSION MUST MAKE IN THE CURRENT CASE?**

21 Yes. In particular, I would again urge the Commission to cap any prudence
22 determination that it makes at a figure that does no more than maintain the

1 current state and value of the Lee project. No additional customer money
2 should go toward developing it under present circumstances.

- 3 • In addition, the Commission should indicate a maximum acceptable cost
4 for the Lee project itself. Such a determination need not be binding at this
5 time, but it would provide useful guidance to Duke Energy and to its
6 customers alike that the sky is not the limit where the Lee project is
7 concerned. Firm caps protecting customers from cost overruns were used
8 in New York, Pennsylvania, Connecticut and California in the 1980s as
9 well as with the Olkiluoto project currently under construction in Finland.

10 Given the instability in nuclear construction cost projections, such a
11 *mechanism is likely to be needed to protect customers over the next*
12 *decade as well.*

- 13 • Also, the Commission should revisit its determination that payments to
14 secure the long lead time items are “project development costs.” Such
15 payments are very much part of the construction process. Their prudence
16 requires detailed separate review of evidence not presented in this
17 proceeding. There is no urgency requiring the payment of large sums to
18 hold a place in line at overseas factories until North Carolina has a much
19 clearer picture of which, if any new reactors are going to get built.

- 20 • Furthermore, falling costs of alternatives make it more urgent now than in
21 2008 that the Commission require that Duke Energy use a competitive
22 power procurement process to screen possible power supply resources.
23 Only then will the Commission have a clear sense of the resources

1 available to North Carolina customers as well as the cost and scheduling
2 of those resources.

3 • Because of the strong likelihood that energy efficiency is available at lower
4 cost than the proposed nuclear station, the Commission should reiterate
5 the statement in its 2008 order to the effect that it will require a showing
6 that programs are in place to capture all cost-effective energy efficiency
7 before it accepts as prudent any decision to build a nuclear unit.

8 • Finally, the Commission should indicate in any decision granting a
9 prudence determination that it recognizes the reduced risk that will flow
10 from the decision and intends to adjust the allowed return on equity
11 accordingly. Shifting risk from investors to customers does not produce
12 real savings. It lowers the cost of capital used in building the plant by
13 increasing customer exposure to events whose cost might otherwise have
14 been borne by investors. If any of these events occur, the customers will
15 pay for them, and this risk offsets any savings from the reduced cost of
16 capital. The Commission should at least lower Duke Energy's return on
17 equity in order prevent the injustice of having customers pay investors as
18 if they were bearing the risks that have in fact been shifted to the
19 customers.

20 **Q. BUT SURELY A PROJECT AS EXPENSIVE AND COMPLEX AS A**
21 **NUCLEAR UNIT COULD NOT BE FINANCED WITHOUT ASSURANCE**
22 **THAT IT WILL RECOVER ITS COST, NO MATTER HOW UNECONOMIC?**

1 A. Size and complexity are not what makes a project unfinanceable. To take
2 just one example, the Trans-Alaska Pipeline, costing some \$7 billion in the
3 dollars of the 1970s and involving unprecedented construction challenges,
4 was built without conscripting capital from its customers before it went into
5 operation. Financing of large and complex projects is a regular occurrence.
6 What makes nuclear projects so hard to finance conventionally is not
7 expense and complexity but the risk that the project will cost too much to be
8 able to sell its output at a price that will recover the costs and provide a
9 return to investors.

10 **Q. ISN'T NUCLEAR POWER SO ESSENTIAL TO COMBATTING CLIMATE**
11 **CHANGES THAT THE COMMISSION SHOULD GRANT DUKE**
12 **ENERGY'S REQUESTS EVEN IN LIGHT OF THE RISKS TO ITS**
13 **CUSTOMERS?**

14 A. No. The 2007 Keystone Fact Finding Report in which Duke Energy
15 participated concluded that nuclear can contribute only modestly to reducing
16 climate change even if the world builds three times its existing nuclear
17 capacity over the next 50 years, an immense achievement that would
18 require increases in the rate of construction far beyond anything that now
19 seems likely. If nuclear power can be built cost effectively, this contribution
20 would make the climate change task easier. However, if nuclear is not cost
21 effective, it will take revenue and attention from other measures that can
22 prevent far more green house gas reductions far more quickly.

23

1 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

2 A. Yes.

APPENDIX A

PETER A. BRADFORD
P.O. BOX 497
PERU, VERMONT 05152
(802) 824-4296

PROFESSIONAL EXPERIENCE:

March 1996- present Energy and Regulatory Advisor;

Peter Bradford is an adjunct professor at Vermont Law School, where he teaches "Nuclear Power and Public Policy" and has taught "The Law of Electric Utility Restructuring". He also advises and teaches on utility regulation, restructuring, nuclear power and energy policy in the U.S. and abroad. He was a member and chair of the Public Oversight Panel for the Comprehensive Vertical Assessment of Vermont Yankee Nuclear Power Plant and has served as an expert witness on investment in new nuclear power plants in several states. He is one of Vermont's two representatives on the Texas-Vermont Low Level Radioactive Waste Disposal Compact Commission. He has been a visiting lecturer in energy policy and environmental protection at Yale University.

He served on the 2007 Keystone Center fact finding collaboration on nuclear power and the 2006 National Academy of Sciences panel evaluating the alternatives to continued operation of the Indian Point Nuclear Power Plants in New York. He is also affiliated with the Regulatory Assistance Project, which provides assistance to state and federal energy regulatory commissions regarding economic regulatory policy and environmental protection.

He served on a panel advising the European Bank for Reconstruction and Development on how best to replace the remaining Chernobyl nuclear plants in Ukraine and also on an expert panel advising the Austrian Institute for Risk Reduction on regulatory agency issues associated with the opening of the Mochovce nuclear power plant in Slovakia. He advised the Vermont Legislature on issues relating to spent fuel storage at Vermont Yankee and the Town of Wiscasset, Maine, on issues related to the storage of spent nuclear fuel at the site of the former Maine Yankee nuclear power plant.

He has advised on electric restructuring issues and has testified on aspects of nuclear power, electricity and telecommunications restructuring in many U.S. states.

He has also advised on energy, telecommunications and water utility restructuring issues in China, Armenia, Azerbaijan, Georgia, India, Indonesia, Mongolia, Canada, Russia, Samoa, South Africa and Trinidad and Tobago. He is a member of the Policy Advisory Committee of the China Sustainable Energy Program, a joint project of the David and Lucille Packard Foundation and the Energy Foundation.

He chaired the New York State Public Service Commission from 1987 until 1995 and the Maine Public Utilities Commission from 1982 until 1987. During these years, New York resolved its stalemate over the Shoreham nuclear power plant and Maine resolved its similarly controversial involvement in Seabrook, both on favorable economic terms. He was Maine's Public Advocate in 1982 and was President of the National Association of Regulatory Utility Commissioners during 1987.

He served on the U.S. Nuclear Regulatory Commission from 1977 until 1982. During his term, the NRC undertook major upgrades of its regulatory and enforcement processes in the wake of the Three Mile Island accident.

Prior to becoming a member of the NRC, he had served on the Maine Public Utilities Commission (1971-1977) and was Chairman in 1974-1975.

Mr. Bradford was an advisor to Maine Governor Kenneth Curtis from 1968 to 1971, with responsibilities for oil, power and environmental matters. He assisted in preparing landmark Maine laws relating to oil pollution and industrial site selection and was Staff Director of the Governor's Task Force on Energy, Heavy Industry and the Coast of Maine.

Mr. Bradford is the author of Fragile Structures: A Story of Oil Refineries, National Security and the Coast of Maine, a book published by Harper's Magazine Press in 1975. His articles on utility regulation and nuclear power have appeared in many publications, including The New York Times, The Washington Post, The Los Angeles Times, The Boston Globe, The Atlanta Journal Constitution, The Bulletin of the Atomic Scientists, and The Electricity Journal.

He is a 1964 graduate of Yale University and received his law degree from the Yale Law School in 1968.

He is married, has three children and lives in Peru, Vermont.

PROFESSIONAL AFFILIATIONS:

1999-present - Member, Policy Advisory Committee, China Sustainable Energy Project (funded by the David and Lucille Packard Foundation and the Energy Foundation).

1998-2002 - Member, Advisory Council, New England Independent System Operator

Nov. 1986-Nov. 1987 President, National Association of Regulatory Utility Commissioners

1977-1995 NARUC positions, Member, Executive Committee; Member, Electricity Committee (1977-1989); Member, Gas Committee (1989-1993); Member, Communications Committee (1975-1977); Board of Directors, National Regulatory Research Institute (1985-1987).

1975-1977, 1982-1986. Advisory Council, Electric Power Research Institute

1987-1995, Member of New York State Energy Planning Board

1987-1995, Member, Board of Directors, New York State Energy Research and Development Administration

1987-1995, Member, New York State Environmental Board;

1987-1995, Chair, New York State Energy Facilities Siting Board

1992-1994, State co-chair, New York State Task Force on Telecommunications Policy

Vice-chair, Board of Directors, Union of Concerned Scientists

Board of Directors, Nuclear Control Institute

EDUCATION:

1964 B.A. History, Yale University, New Haven, CT

1968 L.L.B., Yale University School of Law, New Haven, CT

AWARDS:

Honorary Degree, Unity College, 1981.

Environmental Award, Natural Resources Council of Maine, 1979.

PUBLICATIONS

Books

Fragile Structures: A Story of Oil Refineries, National Security and the Coast of Maine, 1975, Harpers Magazine Press.

Law Review

Maine's Oil Spill Legislation, *Texas International Law Journal*, Vol.7, No.1, Summer 1971, pp.29-43.

Articles

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Contributions to the Bulletin of the Atomic Scientists online forum on *Nuclear Power and Climate Change*, (with Amory Lovins and Stephen Berry), <http://www.thebulletin.org/roundtable/nuclear-power-climate-change/>, March-August, 2007

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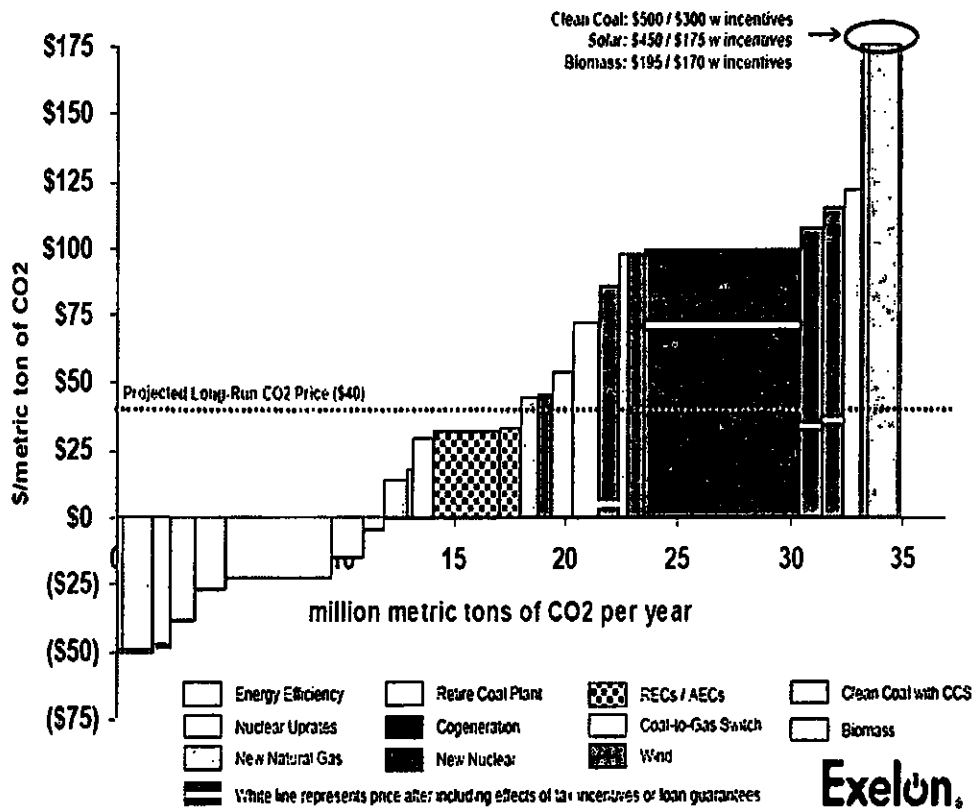
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CERTIFICATE OF SERVICE

I hereby certify that the persons on the service list have been served this DIRECT TESTIMONY OF PETER A. BRADFORD FOR THE PUBLIC ADVOCACY GROUPS (E-7, Sub 819) by deposit in the U.S. Mail, postage prepaid, or by email transmission.

This is the 24th day of February 2011.

A handwritten signature in cursive script, appearing to read "John M. Munkle", is written above a horizontal line.

Attorney at Law