



201 West Main Street, Suite 14
Charlottesville, VA 22902-5065
434-977-4090
Fax 434-977-1483
SouthernEnvironment.org

January 22, 2008

Mr. Charles L.A. Terreni
Chief Clerk of the Commission
SC Public Service Commission
P.O. Drawer 11649
Columbia, SC 29211

RE: Application of Carolina Power and Light Company d/b/a Progress Energy
Carolinas, Incorporated for the Establishment of Procedures for DSM/EE
Programs

DOCKET NO.: 2008-251-E

Dear Mr. Terreni:

Enclosed please find for filing the Pre-Filed Direct Testimony of Rick Hornby and Brian Henderson on behalf of Southern Alliance for Clean Energy, Natural Resources Defense Council, South Carolina Coastal Conservation League and the Southern Environmental Law Center in the above-captioned matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Sarah Rispin", is written over the typed name. The signature is fluid and cursive, with a large initial "S" and "R".

Sarah Rispin

1 **I. INTRODUCTION / SUMMARY**

2 **Q. PLEASE STATE YOUR NAME, EMPLOYER, AND PRESENT POSITION.**

3 A. My name is J. Richard Hornby. I am a Senior Consultant at Synapse Energy Economics,
4 Inc., 22 Pearl Street, Cambridge, MA 02139.

5 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?**

6 A. I am testifying on behalf of a coalition (Coalition) consisting of Southern Alliance for
7 Clean Energy (SACE), Natural Resources Defense Council (NRDC), the South Carolina
8 Coastal Conservation League (CCL) and the Southern Environmental Law Center (SELC).
9 The member groups in this coalition are nonprofit, nonpartisan organizations who promote
10 responsible energy choices that solve global warming problems and ensure clean, safe
11 and healthy communities in South Carolina and throughout the Southeast

12 **Q. PLEASE DESCRIBE SYNAPSE ENERGY ECONOMICS.**

13 A. Synapse Energy Economics (Synapse) is a research and consulting firm specializing in
14 energy and environmental issues, including: electric generation, transmission and
15 distribution system reliability, market power, electricity market prices, stranded costs,
16 efficiency, renewable energy, environmental quality, and nuclear power.

17 **Q. PLEASE SUMMARIZE YOUR WORK EXPERIENCE AND EDUCATIONAL
18 BACKGROUND.**

19 A. I am a consultant specializing in planning, market structure, ratemaking, and gas
20 supply/fuel procurement in the electric and gas industries. Over the past twenty years, I
21 have presented expert testimony and provided litigation support on these issues in
22 approximately 100 proceedings in over thirty jurisdictions in the United States and

1 Canada. Over this period, my clients have included staff of public utility commissions,
2 state energy offices, consumer advocate offices and marketers.

3 Prior to joining Synapse in 2006, I was a Principal with CRA International and,
4 prior to that, Tabors Caramanis & Associates. From 1986 to 1998, I worked with the
5 Tellus Institute (formerly Energy Systems Research Group), initially as Manager of the
6 Natural Gas Program and subsequently as Director of their Energy Group. Prior to 1986,
7 I was Assistant Deputy Minister of Energy for the Province of Nova Scotia.

8 I have a Master of Science in Energy Technology and Policy from the
9 Massachusetts Institute of Technology (MIT) and a Bachelor of Industrial Engineering
10 from the Technical University of Nova Scotia, now merged with Dalhousie University. I
11 have attached my current resume to this testimony as Hornby Exhibit 1.

12 **Q. PLEASE SUMMARIZE YOUR EXPERIENCE WITH EE MEASURES AND**
13 **POLICIES.**

14 A. My experience with energy efficiency (EE) measures and policies began over thirty years
15 ago as a project engineer responsible for identifying and pursuing opportunities to reduce
16 energy use in a factory in Nova Scotia. Subsequently, in my graduate program at MIT I
17 took several courses on energy technologies and policies, and prepared a thesis analyzing
18 federal policies to promote investments in EE. After MIT, I spent several years with the
19 government in Nova Scotia, during which time I administered a provincial program to
20 promote energy conservation in the industrial sector and later included energy
21 conservation in all sectors as part of energy plans developed for the province. More

1 recently, over the past twenty years as a regulatory consultant I have helped review and
2 prepare numerous integrated resource plans (IRPs) in the gas and electric industries.

3 Most recently I presented Direct Testimony in North Carolina Docket No. E-2,
4 Sub 931 regarding the Settlement between Progress Energy Carolinas, Inc (PEC or the
5 Company), North Carolinas Utilities Commission (NCUC) Public Staff and Wal-Mart for
6 a DSM/EE Cost recovery mechanism in that state.

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

8 A. PEC has requested the establishment of procedures to encourage it to invest in cost-
9 effective EE technologies and energy conservation programs. It has also requested an
10 annual rider to allow recovery of all reasonable costs associated with such programs and
11 an appropriate incentive for investing in such programs. PEC's revised application is
12 presented in the Direct Testimony of Company witness Williams filed January 8, 2009.
13 The Coalition retained Synapse to review the Company's request. The purpose of my
14 testimony is to describe my review and present my conclusions based upon that review.

15 **Q. WHAT DATA SOURCES DID YOU RELY UPON TO PREPARE YOUR**
16 **TESTIMONY AND EXHIBITS?**

17 A. My testimony is based primarily upon on the Direct Testimony of Mr. Williams in this
18 proceeding. It is also informed by the testimony and discovery responses filed in PEC's
19 North Carolina proceeding, NCUC Docket E-2 Sub 931, as well as various orders and
20 reports regarding cost-recovery frameworks for ratepayer funded efficiency programs.

21 **Q. HAVE YOU HAD THE OPPORTUNITY TO REVIEW RESPONSES TO DATA**
22 **REQUESTS REGARDING THE COMPANY'S REQUEST?**

1 A. No. I request the right to update my testimony if I receive responses to data requests that
2 clarify my understanding.

3 **Q. PLEASE SUMMARIZE THE COST RECOVERY PROCEDURES REQUESTED**
4 **BY THE COMPANY.**

5 A. Mr. Williams has proposed that the Company be allowed to collect three categories of
6 costs and incentives through a demand-side management (DSM) and EE rider that would
7 be set annually and subject to an annual true-up. The three categories are:

- 8 • Program costs. Expenses would be deferred and amortized over a ten-year period,
9 with the unamortized balance earning the rate of return authorized in the
10 Company's last rate case. Capital costs would be depreciated over the useful life
11 of the equipment, with a return based on Company's current capital structure,
12 current embedded cost of debt and return on approved in its last rate case.
- 13 • A program performance incentive (PPI). The PPI for EE programs would be
14 equal to 13 percent of the net present value of net savings as calculated under the
15 Utility Cost Test (UCT) and would be recovered over ten years. The PPI for
16 DSM programs would equal 8 percent. (PEC's reference to DSM in this context
17 appears to be to load management as specified in S.C. Code Ann. § 58-37-20);
18 and
- 19 • Net Lost Revenues (NLR). PEC would recover NLR for measures installed under
20 each program vintage year for three years, or until its next rate case.

21 **Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE COST**
22 **RECOVERY PROCEDURES REQUESTED BY THE COMPANY.**

1 A. My analysis leads me to the following conclusions regarding PEC's proposals:

2 • First, it is reasonable for the Company to have a set of cost-recovery procedures
3 that enable it to recover the prudently incurred costs of its EE and DSM programs,
4 plus a reasonable financial incentive and a reasonable mechanism for minimizing
5 adverse impacts on its earnings from those programs;

6 • Second, PEC bears the burden of proving that the specific set of cost-recovery
7 procedures it is proposing will result in rates that are just and reasonable;

8 • Third, PEC has not demonstrated that the specific set of cost-recovery procedures
9 it is proposing will result in rates that are just and reasonable. Specifically, PEC
10 has not provided a numerical example to demonstrate the actual operation of the
11 specific set of proposed cost-recovery procedures over their full ten-year period
12 for any representative or proposed set of programs. Without knowing the costs of
13 the programs, the amount of energy conservation they achieve, or the way that
14 any projected capitalized costs, incentives, or NLR will impact ratepayers, it is
15 nearly impossible to determine whether the procedures are just and reasonable.

16 • Fourth, the Company has not demonstrated that the proposed levels of PPI, in
17 addition to the return on equity it will earn on the unamortized balances, are
18 reasonable given that it proposes to recover its costs and incentives through a
19 rider subject to annual true-up and to earn the PPI based upon *whatever* level of
20 reductions it achieves rather than having to meet performance target before
21 earning that incentive. (In other words, PEC's implicit performance goal, after
22 which it gets rewarded, is zero).

1 **II. RATIONALE FOR COST RECOVERY PROCEDURES IN GENERAL**

2 **Q. PLEASE SUMMARIZE THE COMPANY’S RATIONALE FOR THE COST-**
3 **RECOVERY PROCEDURES THAT IT PROPOSES.**

4 A. According to Mr. Williams, PEC is facing the need to add new base-load generation at
5 costs substantially greater than those reflected in its current rates. As a result, it expects
6 that meeting the future service requirements of its customers through DSM/EE programs
7 will be more cost-effective. Mr. Williams then notes the difference, from PEC’s
8 perspective, between meeting future customer service requirements through new supply-
9 side generation and/or capacity, versus reductions in customer electricity usage and
10 demand. Based upon those differences Mr. Williams states that PEC needs “...timely
11 cost recovery for all costs incurred, a mechanism to recover net lost revenues and an
12 appropriate incentive for promoting such programs”. He asserts that South Carolina law
13 permits the type of cost-recovery procedures that the Company is proposing.

14 **Q. WHAT IS YOUR CONCLUSION REGARDING THE COMPANY’S BASIC**
15 **RATIONALE FOR PROPOSING COST RECOVERY PROCEDURES FOR ITS**
16 **EE AND DSM PROGRAMS?**

17 A. The Company’s rationale for proposing cost-recovery procedures for its EE and DSM
18 programs is reasonable. Any entity responsible for reducing energy and demand through
19 EE and DSM programs needs the opportunity to recover its prudently incurred costs plus
20 a reasonable financial incentive to motivate its aggressive pursuit of all cost-effective
21 reductions in electricity usage and demand. In addition, if the entity is a utility, it may
22 need a mechanism or a combination of mechanisms to ensure that its earnings are not

1 adversely affected by those reductions in usage and demand. This rationale is discussed
2 in reports published by such organizations as the American Council for an Energy
3 Efficient Economy (ACEEE)¹ and the National Action Plan for Energy Efficiency
4 (NAPEE).² Moreover, I am advised by counsel that if the Commission adopts procedures
5 to encourage electric utilities to invest in cost-effective efficiency technologies and
6 programs, South Carolina law requires those procedures to provide for the three
7 categories of costs and incentives PEC is proposing. Thus, it is reasonable for PEC to
8 have a set of cost-recovery procedures that enable it to recover the prudently incurred
9 costs of its EE and DSM programs, plus a reasonable financial incentive and a reasonable
10 mechanism for minimizing adverse impacts on its earnings from those programs.

11 **III. REASONABLENESS OF SPECIFIC COST RECOVERY PROCEDURES**

12 **Q. DOES PEC BEAR THE BURDEN OF PROVING THAT THE SPECIFIC SET OF**
13 **COST RECOVERY PROCEDURES IT IS PROPOSING ARE REASONABLE?**

14 **A.** Yes. I am advised by counsel that the Commission is bound by the principle that “[e]very
15 rate made, demanded or received by any electrical utility . . . shall be just and
16 reasonable.” S.C. Code Ann. § 58-27-810 (2007). From a ratemaking policy perspective
17 it is my understanding that the proponent of a change in rates has the burden of proving
18 that the proposed change is just and reasonable.
19

¹ Kushler, Martin, et al. *Aligning Utility Interests with Energy Efficiency Objectives*. ACEEE, October 2006.

² National Action Plan for Energy Efficiency (2007). *Aligning Utility Incentives with Investment in Energy Efficiency*. Prepared by Val R. Jensen, ICF International <www.epa.gov/eeactionplan>.

1 There are a variety of approaches available to PEC for recovering its program
2 costs, earning a performance incentive and minimizing the adverse impact on earnings
3 from its programs. PEC is proposing a specific set of procedures, with specific values for
4 such details as amortization period, return and incentive levels. As the proponent, PEC
5 bears the burden of demonstrating that from the specific set of approaches and design
6 details it is proposing will result in rates that are just and reasonable.

7 **Q. HAS THE COMPANY DEMONSTRATED THAT THE SPECIFIC SET OF COST**
8 **RECOVERY PROCEDURES IT IS PROPOSING ARE REASONABLE?**

9 A. No. Based upon my review PEC has not demonstrated that the specific set of cost-
10 recovery procedures it is proposing will result in rates that are just and reasonable. First,
11 it has not provided a numerical example to demonstrate the actual operation of the
12 specific set of proposed cost-recovery procedures over their full ten year period for a
13 representative, or proposed, set of programs. Second, it has not demonstrated that the
14 proposed levels of PPI, in addition to the return on equity it will earn on the unamortized
15 balances, are reasonable in view of the fact that it proposes to recover its costs and
16 incentives through a rider subject to annual true-up and to earn the PPI based upon
17 whatever level of reductions it achieves rather than having to meet a meaningful level of
18 performance before earning that incentive, i.e. an implicit performance goal of zero.
19 Finally, it has not demonstrated that recovery of NLR for three years is the best approach
20 for minimizing adverse impacts on its earnings from those programs. I discuss each of
21 these flaws in PEC's application below.

1 **Q. HAS PEC DEMONSTRATED THE OPERATION OF ITS PROPOSED COST-**
2 **RECOVERY PROCEDURES OVER THE FULL COST RECOVERY PERIOD?**

3 A. No. PEC is proposing recovery of DSM/EE expenses over a ten-year period and
4 DSM/EE capital costs over potentially longer periods. In the North Carolina proceeding
5 it provided projections for only the first year of that ten-year period for its initial set of
6 programs. In this proceeding it has not provided *any* projections or illustrative examples.

7 **Q. WHY IS IT IMPORTANT FOR THE COMPANY TO PROVIDE A NUMERICAL**
8 **EXAMPLE TO DEMONSTRATE THE ACTUAL OPERATION OF THE**
9 **SPECIFIC SET OF PROPOSED COST-RECOVERY PROCEDURES?**

10 A. A numerical example is essential for all parties to truly understand the implications of the
11 specific set of proposed cost-recovery procedures on ratepayers, and their implications
12 for shareholder incentives. At the end of the day the Commission must determine
13 whether the rates that these procedures result in will be just and reasonable. I do not see
14 how the Commission can make that determination without reviewing the estimated levels
15 of rates and incentives for a proposed, or illustrative, set of programs. For example, how
16 does the projected level of PPI compare to the return on equity? What impact does each
17 category of cost and incentive have on the level of rates to be recovered?

18 Text descriptions of such procedures are subject to interpretation. A numerical
19 example goes a long way towards improving transparency and minimizing the chances of
20 misinterpretation. In addition, a numerical example provides Staff of the Commission
21 and intervenors the opportunity to prepare comparative analyses of alternative
22 approaches, and make better informed recommendations. For example, how would an

1 expensing approach compare to the proposed deferred accounting approach? What is the
2 implication of a lower PPI?

3 **Q. HAS PEC DEMONSTRATED THAT ITS PROPOSAL TO RECOVER A PPI IN**
4 **ADDITION TO RECOVERY OF PROGRAM EXPENSES OVER TEN YEARS**
5 **AND CAPITAL COSTS OVER THEIR USEFUL LIVES IS REASONABLE?**

6 A. No. If the Commission adopts the procedures allowed under S.C. Code Ann. § 58-37-
7 20, they must allow the utility to recover its costs and a reasonable rate of return to make
8 the programs at least as financially attractive as construction of new generating facilities.
9 On its face, PEC's proposal to recover its program costs over ten years, with a return on
10 the unamortized balances, through an annual rider with a true-up appears to make its
11 programs as financially attractive as construction of new generating facilities.

12 However, Mr. Williams states on page 7 of his pre-filed testimony that
13 investments in supply-side resources are more capital intensive than demand-side
14 resources, and therefore result in higher earnings. He goes on to state that the proposed
15 PPI would allow PEC to "...recover at least a portion of the earnings foregone by
16 investing in demand-side versus supply-side resources." Unfortunately, PEC has not
17 provided any quantitative analyses to support his assertions for the PEC system. Mr.
18 Williams does not provide an estimate of the earnings PEC will forego by investing in
19 demand-side resources. Nor does he provide the threshold investment criteria that PEC
20 requires before it will approve funding for either a supply-side or demand-side resource.
21 Thus, the parties to this proceeding lack the analysis and evidence they need in order to
22 determine whether the PPI will be too generous, just right, or not sufficient.

1 The goal of the incentive should be to make investing in demand-side resources at
2 least as financially attractive, and preferably somewhat more attractive, than investing in
3 new generating facilities. However, the incentive should not be designed to ensure that
4 the Company's shareholders receive the same level of absolute earnings as if they had
5 invested in supply-side resources, as that would reduce the savings to ratepayers from
6 investing in less-expensive demand-side resources.

7 **Q. HAVE ANALYSES BEEN PUBLISHED OF THE VARIOUS TYPES AND**
8 **LEVELS OF FINANCIAL INCENTIVES AVAILABLE TO ENCOURAGE**
9 **UTILITY PURSUIT OF ENERGY EFFICIENCY?**

10 **A:** Yes. I realize that the Commission will base its decision on South Carolina specific
11 circumstances and factors. Nevertheless, the lessons learned by other jurisdictions on
12 these procedures may help inform the debate in South Carolina.

13 Peter Cappers and Chuck Goldman from Lawrence Berkeley National Lab have
14 evaluated the financial implications of various types of shareholder incentives and have
15 not drawn any conclusions regarding the best way to motivate utilities to pursue EE.³
16 Both the ACEEE and the NAPEE have published survey reports on this issue, as I noted
17 earlier. These reports describe the various approaches to cost recovery, bonus incentives
18 and earnings stabilization mechanisms that are available to align utility financial
19 incentives with pursuit of EE.

20 The report sponsored by the NAPEE cites a decision by the California Public
21 Utilities Commission (CPUC) that is particularly relevant to PEC's discussion of the

1 incentives needed to put demand-sided investments on a par with, if not ahead of, supply-
2 side investments. In that decision the CPUC adopted an incentive structure after
3 conducting an analysis of the earnings that utilities could achieved from using supply-
4 side resources to meet future energy requirements rather than EE.⁴ Under the incentive
5 structure approved in that proceeding, a utility that achieves 100% or more of its energy
6 reduction goals will receive a pre-tax incentive equal to 12 % of the net savings from that
7 reduction. On its face this incentive seems comparable to the approach that PEC is
8 proposing, but in fact the PEC proposal is more attractive for several reasons.

- 9 • PEC proposes deferred accounting for its program costs, and to earn a return on at
10 its weighted average cost of capital on the unamortized balance, *in addition* to the
11 PPI. In contrast, California utilities are only eligible for the one financial
12 incentive.
- 13 • PEC proposes earning an incentive on load management *and* EE. California
14 utilities only earn an incentive on EE.
- 15 • PEC proposes earning an incentive at whatever level of reductions it actually
16 achieves. California utilities can only earn the incentive if they achieve a pre-
17 determined performance goal, which equates to incremental reductions greater
18 than 1% of annual retail sales. In addition they face includes penalties for failure
19 to meet specified minimum levels of performance.

³ Cappers, Peter et al. Quantitative Financial Analysis of Alternative Energy Efficiency Program Incentive Mechanisms. – *Synapse to provide full cite to paper from 2008 ACEEE Summer Study*

⁴ Decision 07-09-043 in Rulemaking 06-04-010, California Public Utilities Commission

1 **Q. HAVE OTHER JURISDICTIONS TYPICALLY REQUIRED UTILITIES TO**
2 **MEET A PRE-DETERMINED PERFORMANCE TARGET IN ORDER TO**
3 **RECEIVE A PERFORMANCE INCENTIVE?**

4 A: Yes. Chapter 6 of the NAPEE's report, *Aligning Utility Financial Incentives*, notes that
5 "[m]echanisms that allow utilities to capture some portion of net benefits typically
6 include savings performance targets".

7 **Q. HOW DO THE SHAREHOLDER INCENTIVES IN THE COMPANY'S**
8 **PROPOSED COST-RECOVERY PROCEDURES COMPARE TO**
9 **SHAREHOLDER INCENTIVES IN COST-RECOVERY MECHANISMS FOR EE**
10 **PROGRAMS APPROVED IN OTHER JURISDICTIONS?**

11 A: The shareholder incentives in PEC's proposed cost-recovery procedures look high
12 relative to those approved in other jurisdictions because:

- 13 • The Company has not proposed a specific performance target, whereas incentives
14 approved in other states typically have a target.
- 15 • The Company's proposed levels of shareholder incentives appear higher than those
16 approved for utility EE and DSM programs in the other jurisdictions, because of the
17 recovery of a PPI in addition to a return on unamortized balances.

18 However, I acknowledge that it is difficult to make a complete "apples to apples"
19 comparison of utility shareholder incentives for EE and DSM programs. First, a
20 shareholder or management incentives is only one component of the regulatory
21 framework within which a utility is delivering EE programs. Other relevant components
22 may include statutory requirements, explicit performance targets, the method of program

1 cost recovery, the method of lost margin recovery, rate design, and rate levels. It is very
2 difficult to either “normalize for” or capture all of these factors in any comparison of
3 shareholder incentives. Second, the shareholder incentives in other jurisdictions are
4 primarily for EE programs.

5 **Q. PLEASE COMMENT ON THE RECOVERY OF NLR UNDER THE**
6 **SETTLEMENT.**

7 A. Net lost revenues represent the retail revenues PEC estimates it would have collected, in
8 the absence of its programs, minus the costs it is able to avoid because of the reduction in
9 annual energy and peak demand. Thus NLR represents the fixed costs of providing
10 generation, transmission and distribution service, per kWh of retail sales, that PEC will
11 not collect from each kWh of energy reduction resulting from its programs. The
12 Company is proposing to recover net lost revenues for three years. However, it has not
13 demonstrated that it has evaluated other approaches nor that it is the best approach.

14 **Q. WHAT FACTORS DO YOU SUGGEST THAT THE COMMISSION CONSIDER**
15 **WHEN DETERMINING WHETHER A PARTICULAR SET OF COST-**
16 **RECOVERY PROCEDURES IS REASONABLE?**

17 A. In order to determine whether a particular set of cost-recovery procedures is reasonable,
18 the Commission should consider both the performance the Company proposes to achieve,
19 and the compensation the Company will receive if it actually achieves that performance,
20 including recovery of program costs, bonus incentives and net lost revenues.

21 **Q. DOES THIS COMPLETE YOUR DIRECT TESTIMONY?**

22 A. Yes.

James Richard Hornby

Senior Consultant
Synapse Energy Economics, Inc.
22 Pearl Street, Cambridge, MA 02139
(617) 661-3248 ext. 243 • fax: (617) 661-0599
www.synapse-energy.com
rhornby@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. *Senior Consultant*, 2006 to present.
Analysis and expert testimony regarding planning, market structure, ratemaking and contracting issues in the electricity and natural gas industries.

Charles River Associates (formerly Tabors Caramanis & Associates), Cambridge, MA.
Principal, 2004-2006.

Senior Consultant, 1998-2004.

Provided expert testimony and litigation support in several energy contract price arbitration proceedings, as well as in electric and gas utility ratemaking proceedings in Ontario, New York, Nova Scotia and New Jersey. Managed a major productivity improvement and planning project for two electric distribution companies within the Abu Dhabi Water and Electricity Authority. Analyzed a range of market structure and contracting issues in wholesale electricity markets.

Tellus Institute, Boston, MA.

Vice President and Director of Energy Group, 1997-1998.

Presented expert testimony on rates for unbundled retail services in restructured retail markets and analyzed the options for purchasing electricity and gas in those markets.

Manager of Natural Gas Program, 1986-1997.

Prepared testimony and reports on a range of gas industry issues including market structure, unbundled services, ratemaking, strategic planning, market analyses, and supply planning.

Nova Scotia Department of Mines and Energy, Halifax, Canada; 1981-1986

Member, Canada-Nova Scotia Offshore Oil and Gas Board, 1983-1986

Member of a federal-provincial board responsible for regulating petroleum industry exploration and development activity offshore Nova Scotia.

Assistant Deputy Minister of Energy 1983-1986

Responsible for analysis and implementation of provincial energy policies and programs, as well as for Energy Division budget and staff. Directed preparation of comprehensive energy plan emphasizing energy efficiency and use of provincial energy resources. Senior technical advisor on provincial team responsible for negotiating and implementing a federal/provincial fiscal, regulatory, and legislative regime to govern offshore oil and gas. Directed analyses of proposals to develop and market natural gas, coal, and tidal power resources. Also served as Director of Energy Resources (1982-1983) and Assistant to the Deputy Minister (1981-1982).

Nova Scotia Research Foundation, Dartmouth, Canada, Consultant, 1978–1981
Edited Nova Scotia's first comprehensive energy plan. Administered government-funded industrial energy conservation program—audits, feasibility studies, and investment grants.

Canadian Keyes Fibre, Hantsport, Canada, Project Engineer, 1975–1977

Imperial Group Limited, Bristol, England, Management Consultant, 1973–1975

EDUCATION

M.S., Technology and Policy (Energy), Massachusetts Institute of Technology, 1979.
Thesis: "An Assessment of Government Policies to Promote Investments in Energy Conserving Technologies"

B.Eng. Industrial Engineering (with Distinction), Dalhousie University, Canada, 1973

EXPERT TESTIMONY AND LITIGATION SUPPORT (1987 to present)

Provided expert testimony and/or litigation support on planning, market structure, ratemaking and gas supply/fuel procurement in the electric and gas industries in approximately 100 proceedings in over thirty jurisdictions in the United States and Canada. List of proceedings available upon request.
