

MATTER M08670

IN THE MATTER OF NSPI'S 2018 LOAD FORECAST REPORT

REDACTED DIRECT TESTIMONY OF

PAUL CHERNICK

ON BEHALF OF

THE CONSUMER ADVOCATE

RESOURCE INSIGHT, INC.

JULY 4, 2018

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EXHIBIT PLC-1 *QUALIFICATIONS OF PAUL CHERNICK*

1 **I. Identification**

2 **Q: Mr. Chernick, please state your name, occupation, and business address.**

3 A: I am Paul L. Chernick. I am the president of Resource Insight, Inc., 5 Water St.,
4 Arlington, Massachusetts.

5 **Q: Summarize your professional education and experience.**

6 A: Attached to this Evidence as Exhibit PLC-1 is a detailed listing of my qualifications
7 and experience.

8 **II. Introduction and Summary**

9 **Q: On whose behalf are you testifying?**

10 A: My testimony is sponsored by the Nova Scotia Consumer Advocate.

11 **Q: What is the purpose of your testimony?**

12 A: I review aspects of the 2018 Load Forecast Report and supporting documentation
13 filed by Nova Scotia Power, Inc. (NS Power) and comment on aspects of the load
14 forecast methodology, especially in light of new initiatives approved by the Board,
15 as well as reporting metrics.

16 **Q: Please briefly summarize Nova Scotia's 2018 Load Forecast results.**

17 A: In general, NS Power's 2018 load forecast methodology closely resembles that used
18 in the 2017 forecast. NS Power uses Statistically Adjusted End-Use (SAE) models
19 to forecast energy requirements for the residential and commercial classes, an
20 econometric forecast for industrial use, and customer-specific forecasts for the
21 largest customers. In addition to the usual annual updates in such inputs as normal
22 climate and economic forecasts, NS Power has revised historical commercial end-

1 use energy intensity estimates, to reflect updated data from the U.S. Energy
2 Information Administration (Load Forecast at 30).

3 Net of load reductions from behind-the-meter solar generation and demand-
4 side management (DSM), NS Power forecasts that annual net system requirements
5 (NSR) will decline by 0.3 percent and that peak load will rise by 0.2 percent per
6 year (Load Forecast at 7, 51). As in the 2017 Load Forecast, customer fuel
7 switching to electricity from other fuels (for heating space and water) primarily
8 drives the increases in demand.

9 **Q: How will the 10-year Load Forecast Report be utilized by NS Power for**
10 **additional planning?**

11 A: NS Power uses the annual ten-year load forecast report in any planning effort
12 requiring forecasts of energy usage or peak demand. It is an important input to a
13 wide range of regulatory analyses, including “planning, budgeting and operating
14 activities of the Company” (at 9). Specifically, NS Power says that it will use the
15 load forecast data in the following efforts (SBA IR-1):

- 16 • Reliability assessments reporting to the Northeast Power Coordinating Council
- 17 • Internal budgeting
- 18 • FAM allocation calculations for the Annual Adjustment and Base Adjustment
- 19 • Demand side management annual rate and bill impact analysis
- 20 • Fuel requirement forecasts
- 21 • DSM planning
- 22 • Rate calculations for the Annually Adjusted Rates

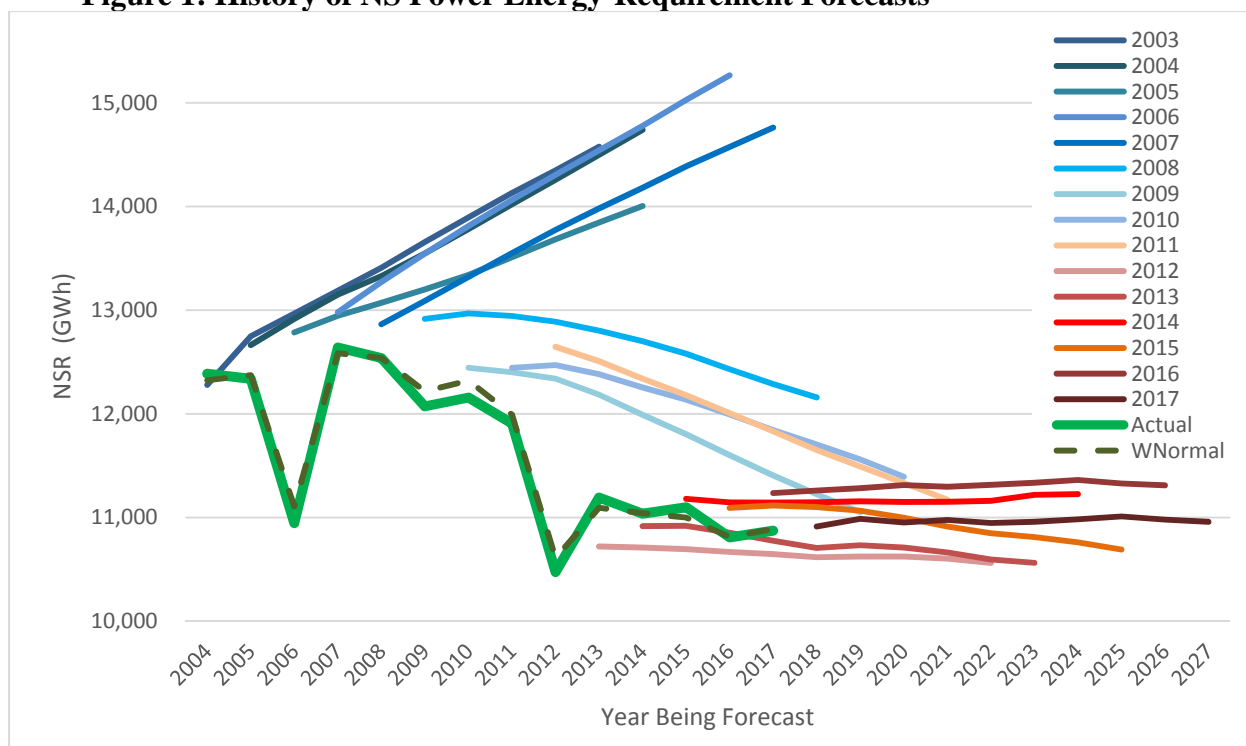
23 While NS Power does not mention it, the load forecasts over the next few
24 years may also be important in determining whether NS Power signs contracts for
25 incremental supplies of renewables in 2020, capacity as early as 2022, and other
26 resources, as well as informing the rate-design proposals that NS Power must file in

1 June 2020. Given the number of applications for the load forecast, it is important to
2 ensure that the forecast report provides reliable and reasonable results.

3 **Q: How have NS Power's forecasts performed over time?**

4 A: The accuracy of NS Power's forecasts have varied over time, as shown in Figure 1
5 (plotted from the data in CA IR-51, Attachment 1).

6 **Figure 1: History of NS Power Energy-Requirement Forecasts**



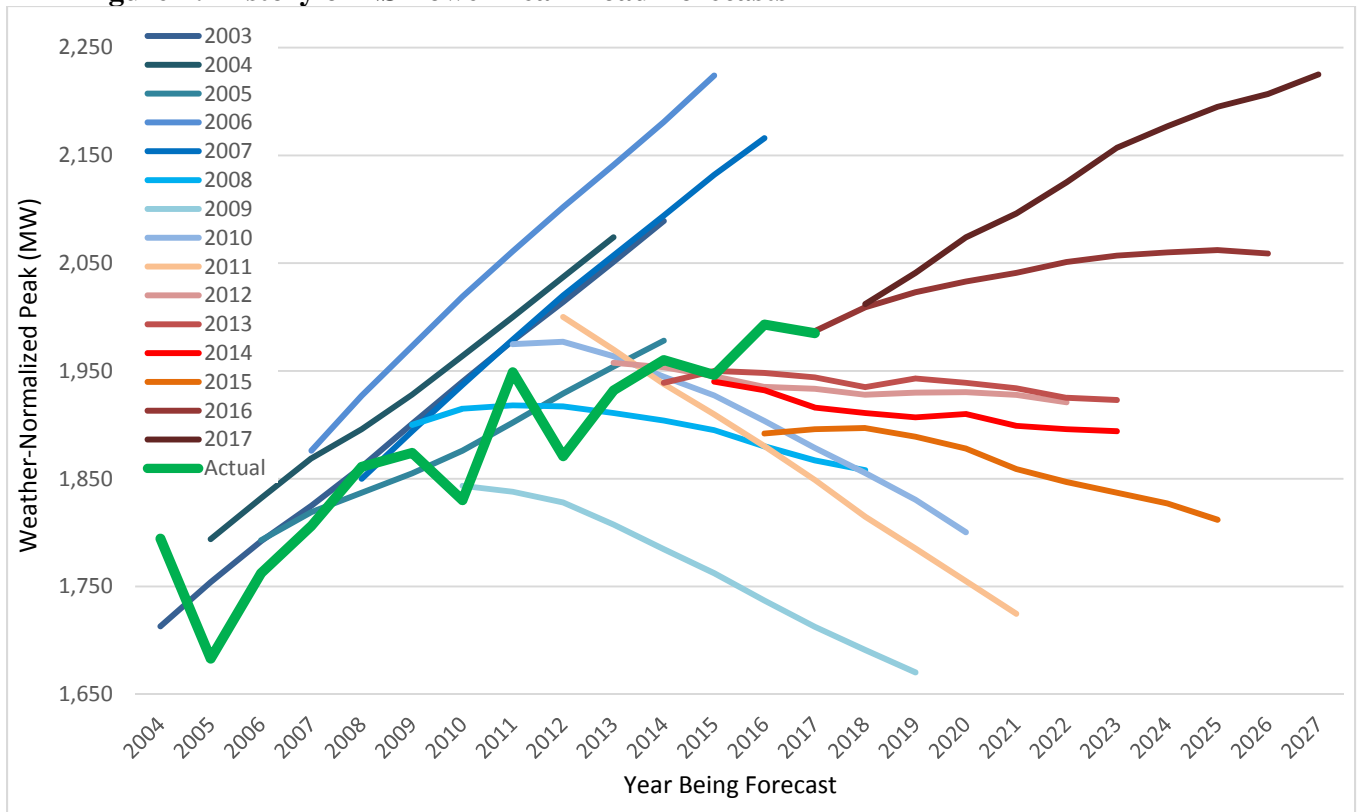
7
8 NS Power's forecasts prior to 2008 were grossly unrealistic, projecting annual
9 growth of 1% to 2%. In the period 2008 to 2011, NS Power recognized that loads
10 were falling, but still overstated near-term load. Since 2012, NS Power has forecast
11 flat or slowly falling load. The projected load level has varied from one forecast to
12 the next, but the range of forecasts is similar to the range of actual loads in the
13 period 2013–2017.

1 In future years, NS Power will have data on customer energy usage as that
2 energy is used, rather than as it is billed. Better data may improve NS Power's
3 forecasting.

4 **Q: Is the same pattern evident in the history of NS Power's peak load forecasts?**

5 A: There are some similarities. As shown in Figure 2, the forecasts from 2003 fit the
6 subsequent actual peaks quit well, while those from 2004–2007 projected excessive
7 growth.

8 **Figure 2: History of NS Power Peak-Load Forecasts**



9
10 In 2008–2011, NS Power projected load declines that did not occur. In 2012–
11 2015, the forecasts were flat or declining more slowly. In 2016 and 2017, NSP has
12 projected peak load trajectories that appear to be roughly consistent with the trend
13 from 2009 or so. But those two latest forecasts produce very different peak
14 projections, with the 2017 forecast projecting 100 MW more than the 2016 forecast

1 as soon as 2023, and 150 MW by 2026. Since those differentials are enough to
2 require an additional large unit, distinguishing between these futures will be
3 important over the next couple years.

4 **Q: What issues have you identified with the 2018 Load Forecast Report?**

5 A: I have not identified any problems with the core econometric and SAE
6 methodologies used in the forecast, but I do have some concerns regarding some
7 input assumptions and NS Power's treatment of energy and peak savings from some
8 of its planned programs.

9 **Q: Do you have any other concerns separate from the load forecasting**
10 **methodology?**

11 A: I have some general comments relating to reporting requirements and
12 recommendations that future load forecast reports utilize the improved level of
13 information enabled by AMI. Specifically, the ability to base the load forecast on
14 actual sales versus the current method of billed sales, collect data at the substation
15 level and record peak usage by customer classes. In addition, I also discuss some
16 data inconsistencies used for the rooftop solar installation projections. Lastly, I
17 develop some comments for consideration in the 2019 Load forecast.

18 **Q: What opportunities will NS Power have to improve future load forecasts?**

19 A: Over the next few years, NS Power will have access to data from the AMI meters,
20 which will allow the forecasters to determine class contributions to peak load, the
21 effect of hourly weather on consumption by customers with varying characteristics
22 (e.g., annual consumption, heating source, rate option), peak contribution by end use
23 (e.g., electric-vehicle ownership), DSM effects on peak load, and similar data.

1 **III. Demand Side Management**

2 **Q: How has NS Power accounted for savings from demand side management?**

3 A: NS Power incorporates the effects of DSM programs administered by Efficiency
4 Nova Scotia (ENS or E1) in two ways in the 2018 load forecast. For 2018 and 2019,
5 NS Power bases DSM adjustments on the Board-approved DSM plan for 2018.
6 Thereafter, NS Power says that it relies on the base case DSM savings identified in
7 the 2014 IRP (Load Forecast at 34).¹

8 **Q: Does NS Power reduce the load forecasts by the amount suggested in the ENS
9 plan or the 2014 IRP?**

10 A: No. As it has in the last few years, NS Power hypothesizes that the savings claimed
11 by NS Power when it ran the programs and by ENS since 2008 may be overstated
12 and attempts to use regression analyses to determine how much of the claimed
13 efficiency improvements appeared in the historical data. NS Power concludes that
14 only 57.9% of residential savings and 60.8% of commercial savings were real.
15 (Load Forecast Report at 36). NS Power interprets these fractions as being the
16 percentage of reported DSM savings that would have been captured in the forecast
17 without any DSM adjustments.

18 NS Power multiplies the percentages derived from its regression analyses by
19 the planned or projected DSM savings in the forecast.

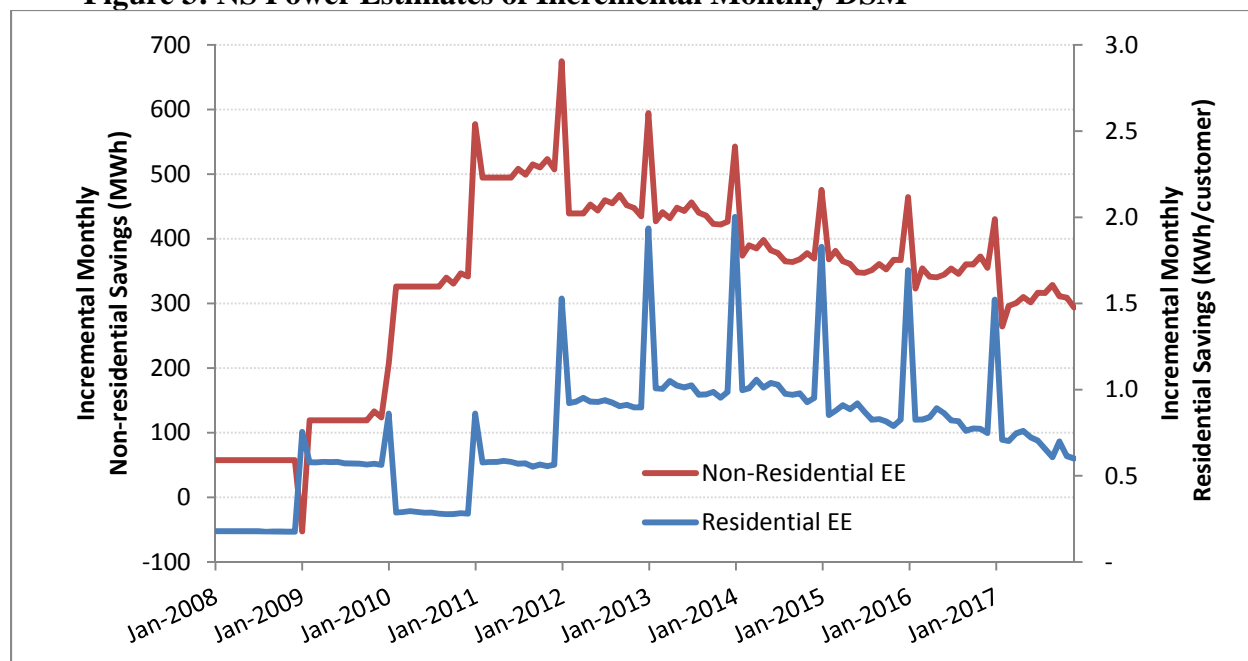
20 **Q: Do you agree with NS Power's interpretation of its results?**

21 A: I am dubious about this interpretation, at best. I suspect that the regression analyses
22 are just trying to fit limited data to a small number of generally rising independent
23 variables, including DSM savings. While NS Power includes 120 monthly DSM

¹ In M08087 the Board approved Preferred IRP provided by Synapse, IRP values reported by NS Power do match those in the Synapse Preferred report.

1 energy reductions in each of its DSM regressions, most of those values appear to
2 have been invented. Sometimes NS Power assumes that DSM savings grow linearly
3 through the year, sometimes with jumps in January, sometimes with apparently
4 random patterns, as shown in Figure 3.

5 **Figure 3: NS Power Estimates of Incremental Monthly DSM**



6
7 Interestingly, other than the spikes in January (except for non-residential in
8 2009, when there is drop in January), the monthly patterns do not show the expected
9 annual patterns in savings, which should rise in the fall due to growing lighting load
10 and then decline in the spring, following lighting use, or rise in the winter, following
11 space-heating use.

12 **Q: Is NS Power's discounting of the DSM savings important?**

13 **A:** Yes, for two reasons. First, reducing the DSM savings by about 40% results in a
14 significantly higher final forecast. Second, if NS Power is correct, Efficiency Nova
15 Scotia is overstating its net DSM savings by about 67%. If the real net DSM savings
16 are that much lower, the cost-effectiveness of ENS's programs would be called into
17 question.

1 I suspect that NS Power's adjustments to the planned DSM savings are
2 unwarranted, but the Board should encourage the parties to try to resolve this issue.

3 **Q: How else might NS Power account for the effect of DSM on the historical load**
4 **data used in its regressions?**

5 A: One approach, used by ISO-NE and PJM, removes the DSM savings from the
6 historical data used in the regression, to derive the relationship between the
7 independent variables and the pre-DSM loads. The resulting coefficients are used to
8 create a no-DSM forecast; subtracting the DSM projection produces the final
9 forecast. This approach eliminates the potential for double-counting DSM, without
10 assuming that past and future DSM savings estimates are seriously biased.

11 **Q: How has NS Power incorporated the claimed savings from its Advanced**
12 **Metering Infrastructure (AMI) project, approved by the Board in M08349 into**
13 **the 2018 Load Forecast?**

14 A: NS Power has not incorporated any savings from AMI into the 2018 Load Forecast,
15 though NS Power acknowledges that critical peak pricing (CPP) programs enabled
16 by AMI will reduce peak by as much as 26 MW by 2022 (Load Forecast at 50). This
17 is quite unfortunate considering NS Power's dedication to deploy AMI systemwide
18 since 2009. And, most recently NS Power claimed \$208 million in estimated
19 benefits for the \$133 million investment in the AMI project, of which 28% are
20 attributed to demand or energy reductions (AMI Application M08349, Appendix B).

21 **Q: What level of AMI enabled DSM should NS Power reflect in the 2018 Load**
22 **Forecast?**

1 A: NS Power should reflect the same level of expected savings for AMI enabled
2 programs as used to justify the benefits of the AMI investment.² NS Power's AMI
3 plan estimated savings of 31 MW from the following programs:

- 4 • Load balancing among phases on feeders: about 3.1 MW (Matter M08349,
5 CA IR-30) throughout the year, which would be about 27 GWh of annual
6 savings.
- 7 • Critical peak pricing: about [REDACTED] MW of peak reduction by 2022, which the
8 Load Forecast Report (at 50) adjusts upward to 26 MW.
- 9 • Bill alert savings program: about [REDACTED] MW and [REDACTED] GWh by 2022, and [REDACTED] MW
10 and [REDACTED] GWh by 2027, based on 0.75% of annual energy usage and peak load
11 for approximately 90% of residential customers (Matter M08087 Application
12 at 35).

13 NS Power does not explain why it ignored these load reductions in the 2018
14 Load Forecast.

15 **Q: Are you aware of any other targeted peak demand reduction programs that NS**
16 **Power has neglected to include in the peak load forecast?**

17 A: Yes. NS Power has recently stated that it is pursuing energy and/or peak savings
18 from:

- 19 • The Intelligent Feeder project (CI 49787), which may be superseded by the
20 load balancing functions of the AMI project.
- 21 • Locational DSM initiatives to reduce peak loading at the substation level
22 (M07815). (M08604, NSPI (CA) IR-1)

² If NS Power no longer believes that those estimates are reasonable, it should inform the Board of its changed savings projections.

- 1 • Working with ENS to develop new peak reduction programs, including water
2 heater timers, electric thermal storage, battery storage, and pricing initiatives.
3 (M08604, NSPI (CA) IR-2)

4 **Q: Why does NS Power not include the DSM savings from the programs that you**
5 **just described?**

6 A: NS Power states that it believes the range of savings from peak demand programs
7 “fits within the sensitivity analysis.” (Load Forecast at 50)

8 **Q: Please describe NSPI’s sensitivity analysis.**

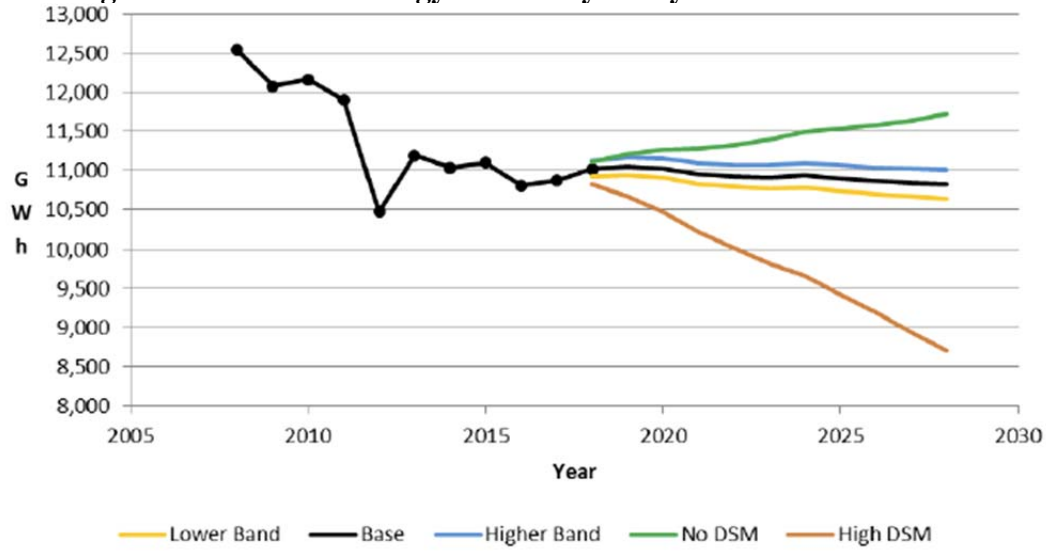
9 A: The sensitivity analysis combines the regression coefficients calculated in the
10 forecasting model with randomly selected inputs for annual variability in weather
11 and economic conditions, to create a Monte Carlo simulation.³ Figure 4 (reproduced
12 from the 2018 Load Forecast, Figure 31) provides the range of energy loads
13 calculated in NS Power’s sensitivity analysis, along with NS Power’s assessment of
14 the effect of variation in DSM effort and effectiveness.⁴

³ The variation in weather appears to mimic the historical distribution of monthly heating degree days (HDDs) and peak-day temperature, while the economic variables seem to be modeled as the historical distribution of annual changes in retail sales, household income, GDP, and employment. Thus, the weather values chosen for any one year do not affect later years, but the economic values do. It is not clear what correlation, if any, NS Power assumed between the peak-day temperature and the monthly HDDs. Nor is it clear whether or how NS Power adjusted the historical variation in the economic variables to be consistent with the lower forecast baseline.

⁴ The High DSM case eliminates NS Power’s roughly 40% reduction in the DSM effects, and thus can be interpreted as a sensitivity case for the accuracy of NS Power’s adjustment of DSM effectiveness. The High DSM case does not reflect increased DSM efforts.

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Figure 4: NS Power Energy Sensitivity Analysis Results



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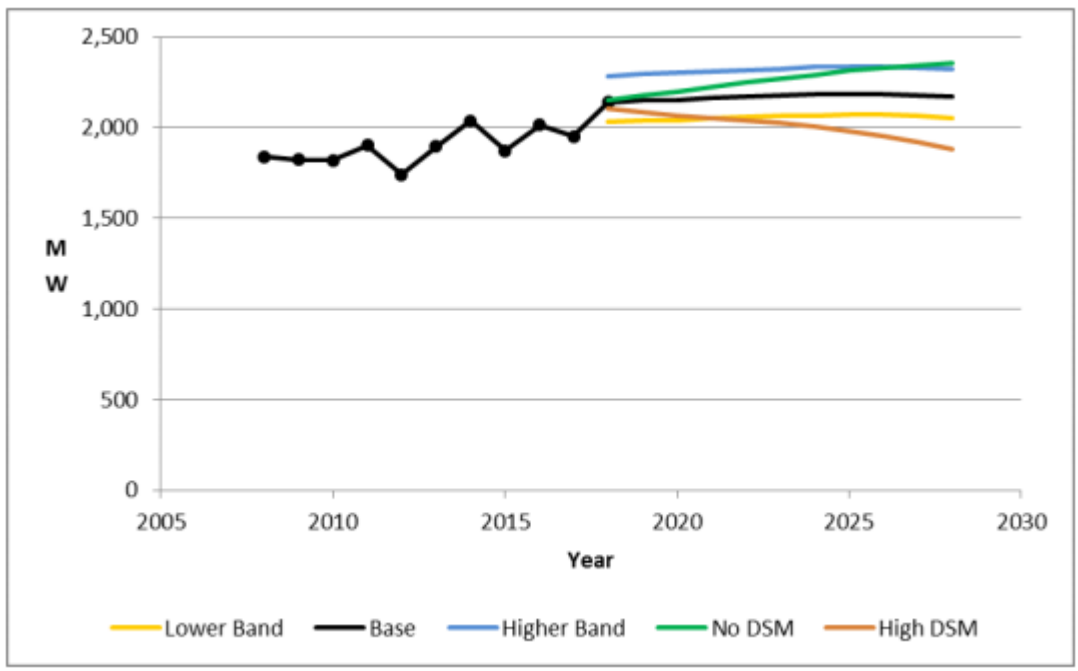
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Figure 5 (from the 2018 Load Forecast, Figure 32) provides the same information for the peak loads from NS Power’s sensitivity analysis.

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Figure 5: NS Power Peak Sensitivity Analysis Results



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As NS Power notes, 97% of the peak-load variation and 72% of the energy variability in its sensitivity analysis for 2020 are due to weather, as is 34% of the variability in the energy forecast for 2028. (Load Forecast Figure D6 to D8). Since

9

10

1 the variability in weather should be nearly constant over time, NS Power's Figures
2 D7 and D8 the cumulative energy variability due to the economy must increase by a
3 factor of three or four over time. This effect is barely visible in Figure 4 or Figure 5;
4 weather apparently continues to dominate load variability.

5 The sensitivity analysis does not reflect uncertainty in the penetrations of heat
6 pumps, electric vehicles, and behind-the-meter photovoltaics, or in Port
7 Hawkesbury Paper operating level.

8 **Q: How should the Board interpret the range of loads shown in Figure 5?**

9 A: The Board should be very cautious in relying on this summary of forecast
10 uncertainty, for two reasons. First, the sensitivity distribution (including the low
11 band in Figure 5) is incomplete in that it does not reflect the probability that NS
12 Power's DSM adjustment is unwarranted, as reflected in the High DSM case; the
13 uncertainty in Port Hawkesbury Paper operations; the uncertainty in NS Power's
14 projections of fuel switching, electric vehicles, or behind-the-meter solar; or the
15 effects of the AMI-enabled programs.

16 Second, the sensitivity analysis conflates two types of variation. Economic
17 drivers vary in the short term and are also uncertain in the longer term. The
18 uncertainty in weather is primarily a short-term effect, with a cold January and a
19 cold peak day increasing peak load in one year, but not the next. Hence, assuming
20 that NS Power's analysis is otherwise accurate, any one annual peak may be as high
21 or low as indicated by the Higher Band and Lower Band lines, but the probability of
22 the load following either band over several years is vanishingly low. NS Power
23 needs to have contingency plans for meeting load in those extreme weather
24 conditions, but it would not be appropriate to plan for those load levels every year.

1 **Q: Does the NS Power sensitivity analysis adequately represent the potential**
2 **effects of the AMI programs and other NS Power efforts that it has not**
3 **modeled in the load forecast?**

4 A: No. The expected effects of the non-modeled programs would shift the base
5 forecast, which the sensitivity analysis does not address. NS Power's base results
6 are thereby biased towards potentially higher system requirements. In addition, the
7 uncertainties in the non-modeled programs (as well as penetrations of fuel
8 switching, electric-vehicle and behind-the-meter solar) will increase the spread
9 between high and low futures.

10 **IV. Exogenous Adjustments**

11 **Q: How does NS Power estimate the effects of end-use trends that are not**
12 **embedded in the historical data for the regression analyses?**

13 A: For the adoption of heat pumps (which can reduce loads if they replace electric
14 resistance heat, but increase loads if they replace non-electric heat), water heaters,
15 rooftop solar and electric vehicles, NS Power estimates the impacts outside of the
16 regression model. NS Power forecasts future adoption rates for water heaters and
17 heat pumps from internal research and surveys of its customers. For electric vehicles
18 and rooftop-solar installations, NS Power relies on external market research to
19 forecast adoption rates.

20 **Q: Do you have any concerns with NS Power's approach for solar installations for**
21 **Nova Scotia customers?**

22 A: Yes. NS Power says that its assumptions for solar installation in the load forecast are
23 based on the solar adoption rates in the economic analysis supporting its AMI
24 deployment filing (Load Forecast at 27). Yet, as shown in Table 1, the load forecast

1 uses a much higher projection of solar penetration than did the AMI filing.⁵ As I
2 noted in my testimony in the AMI case:

3 NS Power bases its proposed annual adoption rate on the growth rates
4 experienced in Massachusetts....

5 The solar market in Massachusetts is an advanced market, much more so than
6 that found in Nova Scotia. Massachusetts has a history of offering solar
7 incentives, including very valuable solar renewable energy credits (currently
8 trading for about \$300/MWh for the projects completed in 2008–2013,
9 \$200/MWh for later projects), tax credits and net metering at rates higher than
10 NS Power’s. Incentives for solar in Nova Scotia are much smaller. (Matter No.
11 M08349, Exhibit N-18, at 16)

12 NS Power’s projection of the rate at which behind-the-meter solar generation
13 will grow in Nova Scotia was probably overstated in the AMI proceeding, unless
14 Nova Scotia enacts incentives comparable to those in Massachusetts, California or
15 other aggressive jurisdictions. The solar projection in the 2018 load forecast is even
16 higher and, barring some change in policy, unlikely.

17 **Table 1: Cumulative Rooftop Solar Installations, AMI Application and 2018 Load**
18 **Forecast**

Year	AMI Filing	Load Forecast Report	Percent difference
2018	█	299	█
2019	█	725	█
2020	█	1,446	█
2021	█	3,298	█
2022	█	6,935	█
2023	█	10,562	█
2024	█	15,785	█
2025	█	17,395	█
2026	█	18,812	█
2027	█	20,343	█
2028	█	21,789	█

Sources: M08349 Appendix B02 workbook, tab “Avoided Net Meters.”
Load Forecast Report, Figure 13

⁵ NS Power did not project any behind-the-meter solar generation in the 2017 Load Forecast.

1 **Q: Do you have any concerns regarding the treatment of electric vehicles in the**
2 **load forecast?**

3 **A:** Yes. In addition to the lack of an analysis of the range of plausible rate of
4 penetration of electric vehicles or their energy use, NS Power assumes that electric
5 vehicle load will increase peak load (Load Forecast at 42). NS Power will have the
6 communication and metering capabilities to provide rate incentives for docked
7 electric vehicles to charge off-peak and to discharge as needed by the system, to
8 reduce annual peak and energy costs. NS Power's 2019 forecast report should
9 address how it would propose to integrate electric vehicles into its system. The rate-
10 design filing that NS Power must make by June 2020 (M08349, June 23, 2018)
11 should explain how the rate design provides incentives for electric vehicles to
12 reduce net peak load, rather than increase it.

13 **V. Gross and Net Load Requirements**

14 **Q: Does NS Power need to generate all the power that it delivers to customers in**
15 **Nova Scotia?**

16 **A:** No. The municipal utilities can purchase some or all of their energy from renewable
17 generators, with NS Power providing transmission, balancing, supplemental
18 capacity, and other services through the Back-Up Top-Up (BUTU) rate. In principle,
19 similar arrangements are available to retail customers under the renewable-to-retail
20 (RtR) rate provisions, although the structure of those rates have precluded any RtR
21 activities.

22 **Q: How does the 2018 Load Forecast report the municipal loads?**

23 **A:** As NS Power explains, the net system energy requirement (NSR) "forecast only
24 accounts for the load served under the bundled rate since from a planning

1 perspective the BUTU amount will be offset by an equal amount of Spill, which is
2 not part of the load forecast. For actual historical sales, BUTU is included in the
3 municipal amount” (Forecast Report at 47). The load forecast report does not
4 describe how NS Power accounts for the Municipal contributions to peak load.

5 **Q: Are the amounts of the Municipal loads served under the BUTU rate**
6 **significant?**

7 A: Yes. In the 2017 load forecast report, NS Power reported that 11% of municipal load
8 was met by third parties in 2016, and estimated that fraction would rise to 18%, in
9 2017 (Matter No. M08087, Exhibit N-2, CA IR-29). NS Power now estimates that
10 25% of municipal load was supplied by third parties in 2017, rising to 35% in 2018
11 (Synapse IR-13j).

12 **Q: What information should NS Power provide, regarding the energy and**
13 **capacity requirements of the Municipal utilities and any other customers who**
14 **choose to be served by third parties?**

15 A: NS Power should be reporting total provincial energy and peak load, as well as the
16 portion served by third parties, and hence the net load that NS Power must supply.
17 This information would be useful for such purposes as:

- 18 • Distinguishing between NS Power’s transmission requirements (which are
19 driven by total load and the location of the third-party generation) and NS
20 Power’s generation requirements (driven by net peak load).
- 21 • Modeling the net Nova Scotia Power load shape for determining the value of
22 incremental energy resources, load-shifting, and other energy-related decisions.

1 **VI. Recommendations**

2 **Q: What are your recommendations?**

3 A: I recommend the following improvements in the 2018 Load Forecast, this summer if
4 possible, but certainly in time for the 2019 Load Forecast Report:

- 5 • NS Power should incorporate its best estimates of the savings from AMI-
6 enabled programs (bill alerts, CPP rate design, and load balancing) in the load
7 forecast. If those estimates are much lower than those used in the economic
8 justification of AMI, NS Power should update its AMI analysis for the Board.
- 9 • NS Power should provide a clear derivation of its behind-the-meter solar
10 installation forecast and explain how it is consistent with experience in other
11 jurisdictions with solar policies similar to those expected in Nova Scotia.
- 12 • The energy and peak contributions of the Municipal class should be reported in
13 both gross and net terms.

14 In addition, the 2019 load forecast should explain how NS Power plans to
15 collect and use the improved data available from the AMI system, and start the
16 process of reporting the load forecast's performance on an ongoing basis.

17 **Q: Does this conclude your testimony?**

18 A: Yes.

PAUL L. CHERNICK

Resource Insight, Inc.
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Arlington, Massachusetts 02476

SUMMARY OF PROFESSIONAL EXPERIENCE

- 1986–Present* **President, Resource Insight, Inc.** Consults and testifies in utility and insurance economics. Reviews utility supply-planning processes and outcomes: assesses prudence of prior power planning investment decisions, identifies excess generating capacity, analyzes effects of power-pool-pricing rules on equity and utility incentives. Reviews electric-utility rate design. Estimates magnitude and cost of future load growth. Designs and evaluates conservation programs for electric, natural-gas, and water utilities, including hook-up charges and conservation cost recovery mechanisms. Determines avoided costs due to cogenerators. Evaluates cogeneration rate risk. Negotiates cogeneration contracts. Reviews management and pricing of district heating systems. Determines fair profit margins for automobile and workers' compensation insurance lines, incorporating reward for risk, return on investments, and tax effects. Determines profitability of transportation services. Advises regulatory commissions in least-cost planning, rate design, and cost allocation.
- 1981–86* **Research Associate, Analysis and Inference, Inc.** (Consultant, 1980–81). Researched, advised, and testified in various aspects of utility and insurance regulation. Designed self-insurance pool for nuclear decommissioning; estimated probability and cost of insurable events, and rate levels; assessed alternative rate designs. Projected nuclear power plant construction, operation, and decommissioning costs. Assessed reasonableness of earlier estimates of nuclear power plant construction schedules and costs. Reviewed prudence of utility construction decisions. Consulted on utility rate-design issues, including small-power-producer rates; retail natural-gas rates; public-agency electric rates, and comprehensive electric-rate design for a regional power agency. Developed electricity cost allocations between customer classes. Reviewed district-heating-system efficiency. Proposed power-plant performance standards. Analyzed auto-insurance profit requirements. Designed utility-financed, decentralized conservation program. Analyzed cost-effectiveness of transmission lines.
- 1977–81* **Utility Rate Analyst, Massachusetts Attorney General.** Analyzed utility filings and prepared alternative proposals. Participated in rate negotiations, discovery, cross-examination, and briefing. Provided extensive expert testimony before various regulatory agencies. Topics included demand forecasting, rate design, marginal costs, time-of-use rates, reliability issues, power-pool operations, nuclear-power cost projections, power-plant cost-benefit analysis, energy conservation, and alternative-energy development.

EDUCATION

SM, Technology and Policy Program, Massachusetts Institute of Technology, February 1978.

SB, Civil Engineering Department, Massachusetts Institute of Technology, June 1974.

HONORS

Chi Epsilon (Civil Engineering)

Tau Beta Pi (Engineering)

Sigma Xi (Research)

Institute Award, Institute of Public Utilities, 1981.

PUBLICATIONS

“Price Effects as a Benefit of Energy-Efficiency Programs” (with John Plunkett), *2014 ACEEE Summer Study on Energy Efficiency in Buildings* (5) 57–5-69. 2014.

“Environmental Regulation in the Changing Electric-Utility Industry” (with Rachel Brailove), *International Association for Energy Economics Seventeenth Annual North American Conference* (96–105). Cleveland, Ohio: USAEE. 1996.

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“Cost Allocation for Utility Ratemaking.” With Susan Geller. Day-long workshop for the staff of the Connecticut Department of Public Utility Control, October 1993.

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“Review and Modification of Regulatory and Rate Making Policy,” National Governors’ Association Working Group on Nuclear Power Cost Overruns; Washington, D.C., June 20 1984.

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District of Columbia Public Service Commission, Docket No. 834, Phase II; Least-cost planning procedures and goals. August 1987 to March 1988.

Connecticut Department of Public Utility Control, Docket No. 87-07-01, Phase 2; Rate design and cost allocations. March 1988 to June 1989.

Austin City Council, Austin Energy Rates, March to June 2012.

Puerto Rico Energy Commission, Puerto Rico Electric Power Authority, rate design issues, September 2015 to present.

EXPERT TESTIMONY

1. **Mass. EFSC 78-12/MDPU 19494**, Phase I; Boston Edison 1978 forecast; Massachusetts Attorney General. June 1978.

Appliance penetration projections, price elasticity, econometric commercial forecast, peak demand forecast. Joint testimony with Susan C. Geller.

2. **Mass. EFSC 78-17**, Northeast Utilities 1978 forecast; Massachusetts Attorney General. September 1978.

Specification of economic/demographic and industrial models, appliance efficiency, commercial model structure and estimation.

3. **Mass. EFSC 78-33**, Eastern Utilities Associates 1978 forecast; Massachusetts Attorney General. November 1978.

Household size, appliance efficiency, appliance penetration, price elasticity, commercial forecast, industrial trending, peak demand forecast.

4. **Mass. DPU 19494, Phase II**; Boston Edison Company construction program; Massachusetts Attorney General. April 1979.

Review of numerous aspects of the 1978 demand forecasts of nine New England electric utilities, constituting 92% of projected regional demand growth, and of the NEPOOL demand forecast. Joint testimony with Susan Geller.

5. **Mass. DPU 19494, Phase II**; Boston Edison Company construction program; Massachusetts Attorney General. April 1979.

Reliability, capacity planning, capability responsibility allocation, customer generation, co-generation rates, reserve margins, operating reserve allocation. Joint testimony with S. Finger.

6. **U.S. ASLB NRC 50-471, Pilgrim Unit 2**; Commonwealth of Massachusetts. June 1979.

Review of the Oak Ridge National Laboratory and NEPOOL demand forecast models; cost-effectiveness of oil displacement; nuclear economics. Joint testimony with Susan Geller.

7. **Mass. DPU 19845**, Boston Edison time-of-use-rate case; Massachusetts Attorney General. December 1979.

Critique of utility marginal cost study and proposed rates; principles of marginal cost principles, cost derivation, and rate design; options for reconciling costs and revenues. Joint testimony with Susan Geller.

8. **Mass. DPU 20055**, petition of Eastern Utilities Associates, New Bedford G. & E., and Fitchburg G. & E. to purchase additional shares of Seabrook Nuclear Plant; Massachusetts Attorney General. January 1980.

Review of demand forecasts of three utilities purchasing Seabrook shares; Seabrook power costs, including construction cost, completion date, capacity factor, O&M expenses, interim replacements, reserves and uncertainties; alternative energy sources, including conservation, cogeneration, rate reform, solar, wood and coal conversion.

9. **Mass. DPU 20248**, petition of Massachusetts Municipal Wholesale Electric Company to purchase additional share of Seabrook Nuclear Plant; Massachusetts Attorney General. June 1980.

Nuclear power costs; update and extension of MDPU 20055 testimony.

- 10. Mass. DPU 200**, Massachusetts Electric Company rate case; Massachusetts Attorney General. June 1980.

Rate design; declining blocks, promotional rates, alternative energy, demand charges, demand ratchets; conservation: master metering, storage heating, efficiency standards, restricting resistance heating.

- 11. Mass. EFSC 79-33**, Eastern Utilities Associates 1979 forecast; Massachusetts Attorney General. July 1980.

Customer projections, consistency issues, appliance efficiency, new appliance types, commercial specifications, industrial data manipulation and trending, sales and resale.

- 12. Mass. DPU 243**, Eastern Edison Company rate case; Massachusetts Attorney General. August 1980.

Rate design: declining blocks, promotional rates, alternative energy, master metering.

- 13. Texas PUC 3298**, Gulf States Utilities rates; East Texas Legal Services. August 1980.

Inter-class revenue allocations, including production plant in-service, O&M, CWIP, nuclear fuel in progress, amortization of canceled plant residential rate design; interruptible rates; off-peak rates. Joint testimony with M. B. Meyer.

- 14. Mass. EFSC 79-1**, Massachusetts Municipal Wholesale Electric Company Forecast; Massachusetts Attorney General. November 1980.

Cost comparison methodology; nuclear cost estimates; cost of conservation, cogeneration, and solar.

- 15. Mass. DPU 472**, recovery of residential conservation-service expenses; Massachusetts Attorney General. December 1980.

Conservation as an energy source; advantages of per-kWh allocation over per-customer-month allocation.

- 16. Mass. DPU 535**; regulations to carry out Section 210 of PURPA; Massachusetts Attorney General. January 1981 and February 1981.

Filing requirements, certification, qualifying-facility status, extent of coverage, review of contracts; energy rates; capacity rates; extra benefits of qualifying facilities in specific areas; wheeling; standardization of fees and charges.

- 17. Mass. EFSC 80-17**, Northeast Utilities 1980 forecast; Massachusetts Attorney General. March 1981.

Specification process, employment, electric heating promotion and penetration, commercial sales model, industrial model specification, documentation of price forecasts and wholesale forecast.

- 18. Mass. DPU 558**, Western Massachusetts Electric Company rate case; Massachusetts Attorney General. May 1981.

Rate design including declining blocks, marginal cost conservation impacts, and promotional rates. Conservation, including terms and conditions limiting renewable, cogeneration, small power production; scope of current conservation program; efficient insulation levels; additional conservation opportunities.

- 19. Mass. DPU 1048**, Boston Edison plant performance standards; Massachusetts Attorney General. May 1982.

Critique of company approach, data, and statistical analysis; description of comparative and absolute approaches to standard-setting; proposals for standards and reporting requirements.

- 20. DC PSC FC785**, Potomac Electric Power rate case; DC Peoples Counsel. July 1982.

Inter-class revenue allocations, including generation, transmission, and distribution plant classification; fuel and O&M classification; distribution and service allocators. Marginal cost estimation, including losses.

- 21. N.H. PSC DE 81-312**, Public Service of New Hampshire supply and demand; Conservation Law Foundation et al. October 1982.

Conservation program design, ratemaking, and effectiveness. Cost of power from Seabrook nuclear plant, including construction cost and duration, capacity factor, O&M, replacements, insurance, and decommissioning.

- 22. Mass. Division of Insurance**, hearing to fix and establish 1983 automobile insurance rates; Massachusetts Attorney General. October 1982.

Profit margin calculations, including methodology, interest rates, surplus flow, tax flows, tax rates, and risk premium.

- 23. Ill. CC 82-0026**, Commonwealth Edison rate case; Illinois Attorney General. October 1982.

Review of Cost-Benefit Analysis for nuclear plant. Nuclear cost parameters (construction cost, O&M, capital additions, useful life, capacity factor), risks, discount rates, evaluation techniques.

- 24. N.M. PSC 1794**, Public Service of New Mexico application for certification; New Mexico Attorney General. May 1983.

Review of Cost-Benefit Analysis for transmission line. Review of electricity price forecast, nuclear capacity factors, load forecast. Critique of company ratemaking proposals; development of alternative ratemaking proposal.

- 25. Conn. DPUC 830301**, United Illuminating rate case; Connecticut Consumers Counsel. June 17 1983.

Cost of Seabrook nuclear power plants, including construction cost and duration, capacity factor, O&M, capital additions, insurance and decommissioning.

- 26. Mass. DPU 1509**, Boston Edison plant performance standards; Massachusetts Attorney General. July 15 1983.

Critique of company approach and statistical analysis; regression model of nuclear capacity factor; proposals for standards and for standard-setting methodologies.

- 27. Mass. Division of Insurance**, hearing to fix and establish 1984 automobile-insurance rates; Massachusetts Attorney General. October 1983.

Profit margin calculations, including methodology, interest rates.

- 28. Conn. DPUC 83-07-15**, Connecticut Light and Power rate case; Alloy Foundry. October 3 1983.

Industrial rate design. Marginal and embedded costs; classification of generation, transmission, and distribution expenses; demand versus energy charges.

- 29. Mass. EFSC 83-24**, New England Electric System forecast of electric resources and requirements; Massachusetts Attorney General. November 14 1983, Rebuttal, February 2 1984.

Need for transmission line. Status of supply plan, especially Seabrook 2. Review of interconnection requirements. Analysis of cost-effectiveness for power transfer, line losses, generation assumptions.

- 30. Mich. PSC U-7775**, Detroit Edison Fuel Cost Recovery Plan; Public Interest Research Group in Michigan. February 21 1984.

Review of proposed performance target for new nuclear power plant. Formulation of alternative proposals.

- 31. Mass. DPU 84-25**, Western Massachusetts Electric Company rate case; Massachusetts Attorney General. April 6 1984.

Need for Millstone 3. Cost of completing and operating unit, cost-effectiveness compared to alternatives, and its effect on rates. Equity and incentive problems created by CWIP. Design of Millstone 3 phase-in proposals to protect ratepayers: limitation of base-rate treatment to fuel savings benefit of unit.

- 32. Mass. DPU 84-49 and 84-50, Fitchburg Gas & Electric financing case; Massachusetts Attorney General. April 13 1984.**

Cost of completing and operating Seabrook nuclear units. Probability of completing Seabrook 2. Recommendations regarding FG&E and MDPU actions with respect to Seabrook.

- 33. Mich. PSC U-7785, Consumers Power fuel-cost-recovery plan; Public Interest Research Group in Michigan. April 16 1984.**

Review of proposed performance targets for two existing and two new nuclear power plants. Formulation of alternative policy.

- 34. FERC ER81-749-000 and ER82-325-000, Montaup Electric rate cases; Massachusetts Attorney General. April 27 1984.**

Prudence of Montaup and Boston Edison in decisions regarding Pilgrim 2 construction: Montaup's decision to participate, the Utilities' failure to review their earlier analyses and assumptions, Montaup's failure to question Edison's decisions, and the utilities' delay in canceling the unit.

- 35. Maine PUC 84-113, Seabrook-1 investigation; Maine Public Advocate. September 13 1984.**

Cost of completing and operating Seabrook Unit 1. Probability of completing Seabrook 1. Comparison of Seabrook to alternatives. Rate effects. Recommendations regarding utility and PUC actions with respect to Seabrook.

- 36. Mass. DPU 84-145, Fitchburg Gas and Electric rate case; Massachusetts Attorney General. November 6 1984.**

Prudence of Fitchburg and Public Service of New Hampshire in decision regarding Seabrook 2 construction: FGE's decision to participate, the utilities' failure to review their earlier analyses and assumptions, FGE's failure to question PSNH's decisions, and utilities' delay in halting construction and canceling the unit. Review of literature, cost and schedule estimate histories, cost-benefit analyses, and financial feasibility.

- 37. Penn. PUC R-842651, Pennsylvania Power and Light rate case; Pennsylvania Consumer Advocate. November 1984.**

Need for Susquehanna 2. Cost of operating unit, power output, cost-effectiveness compared to alternatives, and its effect on rates. Design of phase-in and excess capacity proposals to protect ratepayers: limitation of base-rate treatment to fuel savings benefit of unit.

- 38. N.H. PSC 84-200**, Seabrook Unit-1 investigation; New Hampshire Consumer Advocate. November 1984.
- Cost of completing and operating Seabrook Unit 1. Probability of completing Seabrook 1. Comparison of Seabrook to alternatives. Rate and financial effects.
- 39. Mass. Division of Insurance**, hearing to fix and establish 1986 automobile insurance rates; Massachusetts Attorney General. November 1984.
- Profit-margin calculations, including methodology and implementation.
- 40. Mass. DPU 84-152**, Seabrook Unit 1 investigation; Massachusetts Attorney General. December 1984.
- Cost of completing and operating Seabrook. Probability of completing Seabrook 1. Seabrook capacity factors.
- 41. Maine PUC 84-120**; Central Maine Power rate case; Maine PUC Staff. December 1984.
- Prudence of Central Maine Power and Boston Edison in decisions regarding Pilgrim 2 construction: CMP's decision to participate, the utilities' failure to review their earlier analyses and assumptions, CMP's failure to question Edison's decisions, and the utilities' delay in canceling the unit. Prudence of CMP in the planning and investment in Sears Island nuclear and coal plants. Review of literature, cost and schedule estimate histories, cost-benefit analyses, and financial feasibility.
- 42. Maine PUC 84-113**, Seabrook 2 investigation; Maine PUC Staff. December 1984.
- Prudence of Maine utilities and Public Service of New Hampshire in decisions regarding Seabrook 2 construction: decisions to participate and to increase ownership share, the utilities' failure to review their earlier analyses and assumptions, failure to question PSNH's decisions, and the utilities' delay in halting construction and canceling the unit. Review of literature, cost and schedule estimate histories, cost-benefit analyses, and financial feasibility.
- 43. Mass. DPU 1627**, Massachusetts Municipal Wholesale Electric Company financing case; Massachusetts Executive Office of Energy Resources. January 1985.
- Cost of completing and operating Seabrook nuclear unit 1. Cost of conservation and other alternatives to completing Seabrook. Comparison of Seabrook to alternatives.
- 44. Vt. PSB 4936**, Millstone 3 costs and in-service date; Vermont Department of Public Service. January 1985.
- Construction schedule and cost of completing Millstone Unit 3.
- 45. Mass. DPU 84-276**, rules governing rates for utility purchases of power from qualifying facilities; Massachusetts Attorney General. March 1985 and October 1985.

Institutional and technological advantages of Qualifying Facilities. Potential for QF development. Goals of QF rate design. Parity with other power sources. Security requirements. Projecting avoided costs. Capacity credits. Pricing options. Line loss corrections.

- 46. Mass. DPU 85-121**, investigation of the Reading Municipal Light Department; Wilmington (Mass.) Chamber of Commerce. November 1985.

Calculation on return on investment for municipal utility. Treatment of depreciation and debt for ratemaking. Geographical discrimination in street-lighting rates. Relative size of voluntary payments to Reading and other towns. Surplus and disinvestment. Revenue allocation.

- 47. Mass. Division of Insurance**, hearing to fix and establish 1986 automobile insurance rates; Massachusetts Attorney General and State Rating Bureau. November 1985.

Profit margin calculations, including methodology, implementation, modeling of investment balances, income, and return to shareholders.

- 48. N.M. PSC 1833, Phase II**; El Paso Electric rate case; New Mexico Attorney General. December 1985.

Nuclear decommissioning fund design. Internal and external funds; risk and return; fund accumulation, recommendations. Interim performance standard for Palo Verde nuclear plant.

- 49. Penn. PUC R-850152**, Philadelphia Electric rate case; Utility Users Committee and University of Pennsylvania. January 1986.

Limerick-1 rate effects. Capacity benefits, fuel savings, operating costs, capacity factors, and net benefits to ratepayers. Design of phase-in proposals.

- 50. Mass. DPU 85-270**; Western Massachusetts Electric rate case; Massachusetts Attorney General. March 1986.

Prudence of Northeast Utilities in generation planning related to Millstone 3 construction: decisions to start and continue construction, failure to reduce ownership share, failure to pursue alternatives. Review of industry literature, cost and schedule histories, and retrospective cost-benefit analyses.

- 51. Penn. PUC R-850290**, Philadelphia Electric auxiliary service rates; Albert Einstein Medical Center, University of Pennsylvania, and Amtrak. March 1986.

Review of utility proposals for supplementary and backup rates for small power producers and cogenerators. Load diversity, cost of peaking capacity, value of generation, price signals, and incentives. Formulation of alternative supplementary rate.

- 52. N.M. PSC 2004, Public Service of New Mexico Palo Verde issues; New Mexico Attorney General. May 1986.**

Recommendations for power-plant performance standards for Palo Verde nuclear units 1, 2, and 3.

- 53. Ill. CC 86-0325, Iowa-Illinois Gas and Electric Co. rate investigation; Illinois Office of Public Counsel. August 1986.**

Determination of excess capacity based on reliability and economic concerns. Identification of specific units associated with excess capacity. Required reserve margins.

- 54. N.M. PSC 2009, El Paso Electric rate moderation program; New Mexico Attorney General. August 1986.**

Prudence of EPE in generation planning related to Palo Verde nuclear construction, including failure to reduce ownership share and failure to pursue alternatives. Review of industry literature, cost and schedule histories, and retrospective cost-benefit analyses.

Recommendation for rate-base treatment; proposal of power plant performance standards.

- 55. City of Boston Public Improvements Commission, transfer of Boston Edison district heating steam system to Boston Thermal Corporation; Boston Housing Authority. December 1986.**

History and economics of steam system; possible motives of Boston Edison in seeking sale; problems facing Boston Thermal; information and assurances required prior to Commission approval of transfer.

- 56. Mass. Division of Insurance, hearing to fix and establish 1987 automobile insurance rates; Massachusetts Attorney General and State Rating Bureau. December 1986 and January 1987.**

Profit margin calculations, including methodology, implementation, derivation of cash flows, installment income, income tax status, and return to shareholders.

- 57. Mass. DPU 87-19, petition for adjudication of development facilitation program; Hull (Mass.) Municipal Light Plant. January 1987.**

Estimation of potential load growth; cost of generation, transmission, and distribution additions. Determination of hook-up charges. Development of residential load estimation procedure reflecting appliance ownership, dwelling size.

- 58. N.M. PSC 2004, Public Service of New Mexico nuclear decommissioning fund; New Mexico Attorney General. February 1987.**

Decommissioning cost and likely operating life of nuclear plants. Review of utility funding proposal. Development of alternative proposal. Ratemaking treatment.

- 59. Mass. DPU 86-280**, Western Massachusetts Electric rate case; Massachusetts Energy Office. March 1987.

Marginal cost rate design issues. Superiority of long-run marginal cost over short-run marginal cost as basis for rate design. Relationship of Consumer reaction, utility planning process, and regulatory structure to rate design approach. Implementation of short-run and long-run rate designs. Demand versus energy charges, economic development rates, spot pricing.

- 60. Mass. Division of Insurance 87-9**, 1987 Workers' Compensation rate filing; State Rating Bureau. May 1987.

Profit-margin calculations, including methodology, implementation, surplus requirements, investment income, and effects of 1986 Tax Reform Act.

- 61. Texas PUC 6184**, economic viability of South Texas Nuclear Plant #2; Committee for Consumer Rate Relief. August 1987.

Nuclear plant operating parameter projections; capacity factor, O&M, capital additions, decommissioning, useful life. STNP-2 cost and schedule projections. Potential for conservation.

- 62. Minn. PUC ER-015/GR-87-223**, Minnesota Power rate case; Minnesota Department of Public Service. August 1987.

Excess capacity on MP system; historical, current, and projected. Review of MP planning prudence prior to and during excess; efforts to sell capacity. Cost of excess capacity. Recommendations for ratemaking treatment.

- 63. Mass. Division of Insurance 87-27**, 1988 automobile insurance rates; Massachusetts Attorney General and State Rating Bureau. September 2 1987. Rebuttal October 1987.

Underwriting profit margins. Effect of 1986 Tax Reform Act. Biases in calculation of average margins.

- 64. Mass. DPU 88-19**, power Sales Contract from Riverside Steam and Electric to Western Massachusetts Electric; Riverside Steam and Electric. November 1987.

Comparison of risk from QF contract and utility avoided-cost sources. Risk of oil dependence. Discounting cash flows to reflect risk.

- 65. Mass. Division of Insurance 87-53**, 1987 Workers' Compensation rate refiling; State Rating Bureau. December 1987.

Profit-margin calculations including updating of data, compliance with Commissioner's order, treatment of surplus and risk, interest rate calculation, and investment tax rate calculation.

- 66. Mass. Division of Insurance**, 1987 and 1988 automobile insurance remand rates; Massachusetts Attorney General and State Rating Bureau. February 1988.

Underwriting profit margins. Provisions for income taxes on finance charges. Relationships between allowed and achieved margins, between statewide and nationwide data, and between profit allowances and cost projections.

- 67. Mass. DPU 86-36**, investigation into the pricing and ratemaking treatment to be afforded new electric generating facilities which are not qualifying facilities; Conservation Law Foundation. May 1988.

Cost recovery for utility conservation programs. Compensating for lost revenues. Utility incentive structures.

- 68. Mass. DPU 88-123**, petition of Riverside Steam & Electric; Riverside Steam and Electric Company. May 1988 and November 1988.

Estimation of avoided costs of Western Massachusetts Electric Company. Nuclear capacity factor projections and effects on avoided costs. Avoided cost of energy interchange and power plant life extensions. Differences between median and expected oil prices. Salvage value of cogeneration facility. Off-system energy purchase projections. Reconciliation of avoided cost projection.

- 69. Mass. DPU 88-67**, Boston Gas Company; Boston Housing Authority. June 1988.

Estimation of annual avoidable costs, 1988 to 2005, and levelized avoided costs. Determination of cost recovery and carrying costs for conservation investments. Standards for assessing conservation cost-effectiveness. Evaluation of cost-effectiveness of utility funding of proposed natural gas conservation measures.

- 70. R.I. PUC 1900**, Providence Water Supply Board tariff filing; Conservation Law Foundation, Audubon Society of Rhode Island, and League of Women Voters of Rhode Island. June 1988.

Estimation of avoidable water supply costs. Determination of costs of water conservation. Conservation cost-benefit analysis.

- 71. Mass. Division of Insurance 88-22**, 1989 automobile insurance rates; Massachusetts Attorney General and State Rating Bureau; Profit Issues, August 1988, supplemented August 1988; Losses and Expenses, September 1988.

Underwriting profit margins. Effects of 1986 Tax Reform Act. Taxation of common stocks. Lag in tax payments. Modeling risk and return over time. Treatment of finance charges. Comparison of projected and achieved investment returns.

72. **Vt. PSB 5270** Module 6, investigation into least-cost investments, energy efficiency, conservation, and the management of demand for energy; Conservation Law Foundation, Vermont Natural Resources Council, and Vermont Public Interest Research Group. September 1988.

Cost recovery for utility conservation programs. Compensation of utilities for revenue losses and timing differences. Incentive for utility participation.

73. **Vt. House of Representatives, Natural Resources Committee**, House Act 130; “Economic Analysis of Vermont Yankee Retirement”; Vermont Public Interest Research Group. February 1989.

Projection of capacity factors, operating and maintenance expense, capital additions, overhead, replacement power costs, and net costs of Vermont Yankee.

74. **Mass. DPU 88-67** Phase II, Boston Gas company conservation program and rate design; Boston Gas Company. March 1989.

Estimation of avoided gas cost; treatment of non-price factors; estimation of externalities; identification of cost-effective conservation.

75. **Vt. PSB 5270**, status conference on conservation and load management policy settlement; Central Vermont Public Service, Conservation Law Foundation, Vermont Natural Resources Council, Vermont Public Interest Research Group, and Vermont Department of Public Service. May 1989.

Cost-benefit test for utility conservation programs. Role of externalities. Cost recovery concepts and mechanisms. Resource allocations, cost allocations, and equity considerations. Guidelines for conservation preapproval mechanisms. Incentive mechanisms and recovery of lost revenues.

76. **Boston Housing Authority Court 05099**, Gallivan Boulevard Task Force vs. Boston Housing Authority, et al.; Boston Housing Authority. June 1989.

Effect of master-metering on consumption of natural gas and electricity. Legislative and regulatory mandates regarding conservation.

77. **Mass. DPU 89-100**, Boston Edison rates; Massachusetts Energy Office. June 1989.

Prudence of decision to spend \$400 million from 1986–88 to return Pilgrim nuclear plant to service. Projections of nuclear capacity factors, O&M, capital additions, and overhead. Review of decommissioning cost, tax effect of abandonment, replacement power cost, and plant useful life estimates. Requirements for prudence and used-and-useful analyses.

- 78. Mass. DPU 88-123**, petition of Riverside Steam and Electric Company; Riverside Steam and Electric. July 1989. Rebuttal, October 1989.

Reasonableness of Northeast Utilities' 1987 avoided cost estimates. Projections of nuclear capacity factors, economy purchases, and power plant operating life. Treatment of avoidable energy and capacity costs and of off-system sales. Expected versus reference fuel prices.

- 79. Mass. DPU 89-72**, Statewide Towing Association police-ordered towing rates; Massachusetts Automobile Rating Bureau. September 1989.

Review of study supporting proposed increase in towing rates. Critique of study sample and methodology. Comparison to competitive rates. Supply of towing services. Effects of joint products and joint sales on profitability of police-ordered towing. Joint testimony with I. Goodman.

- 80. Vt. PSB 5330**, application of Vermont utilities for approval of a firm power and energy contract with Hydro-Quebec; Conservation Law Foundation, Vermont Natural Resources Council, Vermont Public Interest Research Group. December 1989. Surrebuttal February 1990.

Analysis of a proposed 20-year power purchase. Comparison to efficiency investment. Critique of conservation potential analysis. Analysis of Vermont electric energy supply. Planning risk of large supply additions. Valuation of environmental externalities. Identification of possible improvements to proposed contract.

- 81. Mass. DPU 89-239**, inclusion of externalities in energy-supply planning, acquisition, and dispatch for Massachusetts utilities. Boston Gas Company. December 1989; April 1990; May 1990.

Critique of Division of Energy Resources report on externalities. Methodology for evaluating external costs. Proposed values for environmental and economic externalities of fuel supply and use.

- 82. California PUC**, incorporation of environmental externalities in utility planning and pricing; Coalition of Energy Efficient and Renewable Technologies. February 1990.

Approaches for valuing externalities for inclusion in setting power purchase rates. Effect of uncertainty on assessing externality values.

- 83. Ill. CC 90-0038**, proceeding to adopt a least-cost electric-energy plan for Commonwealth Edison Company; City of Chicago. May 25 1990. Joint rebuttal testimony with David Birr, August 1990.

Problems in Commonwealth Edison's approach to demand-side management. Potential for cost-effective conservation. Valuing externalities in least-cost planning.

- 84. Md. PSC 8278**, adequacy of Baltimore Gas & Electric's integrated resource plan; Maryland Office of People's Counsel. September 1990.

Rationale for demand-side management. BG&E's problems in approach to DSM planning. Potential for cost-effective conservation. Valuation of environmental externalities. Recommendations for short-term DSM program priorities.

- 85. Ind. URC**, integrated-resource-planning docket; Indiana Office of Utility Consumer Counselor. November 1990.

Integrated resource planning process and methodology, including externalities and screening tools. Incentives, screening, and evaluation of demand-side management. Potential of resource bidding in Indiana.

- 86. Mass. DPU 89-141, 90-73, 90-141, 90-194, 90-270**; preliminary review of utility treatment of environmental externalities in October qualifying-facilities filings; Boston Gas Company. November 1990.

Generic and specific problems in Massachusetts utilities' RFPs with regard to externality valuation requirements. Recommendations for corrections.

- 87. Mass. EFSC 90-12/90-12A**, adequacy of Boston Edison proposal to build combined-cycle plant; Conservation Law Foundation. December 1990.

Problems in Boston Edison's treatment of demand-side management, supply option analysis, and resource planning. Recommendations of mitigation options.

- 88. Maine PUC 90-286**, adequacy of conservation program of Bangor Hydro Electric; Penobscot River Coalition. February 1991.

Role of utility-sponsored DSM in least-cost planning. Bangor Hydro's potential for cost-effective conservation. Problems with Bangor Hydro's assumptions about customer investment in energy efficiency measures.

- 89. Va. SCC PUE900070**, commission investigation; Southern Environmental Law Center. March 1991.

Role of utilities in promoting energy efficiency. Least-cost planning objectives of and resource acquisition guidelines for DSM. Ratemaking considerations for DSM investments.

- 90. Mass. DPU 90-261-A**, economics and role of fuel-switching in the DSM program of the Massachusetts Electric Company; Boston Gas Company. April 1991.

Role of fuel-switching in utility DSM programs and specifically in Massachusetts Electric's. Establishing comparable avoided costs and comparison of electric and gas system costs. Updated externality values.

- 91. Private arbitration**, Massachusetts Refusetech Contractual Request for Adjustment to Service Fee; Massachusetts Refusetech. May 1991.

NEPCo rates for power purchases from the New England Solid Waste Compact plant. Fuel price and avoided cost projections vs. realities.

- 92. Vt. PSB 5491**, cost-effectiveness of Central Vermont's commitment to Hydro Quebec purchases; Conservation Law Foundation. July 1991.

Changes in load forecasts and resale markets since approval of HQ purchases. Effect of HQ purchase on DSM.

- 93. S.C. PSC 91-216-E**, cost recovery of Duke Power's DSM expenditures; South Carolina Department of Consumer Affairs. Direct, September 13 1991; Surrebuttal October 1991.

Problems with conservation plans of Duke Power, including load building, cream skimming, and inappropriate rate designs.

- 94. Md. PSC 8241 Phase II**, review of Baltimore Gas & Electric's avoided costs; Maryland Office of People's Counsel. September 1991.

Development of direct avoided costs for DSM. Problems with BG&E's avoided costs and DSM screening. Incorporation of environmental externalities.

- 95. Bucksport (Maine) Planning Board**, AES/Harriman Cove shoreland zoning application; Conservation Law Foundation and Natural Resources Council of Maine. October 1991.

New England's power surplus. Costs of bringing AES/Harriman Cove on line to back out existing generation. Alternatives.

- 96. Mass. DPU 91-131**, update of externalities values adopted in Docket 89-239; Boston Gas Company. October 1991. Rebuttal, December 1991.

Updates on pollutant externality values. Addition of values for chlorofluorocarbons, air toxics, thermal pollution, and oil import premium. Review of state regulatory actions regarding externalities.

- 97. Fla. PSC 910759**, petition of Florida Power Corporation for determination of need for proposed electrical power plant and related facilities; Floridians for Responsible Utility Growth. October 1991.

Florida Power's obligation to pursue integrated resource planning and failure to establish need for proposed facility. Methods to increase scope and scale of demand-side investment.

- 98. Fla. PSC 910833-EI**, petition of Tampa Electric Company for a determination of need for proposed electrical power plant and related facilities; Floridians for Responsible Utility Growth. October 1991.

Obligation to pursue integrated resource planning, failure to establish need for proposed facility. Methods to increase scope and scale of demand-side investment.

- 99. Penn. PUC I-900005, R-901880**; investigation into demand-side management by electric utilities; Pennsylvania Energy Office. January 1992.

Appropriate cost recovery mechanism for Pennsylvania utilities. Purpose and scope of direct cost recovery, lost revenue recovery, and incentives.

- 100. S.C. PSC 91-606-E**, petition of South Carolina Electric and Gas for a certificate of public convenience and necessity for a coal-fired plant; South Carolina Department of Consumer Affairs. January 1992.

Justification of plant certification under integrated resource planning. Failures in SCE&G's DSM planning and company potential for demand-side savings.

- 101. Mass. DPU 92-92**, adequacy of Boston Edison's street-lighting options; Town of Lexington. June 1992.

Efficiency and quality of street-lighting options. Boston Edison's treatment of high-quality street lighting. Corrected rate proposal for the Daylux lamp. Ownership of public street lighting.

- 102. S.C. PSC 92-208-E**, integrated-resource plan of Duke Power Company; South Carolina Department of Consumer Affairs. August 1992.

Problems with Duke Power's DSM screening process, estimation of avoided cost, DSM program design, and integration of demand-side and supply-side planning.

- 103. N.C. UC E-100 Sub 64**, integrated-resource-planning docket; Southern Environmental Law Center. September 1992.

General principles of integrated resource planning, DSM screening, and program design. Review of the IRPs of Duke Power Company, Carolina Power & Light Company, and North Carolina Power.

- 104. Ont. EAB Ontario Hydro Demand/Supply Plan Hearings, *Environmental Externalities Valuation and Ontario Hydro's Resource Planning* (3 vols.)**; Coalition of Environmental Groups. October 1992.

Valuation of environmental externalities from fossil fuel combustion and the nuclear fuel cycle. Application to Ontario Hydro's supply and demand planning.

- 105. Texas PUC 110000**, application of Houston Lighting and Power company for a certificate of convenience and necessity for the DuPont Project; Destec Energy, Inc. September 1992.
- Valuation of environmental externalities from fossil fuel combustion and the application to the evaluation of proposed cogeneration facility.
- 106. Maine BEP**, in the matter of the Basin Mills Hydroelectric Project application; Conservation Intervenors. November 1992.
- Economic and environmental effects of generation by proposed hydro-electric project.
- 107. Md. PSC 8473**, review of the power sales agreement of Baltimore Gas and Electric with AES Northside; Maryland Office of People's Counsel. November 1992.
- Non-price scoring and unquantified benefits; DSM potential as alternative; environmental costs; cost and benefit estimates.
- 108. N.C. UC E-100 Sub 64**, analysis and investigation of least cost integrated resource planning in North Carolina; Southern Environmental Law Center. November 1992.
- Demand-side management cost recovery and incentive mechanisms.
- 109. S.C. PSC 92-209-E**, in re Carolina Power & Light Company; South Carolina Department of Consumer Affairs. November 1992.
- Demand-side-management planning: objectives, process, cost-effectiveness test, comprehensiveness, lost opportunities. Deficiencies in CP&L's portfolio. Need for economic evaluation of load building.
- 110 Fla. DER** hearings on the Power Plant Siting Act; Legal Environmental Assistance Foundation. December 1992.
- Externality valuation and application in power-plant siting. DSM potential, cost-benefit test, and program designs.
- 111. Md. PSC 8487**, Baltimore Gas and Electric Company electric rate case. Direct January 1993; rebuttal February 1993.
- Class allocation of production plant and O&M; transmission, distribution, and general plant; administrative and general expenses. Marginal cost and rate design.
- 112. Md. PSC 8179**, Approval of amendment to Potomac Edison purchase agreement with AES Warrior Run; Maryland Office of People's Counsel. January 29 1993.
- Economic analysis of proposed coal-fired cogeneration facility.

- 113. Mich. PSC U-10102**, Detroit Edison rate case; Michigan United Conservation Clubs. February 17 1993.
- Least-cost planning; energy efficiency planning, potential, screening, avoided costs, cost recovery, and shareholder incentives.
- 114. Ohio PUC 91-635-EL-FOR, 92-312-EL-FOR, 92-1172-EL-ECP**; Cincinnati Gas and Electric demand-management programs; City of Cincinnati. April 1993.
- Demand-side-management planning, program designs, potential savings, and avoided costs.
- 115. Mich. PSC U-10335**, Consumers Power rate case; Michigan United Conservation Clubs. October 1993.
- Least-cost planning; energy efficiency planning, potential, screening, avoided costs, cost recovery, and shareholder incentives.
- 116. Ill. CC 92-0268**, electric-energy plan for Commonwealth Edison; City of Chicago. Direct, February 1 1994; rebuttal, September 1994.
- Cost-effectiveness screening of demand-side management programs and measures; estimates by Commonwealth Edison of costs avoided by DSM and of future cost, capacity, and performance of supply resources.
- 117. FERC 2422 et al.**, application of James River–New Hampshire Electric, Public Service of New Hampshire, for licensing of hydro power; Conservation Law Foundation; 1993.
- Cost-effective energy conservation available to the Public Service of New Hampshire; power-supply options; affidavit.
- 118. Vt. PSB 5270-CV-1,-3, and 5686**; Central Vermont Public Service fuel-switching and DSM program design, on behalf of the Vermont Department of Public Service. Direct, April 1994; rebuttal, June 1994.
- Avoided costs and screening of controlled water-heating measures; risk, rate impacts, participant costs, externalities, space- and water-heating load, benefit-cost tests.
- 119. Fla. PSC 930548-EG–930551-EG**, conservation goals for Florida electric utilities; Legal Environmental Assistance Foundation, Inc. April 1994.
- Integrated resource planning, avoided costs, rate impacts, analysis of conservation goals of Florida electric utilities.
- 120. Vt. PSB 5724**, Central Vermont Public Service Corporation rate request; Vermont Department of Public Service. Joint surrebuttal testimony with John Plunkett. August 1994.
- Costs avoided by DSM programs; Costs and benefits of deferring DSM programs.

- 121. Mass. DPU 94-49**, Boston Edison integrated-resource-management plan; Massachusetts Attorney General. August 1994.
- Least-cost planning, modeling, and treatment of risk.
- 122. Mich. PSC U-10554**, Consumers Power Company DSM program and incentive; Michigan Conservation Clubs. November 1994.
- Critique of proposed reductions in DSM programs; discussion of appropriate measurements of cost-effectiveness, role of DSM in competitive power markets.
- 123. Mich. PSC U-10702**, Detroit Edison Company cost recovery, on behalf of the Residential Ratepayers Consortium. December 1994.
- Impact of proposed changes to DSM plan on energy costs and power-supply-cost-recovery charges. Critique of proposed DSM changes; discussion of appropriate measurements of cost-effectiveness, role of DSM in competitive power markets.
- 124. N.J. BRC EM92030359**, environmental costs of proposed cogeneration; Freehold Cogeneration Associates. November 1994.
- Comparison of potential externalities from the Freehold cogeneration project with that from three coal technologies; support for the study “The Externalities of Four Power Plants.”
- 125. Mich. PSC U-10671**, Detroit Edison Company DSM programs; Michigan United Conservation Clubs. January 1995.
- Critique of proposal to scale back DSM efforts in light of potential for competition. Loss of savings, increase of customer costs, and decrease of competitiveness. Discussion of appropriate measurements of cost-effectiveness, role of DSM in competitive power markets.
- 126. Mich. PSC U-10710**, power-supply-cost-recovery plan of Consumers Power Company; Residential Ratepayers Consortium. January 1995.
- Impact of proposed changes to DSM plan on energy costs and power-supply-cost-recovery charges. Critique of proposed DSM changes; discussion of appropriate measurements of cost-effectiveness, role of DSM in competitive power markets.
- 127. FERC 2458 and 2572**, Bowater–Great Northern Paper hydropower licensing; Conservation Law Foundation. February 1995.
- Comments on draft environmental impact statement relating to new licenses for two hydropower projects in Maine. Applicant has not adequately considered how energy conservation can replace energy lost due to habitat-protection or -enhancement measures.

- 128. N.C. UC E-100 Sub 74**, Duke Power and Carolina Power & Light avoided costs; Hydro-Electric–Power Producer’s Group. February 1995.
- Critique and proposed revision of avoided costs offered to small hydro-power producers by Duke Power and Carolina Power and Light.
- 129. New Orleans City Council UD-92-2A and -2B**, least-cost IRP for New Orleans Public Service and Louisiana Power & Light; Alliance for Affordable Energy. Direct, February 1995; rebuttal, April 1995.
- Critique of proposal to scale back DSM efforts in light of potential competition.
- 130. D.C. PSC FC917 II**, prudence of DSM expenditures of Potomac Electric Power Company; Potomac Electric Power Company. Rebuttal testimony, February 1995.
- Prudence of utility DSM investment; prudence standards for DSM programs of the Potomac Electric Power Company.
- 131. Ont. Energy Board EBRO 490**, DSM cost recovery and lost-revenue–adjustment mechanism for Consumers Gas Company; Green Energy Coalition. April 1995.
- Demand-side-management cost recovery. Lost-revenue–adjustment mechanism for Consumers Gas Company.
- 132. New Orleans City Council CD-85-1**, New Orleans Public Service rate increase; Alliance for Affordable Energy. Rebuttal, May 1995.
- Allocation of costs and benefits to rate classes.
- 133. Mass. DPU Docket DPU-95-40**, Mass. Electric cost-allocation; Massachusetts Attorney General. June 1995.
- Allocation of costs to rate classes. Critique of cost-of-service study. Implications for industry restructuring.
- 134. Md. PSC 8697**, Baltimore Gas & Electric gas rate increase; Maryland Office of People’s Counsel. July 1995.
- Rate design, cost-of-service study, and revenue allocation.
- 135. N.C. UC E-2 Sub 669**. December 1995.
- Need for new capacity. Energy-conservation potential and model programs.
- 136. Arizona CC U-1933-95-317**, Tucson Electric Power rate increase; Residential Utility Consumer Office. January 1996.
- Review of proposed rate settlement. Used-and-usefulness of plant. Rate design. DSM potential.

- 137. Ohio PUC 95-203-EL-FOR**; Campaign for an Energy-Efficient Ohio. February 1996
Long-term forecast of Cincinnati Gas and Electric Company, especially its DSM portfolio. Opportunities for further cost-effective DSM savings. Tests of cost effectiveness. Role of DSM in light of industry restructuring; alternatives to traditional utility DSM.
- 138 Vt. PSB 5835**, Central Vermont Public Service Company rates; Vermont Department of Public Service. February 1996.
Design of load-management rates of Central Vermont Public Service Company.
- 139. Md. PSC 8720**, Washington Gas Light DSM; Maryland Office of People's Counsel. May 1996.
Avoided costs of Washington Gas Light Company; integrated least-cost planning.
- 140. Mass. DPU 96-100**, Massachusetts Utilities' Stranded Costs; Massachusetts Attorney General. Oral testimony in support of "estimation of Market Value, Stranded Investment, and Restructuring Gains for Major Massachusetts Utilities," July 1996.
Stranded costs. Calculation of loss or gain. Valuation of utility assets.
- 141. Mass. DPU 96-70**, Essex County Gas Company rates; Massachusetts Attorney General. July 1996.
Market-based allocation of gas-supply costs of Essex County Gas Company.
- 142. Mass. DPU 96-60**, Fall River Gas Company rates; Massachusetts Attorney General. Direct, July 1996; surrebuttal, August 1996.
Market-based allocation of gas-supply costs of Fall River Gas Company.
- 143. Md. PSC 8725**, Maryland electric-utilities merger; Maryland Office of People's Counsel. July 1996.
Proposed merger of Baltimore Gas & Electric Company, Potomac Electric Power Company, and Constellation Energy. Cost allocation of merger benefits and rate reductions.
- 144. N.H. PUC DR 96-150**, Public Service Company of New Hampshire stranded costs; New Hampshire Office of Consumer Advocate. December 1996.
Market price of capacity and energy; value of generation plant; restructuring gain and stranded investment; legal status of PSNH acquisition premium; interim stranded-cost charges.
- 145. Ont. Energy Board EBRO 495**, LRAM and shared-savings incentive for DSM performance of Consumers Gas; Green Energy Coalition. March 1997.
LRAM and incentive mechanisms in rates for the Consumers Gas Company.

- 146. New York PSC 96-E-0897**, Consolidated Edison restructuring plan; City of New York. April 1997.
- Electric-utility competition and restructuring; critique of proposed settlement of Consolidated Edison Company; stranded costs; market power; rates; market access.
- 147. Vt. PSB 5980**, proposed statewide energy plan; Vermont Department of Public Service. Direct, August 1997; rebuttal, December 1997.
- Justification for and estimation of statewide avoided costs; guidelines for distributed IRP.
- 148. Mass. DPU 96-23**, Boston Edison restructuring settlement; Utility Workers Union of America. September 1997.
- Performance incentives proposed for the Boston Edison company.
- 149. Vt. PSB 5983**, Green Mountain Power rate increase; Vermont Department of Public Service. Direct, October 1997; rebuttal, December 1997.
- In three separate pieces of prefiled testimony, addressed the Green Mountain Power Corporation's (1) distributed-utility-planning efforts, (2) avoided costs, and (3) prudence of decisions relating to a power purchase from Hydro-Quebec.
- 150. Mass. DPU 97-63**, Boston Edison proposed reorganization; Utility Workers Union of America. October 1997.
- Increased costs and risks to ratepayers and shareholders from proposed reorganization; risks of diversification; diversion of capital from regulated to unregulated affiliates; reduction in Commission authority.
- 151. Mass. DTE 97-111**, Commonwealth Energy proposed restructuring; Cape Cod Light Compact. Joint testimony with Jonathan Wallach, January 1998.
- Critique of proposed restructuring plan filed to satisfy requirements of the electric-utility restructuring act of 1997. Failure of the plan to foster competition and promote the public interest.
- 152. N.H. PUC Docket DR 97-241**, Connecticut Valley Electric fuel and purchased-power adjustments; City of Claremont, N.H. February 1998.
- Prudence of continued power purchase from affiliate; market cost of power; prudence disallowances and cost-of-service ratemaking.
- 153. Md. PSC 8774**, APS-DQE merger; Maryland Office of People's Counsel. February 1998.
- Proposed power-supply arrangements between APS's potential operating subsidiaries; power-supply savings; market power.

- 154. Vt. PSB 6018**, Central Vermont Public Service Co. rate increase; Vermont Department of Public Service. February 1998.
- Prudence of decisions relating to a power purchase from Hydro-Quebec. Reasonableness of avoided-cost estimates. Quality of DU planning.
- 155. Maine PUC 97-580**, Central Maine Power restructuring and rates; Maine Office of Public Advocate. May 1998; Surrebuttal, August 1998.
- Determination of stranded costs; gains from sales of fossil, hydro, and biomass plant; treatment of deferred taxes; incentives for stranded-cost mitigation; rate design.
- 156. Mass. DTE 98-89**, purchase of Boston Edison municipal street lighting; Towns of Lexington and Acton. Affidavit, August 1998.
- Valuation of municipal streetlighting; depreciation; applicability of unbundled rate.
- 157. Vt. PSB 6107**, Green Mountain Power rate increase; Vermont Department of Public Service. Direct, September 1998; Surrebuttal drafted but not filed, November 2000.
- Prudence of decisions relating to a power purchase from Hydro-Quebec. Least-cost planning and prudence. Quality of DU planning.
- 158. Mass. DTE 97-120**, Western Massachusetts Electric Company proposed restructuring; Massachusetts Attorney General. Joint testimony with Jonathan Wallach, October 1998. Joint surrebuttal with Jonathan Wallach, January 1999.
- Market value of the three Millstone nuclear units under varying assumptions of plant performance and market prices. Independent forecast of wholesale market prices. Value of Pilgrim and TMI-1 asset sales.
- 159. Md. PSC 8794 and 8804**, BG&E restructuring and rates; Maryland Office of People's Counsel. Direct, December 1998; rebuttal, March 1999.
- Implementation of restructuring. Valuation of generation assets from comparable-sales and cash-flow analyses. Determination of stranded cost or gain.
- 160. Md. PSC 8795**; Delmarva Power & Light restructuring and rates; Maryland Office of People's Counsel. December 1998.
- Implementation of restructuring. Valuation of generation assets and purchases from comparable-sales and cash-flow analyses. Determination of stranded cost or gain.
- 161. Md. PSC 8797**, Potomac Edison Company restructuring and rates; Maryland Office of People's Counsel. Direct, January 1999; rebuttal, March 1999.
- Implementation of restructuring. Valuation of generation assets and purchases from comparable-sales and cash-flow analyses. Determination of stranded cost or gain.

- 162. Conn. DPUC 99-02-05, Connecticut Light and Power Company stranded costs; Connecticut Office of Consumer Counsel. April 1999.**
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- 163. Conn. DPUC 99-03-04, United Illuminating Company stranded costs; Connecticut Office of Consumer Counsel. April 1999.**
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- 165. Utah PSC 98-2035-04, PacifiCorp–Scottish Power merger, Utah Committee of Consumer Services. June 1999.**
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- 167. Conn. DPUC 99-03-36, Connecticut Light and Power Company proposed standard offer; Connecticut Office of Consumer Counsel. Direct, July 1999; supplemental, July 1999.**
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- 170. Conn. DPUC 99-08-01**, standards for utility restructuring; Connecticut Office of Consumer Counsel. Direct, November 1999; supplemental, January 2000.

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- 176. Ont. Energy Board RP-1999-0017**, Union Gas PBR proposal; Green Energy Coalition. March 2000.

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- 177. N.Y. PSC 99-S-1621**, Consolidated Edison steam rates; City of New York. April 2000.

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180. Conn. DPUC 99-09-03; Connecticut Natural Gas Corporation merger and rate plan; Connecticut office of Consumer Counsel. September 2000.

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- 186. N.J. BPU GM00080564**, Public Service Electric and Gas transfer of gas supply contracts; New Jersey Ratepayer Advocate. Direct, May 2001.
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- 188. N.J. BPU EX01050303**, New Jersey electric companies' procurement of basic supply; New Jersey Ratepayer Advocate. August 2001.
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- 192. Vt. PSB 6545**, Vermont Yankee proposed sale; Vermont Department of Public Service. January 2002.
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- 198. N.J. BPU ER02080507**, Jersey Central Power & Light rates; N.J. Division of the Ratepayer Advocate. Phase I December 2002; Phase II (oral) July 2003.
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- 199. Conn. DPUC 03-07-02**, CL&P rates; AARP. October 2003
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- 200. Conn. DPUC 03-07-01**, CL&P transitional standard offer; AARP. November 2003.
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- 202. Ohio PUC 03-2144-EL-ATA**, Ohio Edison, Cleveland Electric, and Toledo Edison Cos. rates and transition charges; Green Mountain Energy Co. February 2004.
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- 210. B.C. UC 3698388**, British Columbia Hydro resource-acquisition plan; British Columbia Sustainable Energy Association and Sierra Club of Canada BC Chapter. September 2005.
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- 215. Ont. Energy Board EB-2006-0021**, Natural-gas demand-side-management generic issues proceeding; School Energy Coalition. Evidence, June 2006.
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- 216. Ind. URC 42943 and 43046**, Vectren Energy DSM proceedings; Citizens Action Coalition. Direct, June 2006.
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- 219. Conn. DPUC 06-01-08,** Connecticut L&P procurement of power for standard service and last-resort service; Connecticut Office of Consumer Counsel. Reports and technical hearings quarterly since September 2006 to October 2013.

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- 232. Utah PSC 07-035-93**, Rocky Mountain Power Rates; Utah Committee of Consumer Services. July 2008
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- 237. Md. PSC 9036**, Columbia Gas rates; Maryland Office of People's Counsel. January 2009.
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- 242. Mass. DPU 09-39**, NGrid rates; Mass. Department of Energy Resources. August 2009.
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- 243. Utah PSC 09-035-23**, Rocky Mountain Power rates; Utah Office of Consumer Services. Direct, October 2009; rebuttal, November 2009.
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- 246. B.C. UC 3698573**, British Columbia Hydro rates; British Columbia Sustainable Energy Association and Sierra Club British Columbia. February 2010.
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- 247. Ark. PSC 09-084-U**, Entergy Arkansas rates; National Audubon Society and Audubon Arkansas. Direct, February 2010; surrebuttal, April 2010.
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- 248. Ark. PSC 10-010-U**, Energy efficiency; National Audubon Society and Audubon Arkansas. Direct, March 2010; reply, April 2010.
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- 249. Ark. PSC 08-137-U**, Generic rate-making; National Audubon Society and Audubon Arkansas. Direct, March 2010; supplemental, October 2010; reply, October 2010.
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- 250. Plymouth, Mass., Superior Court** Civil Action No. PLCV2006-00651-B (Hingham Municipal Lighting Plant v. Gas Recovery Systems LLC et al.), Breach of agreement; defendants. Affidavit, May 2010.
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- 251. N.S. UARB M02961**, Port Hawkesbury biomass project; Nova Scotia Consumer Advocate. June 2010.
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- 252. Mass. DPU 10-54**, NGrid purchase of long-term power from Cape Wind; Natural Resources Defense Council et al. July 2010.
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- 255. N.S. UARB Matter No. 03454**, Heritage Gas rates; Nova Scotia Consumer Advocate. October 2010.
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- 257. N.S. UARB M03665**, Nova Scotia Power depreciation rates; Nova Scotia Consumer Advocate. February 2011.
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- 258. New Orleans City Council UD-08-02**, Entergy IRP rules; Alliance for Affordable Energy. December 2010.
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- 259. N.S. UARB M03665**, depreciation rates of Nova Scotia Power; Nova Scotia Consumer Advocate. February 2011.
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- 260. N.S. UARB M03632**, renewable-energy community-based feed-in tariffs; Nova Scotia Consumer Advocate. March 2011.
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- 262. Utah PSC 10-035-124**, Rocky Mountain Power rate case; Utah Office of Consumer Services. June 2011.
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- 263. N.S. UARB M04104**; Nova Scotia Power general rate application; Nova Scotia Consumer Advocate. August 2011.
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- 264. N.S. UARB M04175**, Load-retention tariff; Nova Scotia Consumer Advocate. August 2011.
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- 265. Ark. PSC 10-101-R**, Rulemaking re self-directed energy efficiency for large customers; National Audubon Society and Audubon Arkansas. July 2011.
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- 266. Okla.** CC PUD 201100077, current and pending federal regulations and legislation affecting Oklahoma utilities; Sierra Club. Comments July, October 2011; presentation July 2011.

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- 267. Nevada** PUC 11-08019, integrated analysis of resource acquisition, Sierra Club. Comments, September 2011; hearing, October 2011.

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- 268. La.** PSC R-30021, Louisiana integrated-resource-planning rules; Alliance for Affordable Energy. Comments, October 2011.

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- 270. Ky.** PSC 2011-00375, Kentucky utilities' purchase and construction of power plants; Sierra Club and National Resources Defense Council. December 2011.

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- 271. N.S.** UARB M04819, demand-side-management plan of Efficiency Nova Scotia; Nova Scotia Consumer Advocate. May 2012.

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- 272. Kansas** CC 12-GIMX-337-GIV, utility energy-efficiency programs; The Climate and Energy Project. June 2012.

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- 273. N.S.** UARB M04862, Port Hawksbury load-retention mechanism; Nova Scotia Consumer Advocate. June 2012.

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- 274. Utah** PSC 11-035-200, Rocky Mountain Power Rates; Utah Office of Consumer Council. June 2012.

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- 275. Ark. PSC 12-008-U**, environmental controls at Southwestern Electric Power Company's Flint Creek plant; Sierra Club. Direct, June 2012; rebuttal, August 2012; further, March 2013.

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- 276. U.S. EPA EPA-R09-OAR-2012-0021**, air-quality implementation plan; Sierra Club. September 2012.

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- 277. Arkansas PSC Docket No. 07-016-U**; Entergy Arkansas' integrated resource plan; Audubon Arkansas. Comments, September 2012.

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- 278. Vt. PSB 7862**, Entergy Nuclear Vermont and Entergy Nuclear Operations petition to operate Vermont Yankee; Conservation Law Foundation. October 2012.

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- 279. Man. PUB 2012-13 GRA**, Manitoba Hydro rates; Green Action Centre. November 2012.

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- 280. N.S. UARB M05339**, Capital Plan of Nova Scotia Power; Nova Scotia Consumer Advocate. January 2013.

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- 281. N.S. UARB M05416**, South Canoe wind project of Nova Scotia Power; Nova Scotia Consumer Advocate. January 2013.

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- 282. N.S. UARB 05419**; Maritime Link transmission project and related contracts, Nova Scotia Consumer Advocate and Small Business Advocate. Direct, April 2013; supplemental (with Seth Parker), November 2013.

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- 283. Ont. Energy Board** 2012-0451/0433/0074, Enbridge Gas Greater Toronto Area project; Green Energy Coalition. June 2013, revised August 2013.
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- 284. N.S. UARB** 05092, tidal-energy feed-in-tariff rate; Nova Scotia Consumer Advocate. August 2013.
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- 285. N.S. UARB** 05473, Nova Scotia Power 2013 cost-of-service study; Nova Scotia Consumer Advocate. October 2013.
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- 286. B.C. UC** 3698715 & 3698719; performance-based ratemaking plan for FortisBC companies; British Columbia Sustainable Energy Association and Sierra Club British Columbia. Direct (with John Plunkett), December 2013.
- Rationale for enhanced gas and electric DSM portfolios. Correction of utility estimates of electric avoided costs. Errors in program screening. Program potential. Recommended program ramp-up rates.
- 287. Conn. PURA** Docket No. 14-01-01, Connecticut Light and Power Procurement of Standard Service and Last-Resort Service. July and October 2014.
- Proxy for review of bids. Oversight of procurement and selection process.
- 288. Conn. PURA** Docket No. 14-01-02, United Illuminating Procurement of Standard Service and Last-Resort Service. January, April, July, and October 2014.
- Proxy for review of bids. Oversight of procurement and selection process.
- 289. Man. PUB** 2014, need for and alternatives to proposed hydro-electric facilities; Green Action Centre. Evidence (with Wesley Stevens) February 2014.
- Potential for fuel switching, DSM, and wind to meet future demand.
- 290. Utah PSC** 13-035-184, Rocky Mountain Power Rates; Utah Office of Consumer Services. May 2014.
- Class cost allocation. Classification and allocation of generation plant and purchased power. Principles of cost-causation. Design of backup rates.
- 291. Minn. PSC** E002/GR-13-868, Northern States Power rates; Clean Energy Intervenors. Direct, June 2014; rebuttal, July 2014; surrebuttal, August 2014.
- Inclining-block residential rate design. Rationale for minimizing customer charges.

- 292. Cal. PUC** Rulemaking 12-06-013, electric rates and rate structures; Natural Resources Defense Council. September 2014.

Redesigning residential rates to simplify tier structure while maintaining efficiency and conservation incentives. Effect of marginal price on energy consumption. Realistic modeling of consumer price response. Benefits of minimizing customer charges.

- 293. Md. PSC** 9361, proposed merger of PEPCo Holdings into Exelon; Sierra Club and Chesapeake Climate Action Network. Direct, December 2014; surrebuttal, January 2015.

Effect of proposed merger on Consumer bills, renewable energy, energy efficiency, and climate goals.

- 294. N.S. UARB** M06514, 2015 capital-expenditure plan of Nova Scotia Power; Nova Scotia Consumer Advocate. January 2015.

Economic evaluation of proposed projects. Treatment of AFUDC, overheads, and replacement costs of lost generation. Computation of rate effects of spending plan.

- 295. Md. PSC** 9153 et al., Maryland energy-efficiency programs; Maryland Office of People's Counsel. January 2015.

Costs avoided by demand-side management. Demand-reduction-induced price effects.

- 296. Québec Régie de L'énergie** R-3867-2013 phase 1, Gaz Métro cost allocation and rate structure; ROEE. February 2015

Classification of the area-spanning system; minimum system and more realistic approaches. Allocation of overhead, energy-efficiency, gas-supply, engineering-and-planning, and billing costs.

- 297. Conn. PURA** Docket No. 15-01-01, Connecticut Light and Power Procurement of Standard Service and Last-Resort Service. February and July 2015.

Proxy for review of bids. Oversight of procurement and selection process.

- 298. Conn. PURA** Docket No. 15-01-02, United Illuminating Procurement of Standard Service and Last-Resort Service. February, July, and October 2015.

Proxy for review of bids. Oversight of procurement and selection process.

- 299. Ky. PSC** 2014-00371, Kentucky Utilities electric rates; Sierra Club. March 2015.

Review basis for higher customer charges, including cost allocation. Design of time-of-day rates.

- 300. Ky. PSC 2014-00372**, Louisville Gas and Electric electric rates; Sierra Club. March 2015.
- Review basis for higher customer charges, including cost allocation. Design of time-of-day rates.
- 301. Mich. PSC U-17767**, DTE Electric Company rates; Michigan Environmental Council, Sierra Club, and Natural Resource Defense Council. May 2015.
- Cost effectiveness of pollution-control retrofits versus retirements. Market prices. Costs of alternatives.
- 302. N.S. UARB M06733**, supply agreement between Efficiency One and Nova Scotia Power; Nova Scotia Consumer Advocate. June 2015.
- Avoided costs. Cost-effectiveness screening of DSM. Portfolio design. Affordability and bill effects.
- 303. Penn. PUC P-2014-2459362**, Philadelphia Gas Works DSM, universal-service, and energy-conservation plans; Philadelphia Gas Works. Direct, May 2015; Rebuttal, July 2015.
- Avoided costs. Recovery of lost margin.
- 304. Ont. Energy Board EB-2015-0029/0049**, 2015–2020 DSM Plans Of Enbridge Gas Distribution and Union Gas, Green Energy Coalition. Evidence July 31, 2015, Corrected August 12, 2015.
- Avoided costs: price mitigation, carbon prices, marginal gas supply costs, avoidable distribution costs, avoidable upstream costs (including utility-owned pipeline facilities).
- 305. PUC Ohio Case No. 14-1693-EL-RDR**, AEP Ohio Affiliate purchased-power agreement, Sierra Club. September 2015.
- Economics of proposed PPA, market energy and capacity projections. Risk shifting. Lack of price stability and reliability benefits. Market viability of PPA units.
- 306. N.S. UARB Matter No. M06214**, NS Power Renewable-to-Retail rate, Nova Scotia Consumer Advocate. November 2015.
- Review of proposed design of rate for third-party sales of renewable energy to retail customers. Distribution, transmission and generation charges.
- 307. PUC Texas Docket No. 44941**, El Paso Electric rates; Energy Freedom Coalition of America. December 2015.
- Cost allocation and rate design. Effect of proposed DG rate on solar customers. Load shapes of residential customers with and without solar. Problems with demand charges.

- 308. N.S. UARB** Matter No. M07176, NS Power 2016 Capital Expenditures Plan, Nova Scotia Consumer Advocate. February 2016.

Economic evaluation of proposed projects, including replacement energy costs and modeling of equipment failures. Treatment of capitalized overheads and depreciation cash flow in computation of rate effects of spending plan.

- 309. Md. PSC** Case No. 9406, BGE Application for recovery of Smart Meter costs, Maryland Office of People’s Counsel. Direct February 2016, Rebuttal March 2016, Surrebuttal March 2016.

Assessment of benefits of Smart Meter programs for energy revenue, load reductions and price mitigation; capacity load reductions and price mitigation; free riders and load shifting in peak-time rebate (PTR) program; cost of PTR participation; effect of load reductions on PJM capacity obligations, capacity prices and T&D costs.

- 310. City of Austin TX**, Austin Energy 2016 Rate Review, Sierra Club and Public Citizen. May 2016

Allocation of generation costs. Residential rate design. Geographical rate differentials. Recognition of coal-plant retirement costs.

- 311. Manitoba PUB**, Manitoba Hydro Cost of Service Methodology Review, Green Action Centre. June 2016, reply August 2016.

Allocation of generation costs. Identifying generation-related transmission assets. Treatment of subtransmission. Classification of distribution lines. Allocation of distribution substations and lines. Customer allocators. Shared service drops.

- 312. Md. PSC** Case No. 9418, PEPCo Application for recovery of Smart Meter costs, Maryland Office of People’s Counsel. Direct July 2016, Rebuttal August 2016, Surrebuttal September 2016.

Assessment of benefits of Smart Meter programs for energy revenue, load reductions and price mitigation; load reductions in dynamic-pricing (DP) program; cost of DP participation; effect of load reductions on PJM capacity obligations, capacity prices and T&D costs.

- 313. Md. PSC** Case No. 9424, Delmarva P&L Application for recovery of Smart Meter costs, Maryland Office of People’s Counsel. Direct September 2016, Rebuttal October 2016, Surrebuttal October 2016.

Estimation of effects of Smart Meter programs—dynamic pricing (DP), conservation voltage reduction and an informational program—on wholesale revenues, wholesale prices and avoided costs; estimating load reductions from the DP program; cost of DP participation; effect of load reductions on PJM capacity obligations, capacity prices and T&D costs.

- 314. N.H. PUC** Docket No. DE 16-576, Alternative Net Metering Tariffs, Conservation Law Foundation. Direct October 2016, Reply December 2016.

Framework for evaluating rates for distributed generation. Costs avoided and imposed by distributed solar. Rate design for distributed generation.

- 315. Puerto Rico Energy Commission** CEPR-AP-2015-0001, Puerto Rico Electric Power Authority rate proceeding, PR Energy Commission. Report December 2016.

Comprehensive review of structure of electric utility, cost causation, load data, cost allocation, revenue allocation, marginal costs, retail rate designs, identification and treatment of customer subsidies, structuring rate riders, and rates for distributed generation and net metering.

- 316. N.S. UARB** Matter No. M07745, NS Power 2017 Capital Expenditures Plan, Nova Scotia Consumer Advocate. January 2017.

Computation and presentation of rate effects. Consistency of assumed plant operation and replacement power costs. Control of total cost of small projects. Coordination of information-technology investments. Investments in biomass plant with uncertain future.

- 317. N.S. UARB** Matter No. M07746, NS Power Enterprise Resource Planning project, Nova Scotia Consumer Advocate. February 2017.

Estimated software project costs. Costs of internal and contractor labor. Affiliate cost allocation.

- 318. N.S. UARB** Matter No. M07767, NS Power Advanced Metering Infrastructure projects, Nova Scotia Consumer Advocate. February 2017.

Design and goals of the AMI pilot program. Procurement. Coordination with information-technology and software projects.

- 319. Québec Régie de l'énergie** R-3867-2013 phase 3A; Gaz Métro estimates of marginal O&M costs; ROEE. March 2017.

Estimation of one-time, continuing and periodic customer-related operating and maintenance cost. Costs related to loads and revenues. Dealing with lumpy costs.

- 320. N.S. UARB** Matter No. M07718, NS Power Maritime Link Cost Recovery, Nova Scotia Consumer Advocate. April 2017.

Usefulness of transmission interconnection prior to operation of the associated power plant.

- 321. Mass. DPU** 17-05, Eversource Rate Case, Cape Light Compact. Direct April 2017, Rebuttal May 2017.

Critique of proposed performance-based ratemaking mechanism. Proposal for improvements.

- 322. PUCO 16-1852**, AEP Ohio Electric Security Plan, Natural Resources Defense Council. May 2017.
- Residential customer charge. Cost causation. Effect of rate design on consumption.
- 323. Iowa Utilities Board RPU-2017-0001**, Interstate Power and Light rate case, Natural Resources Defense Council. Direct August 2017, Reply September 2017.
- Critique of proposed demand-charge pilot rates for residential and small commercial customers. Defects of demand rates and shortcomings of IPL experimental proposal design.
- 324. N.S. UARB Matter No. M08087**, NS Power 2017 Load Forecast, Nova Scotia Consumer Advocate. Direct August 2017.
- Review of forecast methodology, including extrapolation of drivers of commercial load from US national data; treatment of non-firm and competitive loads; behind-the-meter generation and controlling peak-load growth.
- 325. Québec Régie de l'énergie R-3867-2013 phase 3B**; Gaz Métro line-extension policy; ROÉÉ. September 2017.
- The costs of adding new load. Estimating the durability of revenues from line extensions.
- 326. Mass. EFSB 17-02**; Eversource proposed Hudson-Sudbury transmission line; Town of Sudbury. October 2017.
- Accuracy of ISO New England regional load forecasts. Potential for distributed solar, storage and demand response.
- 327. Manitoba PUB**, Manitoba 2017/18 & 2018/19 General Rate Application; Green Action Coalition. October 2017.
- Marginal costs. Rate design. Affordability rate design for low-income and electric-heating customers. Design of residential inclining blocks. Problems with demand charges and demand ratchets. Cost-of-service study improvements.
- 328. N.S. UARB Matter No. M08383**, NS Power 2018 Annually Adjusted Rates; Consumer Advocate. January 2018.
- Projection of incremental dispatch cost. Computing administrative charges. Methodological issues.

- 329. N.S. UARB** Matter No. M08349, NS Power’s Advanced Metering Infrastructure Proposal; Consumer Advocate. January 2018.

Estimation of AMI benefits: load balancing among feeders, critical peak pricing, avoided costs of meters for distributed generation. NS Power’s claims of benefits from accounting credits (AFUDC, overheads, and converting write-offs to reduced revenue) and shifting costs to customers (earlier billing, higher recorded usage). Realistic AMI meter life. Excessive charge for customers who opt out of AMI.

- 330. N.S. UARB** Matter No. M08350, NS Power 2018 Annual Capital Expenditures Plan; Consumer Advocate. February 2018.

Overlap between ACE projects and AMI project. Hydro project planning and valuation of lost hydro energy output.

- 331. Conn. PURA** Docket No. 08-01-01RE05, Proposed Amendment to Peaker Contracts; Connecticut Consumers Counsel. May 2018.

Dividing increased revenues from ISO-NE’s Pay-for-Performance mechanism between contract generators and ratepayers.

- 332. Kansas Corporation Commission** Docket No. 18-WSEE-328-RTS, Westar Rate Case; Sierra Club. June 2018.

Costs of running Westar coal plants. Costs of renewables and other alternatives. Recommendation regarding planning, coal retirement schedule, and acquisition of leased capacity.

ACRONYMS AND INITIALISMS

APS	Alleghany Power System	NARUC	National Association of Regulatory Utility Commissioners
ASLB	Atomic Safety and Licensing Board	NEPOOL	New England Power Pool
BEP	Board of Environmental Protection	NRC	Nuclear Regulatory Commission
BPU	Board of Public Utilities	OCA	Office of Consumer Advocate
BRC	Board of Regulatory Commissioners	PSB	Public Service Board
CC	Corporation Commission	PBR	Performance-based Regulation
CMP	Central Maine Power	PSC	Public Service Commission
DER	Department of Environmental Regulation	PUC	Public Utility Commission
DPS	Department of Public Service	PUB	Public Utilities Board
DQE	Duquesne Light	PURA	Public Utility Regulatory Authority
DPUC	Department of Public Utilities Control	PURPA	Public Utility Regulatory Policy Act
DSM	Demand-Side Management	ROEE	Regroupement des organismes environnementaux en énergie
DTE	Department of Telecommunications and Energy	SCC	State Corporation Commission
EAB	Environmental Assessment Board	UARB	Utility and Review Board
EFSB	Energy Facilities Siting Board	USAEE	U.S. Association of Energy Economists
EFSC	Energy Facilities Siting Council	UC	Utilities Commission
EUB	Energy and Utilities Board	URC	Utility Regulatory Commission
FERC	Federal Energy Regulatory Commission	UTC	Utilities and Transportation Commission
ISO	Independent System Operator		
LRAM	Lost-Revenue-Adjustment Mechanism		