

Matter No. M10400

**In the Matter of an Application by Nova Scotia Power Incorporated
(NS Power) for approval of CI 46075 – IT – T&D WAM Phase 2 –
Work Management and Scheduling & Dispatch Application**

**EVIDENCE OF
JOHN D. WILSON
ON BEHALF OF
THE CONSUMER ADVOCATE**

Resource Insight, Inc.

MARCH 10, 2022

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Attachment JDW-1

Professional qualifications of John D. Wilson

1 **I. Identification & Qualifications**

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

3 A: I am John D. Wilson. I am the research director of Resource Insight, Inc., 10 Court Street,
4 Arlington, Massachusetts.

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

6 A: I received a BA degree from Rice University in 1990, with majors in physics and history, and
7 an MPP degree from the Harvard Kennedy School of Government with an emphasis in
8 energy and environmental policy, and economic and analytic methods.

9 I was Deputy Director of regulatory policy at the Southern Alliance for Clean Energy
10 for more than twelve years, where I was the senior staff member responsible for SACE's
11 utility regulatory research and advocacy, as well as energy resource analysis. I engaged with
12 southeastern utilities through regulatory proceedings, formal workgroups, informal
13 consultations, and research-driven advocacy.

14 My work has considered, among other things, the cost-effectiveness of prospective
15 new electric generation plants and transmission lines, retrospective review of generation-
16 planning decisions, conservation program design, ratemaking and cost recovery for utility
17 efficiency programs, allocation of costs of service between rate classes and jurisdictions,
18 design of retail rates, and performance-based ratemaking for electric utilities.

19 My professional qualifications are further summarized in Attachment JDW-1.

20 **Q: Have you testified previously in utility proceedings?**

21 A: Yes. I have testified more than thirty times before utility regulators in California, Colorado,
22 Nova Scotia and the Southeast U.S., and appeared numerous additional times before various
23 regulatory and legislative bodies.

24 **Q: Have you previously testified in other proceedings before this Board?**

25 A: Yes. I have filed testimony in twelve matters. I have also assisted the Consumer Advocate in
26 preparing comments and developing positions in numerous proceedings and stakeholder
27 processes.

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

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

1 **II. Introduction and Summary**

2 **Q: Please summarize NS Power’s Application.**

3 A: NS Power is seeking approval to replace its work and asset management (WAM) system,
4 Maximo, and its field service management (FSM) system, Accruent G4, with an upgraded
5 version of Maximo and Salesforce Field Service, respectively, at a total estimated cost of
6 \$60.9 million.¹

7 **Q: What is the purpose of your evidence?**

8 A: NS Power’s evidence supports the need for the project, shows evidence of sound
9 procurement practices, and demonstrates the likelihood that the investment is cost effective.
10 In addition to providing its own evidence, NS Power supports the need and scope of the
11 project with a review by METSCO Energy Solutions Inc.,² and supports the cost of the project
12 compared to other projects of similar size and scope with a review by Gartner, Inc.³ Subject
13 to review of additional evidence that may be submitted, I believe the Board should approve
14 the Application as submitted.

15 My evidence reviews three topics. First, I critique several critical assumptions in NS
16 Power’s economic analysis. Second, I suggest several further applications of the WAM
17 software that may further minimize NS Power’s future costs. Third, I briefly review NS
18 Power’s application of the Non-Binding Contingency Guidelines, which are an issue in the
19 2022 ACE Plan proceeding (M10366).

20 **Q: Please summarize your recommendations.**

21 A: I have four recommendations.

- 22 1. The Board should direct NS Power to engage an independent consultant to develop a
23 measurement and verification plan. NS Power should submit the measurement and
24 verification plan by early 2023 to ensure that appropriate key indicators are being
25 tracked. The final report from the independent consultant should be submitted in
26 early 2026.
- 27 2. During the annual ACE Plan proceedings, the Board may wish to inquire as to
28 whether the software acquired in the proposed project might help reduce costs

¹ Exhibit N-4, Application, p. 5, lines 11-12, 27-29.

² Exhibit N-4, Application, Appendix F. (Hereafter, “METSCO Report”)

³ Exhibit N-4, Application, Appendix G. (Hereafter, “Gartner Report”)

1 related to vegetation management, transmission work and tracking the unplanned
2 replacement of deteriorated equipment.

3 3. The Board should approve the proposed contingency but encourage NS Power to
4 supply the following documentation in future applications, as recommended in the
5 evidence I filed in the 2022 ACE Plan proceeding:

6 a. Project maturity classification checklist;

7 b. Statement of the basis for the contingency guidelines including, as applicable:

8 i. Predetermined guidelines—reference to or statement of documented
9 basis for use of a standard “single contingency” or other referenced
10 practice;

11 ii. Subject matter expert judgement—documented reasons for the
12 determination, including a supporting risk register; and

13 iii. Other, more technical methods—Supporting analysis as described in
14 the Contingency Guidelines.

15 4. The Board may wish to consider the TCO presented in this Application as a model for
16 the TCO that NS Power should present for each IT project with a budget over \$1
17 million, as I recommend in my 2022 ACE Plan evidence.

18 **III. Economic Analysis**

19 **Q: How has NS Power justified the cost-effectiveness of its Application?**

20 A: NS Power has (a) conducted competitive solicitations for the two major software
21 investments and for an implementation consultant and (b) submitted an economic analysis
22 (EA) comparing the project against a “technological obsolescence upgrade only option.”⁴

23 **A. Software and Services Procurements**

24 **Q: What is your opinion of NS Power’s competitive solicitations for the software 25 investments?**

26 A: NS Power’s competitive solicitations each evaluated multiple competitive proposals.

⁴ Exhibit N-4, Application, p. 37, lines 26-29.

1 For its WAM system, NS Power proposes to procure an upgraded version 8.6 of the
2 IBM Maximo version 7.1 software it currently uses.⁵ Several competitors submitted
3 proposals and still more were invited to propose. NS Power's evaluation team conducted a
4 thorough review in June 2020, with Maximo and one competitor being shortlisted for final
5 evaluation.⁶ The bid comparison worksheet demonstrates that the evaluation team
6 considered each requirement and performance objective, including reference checks.⁷ The
7 METSCO Report also summarizes NS Power's bid evaluation and confirms that NS Power
8 followed a reasonable process and that Maximo will deliver NS Power's requirements.⁸

9 For its FSM system, NS Power proposes to procure Salesforce Field Service, noting
10 that Accruent G4 no longer meets "requirements for T&D scheduling & dispatch."⁹ Several
11 competitors submitted proposals and others were invited to propose. NS Power's evaluation
12 team conducted a thorough review in June 2020, with Salesforce and one competitor being
13 shortlisted for final evaluation.¹⁰ The bid comparison worksheet demonstrates that the
14 evaluation team considered in detail each requirement and performance objective,
15 including reference checks.¹¹ The METSCO Report also summarizes NS Power's bid
16 evaluation and confirms that the evaluation process was reasonable and that Salesforce
17 Field Service will deliver NS Power's requirements.¹²

18 Notably, of the three electric utilities that NS Power included in its table of utility
19 references, two are using the same combination of Maximo and Salesforce (which acquired
20 Click).¹³ Those references should have informed NS Power's evaluation team regarding any
21 issues with the integration of these two products. NS Power also conducted an operating
22 cost evaluation of Salesforce and the other shortlisted competitor in combination with
23 Maximo, confirming that in addition to offering operational benefits, Salesforce also
24 provided operating cost savings.¹⁴

⁵ Exhibit N-4, Application, p. 6, line 11.

⁶ Exhibit N-4, Application, Appendix C, pp. 3-4.

⁷ Exhibit N-4, Application, Appendix C.

⁸ Exhibit N-4, Application, Appendix F, pp. 16, 19.

⁹ Exhibit N-4, Application, Appendix C, p. 13.

¹⁰ Exhibit N-4, Application, Appendix D, pp. 3-5.

¹¹ Exhibit N-4, Application, Appendix D.

¹² Exhibit N-4, Application, Appendix F, pp. 17, 19.

¹³ Exhibit N-4, Application, Appendix D, p. 26.

¹⁴ Exhibit N-4, Application, Appendix D, p. 28.

1 Another check of the reasonableness of NS Power’s selection of Salesforce is Southern
2 California Edison’s (SCE) evaluation of Salesforce as a “digital platform-based tool” against
3 five uses cases, including the following uses relevant to NS Power: inspection of overhead
4 pole infrastructure, managing transmission and distribution crews’ materials lists, and
5 predictive modeling to increase field safety. SCE later extended the scope of Salesforce to
6 also meet its vegetation management software needs.¹⁵ SCE’s Salesforce license covers all of
7 these solutions.

8 Based on my review of both the SCE and NS Power procurements, Salesforce offers a
9 flexible product that offers capabilities that are applicable to a wide range of utility operation
10 requirements. However, I cannot testify as to whether it delivers those capabilities, since I
11 have neither used it nor had the opportunity to review its implementation performance.

12 **Q: What is your opinion of NS Power’s competitive solicitations for an**
13 **implementation consultant?**

14 A: It appears to be common practice for utilities to engage a consultant to support
15 implementation of products like Maximo and Salesforce, focusing on integration of the new
16 software systems with other existing (or upgraded) IT platforms. Similarly, SCE engaged
17 Deloitte LLP to provide those services.

18 NS Power proposes to contract with PricewaterhouseCoopers (PwC) to implement the
19 WAM and FSM systems. The selection of PwC occurred after NS Power selected Maximo
20 and Salesforce. Several competitors submitted proposals and still more were invited to
21 propose. NS Power’s evaluation team conducted a thorough review, with PwC and four
22 competitors being shortlisted for final evaluation.¹⁶ The bid comparison worksheet
23 demonstrates that the evaluation team gave detailed consideration to each requirement and
24 performance objective, including reference checks and experience with implementing
25 Maximo and Salesforce.¹⁷ The evaluation team found that PwC was equal to or better than
26 its competitors on nearly every selection criteria, with the exception of pricing, where some
27 of the less qualified competitors offered significantly lower pricing.¹⁸ The METSCO Report

¹⁵ John D. Wilson, Direct Testimony on Behalf of Small Business Utility Advocates (August 20, 2021), Application of Southern California Edison (2021-2023 General Revenue Case, Track 3), California Public Utility Commission Docket No. A.19-08-013.

¹⁶ Exhibit N-4, Application, Appendix E, pp. 3-5.

¹⁷ Exhibit N-4, Application, Appendix E.

¹⁸ Exhibit N-4, Application, Appendix E, pp. 5, 9.

1 also summarizes NS Power’s bid evaluation for the implementation contractor, confirms
2 that the process was reasonable, finds that PwC was most likely to meet NS Power’s
3 requirements, and determined that the PwC bid cost was lower than the second-strongest
4 bid.¹⁹

5 **Q: What is your overall opinion of NS Power’s procurement processes?**

6 A: Based on the evidence supplied by NS Power, the procurement processes appear to have
7 selected software and service contracts that should meet NS Power’s requirements. To the
8 extent that any of the winning bids had costs that exceeded a competitor, either the
9 competitor failed to meet the minimum requirements or the winning bid was demonstrably
10 superior in terms of expected performance.

11 ***B. Gartner Report***

12 **Q: Please summarize the Gartner Report.**

13 A: NS Power retained Gartner to assess the cost of the proposed project, compared to other
14 projects of similar size and scope.²⁰ The Gartner Report found that NS Power’s estimated
15 cost (including contingency) is 8 percent above the benchmark average.²¹ Whether the
16 actual cost comes in below or above the benchmark average depends on whether the
17 contingency is fully utilized.²² Due to the age of the existing systems,²³ Gartner “would
18 expect more internal effort to address the change in the operating model.”²⁴

19 **Q: What conclusions do you draw from the Gartner Report?**

20 A: The Gartner Report provides further support for the effectiveness of NS Power’s
21 procurement process. While NS Power did not achieve a “below average cost” solution,
22 which might be recognized as “minimizing costs,” Gartner’s observation that the project
23 requires above-average effort due to the age of the existing solutions may well account for
24 the difference between NS Power’s proposal and Gartner’s benchmark.

¹⁹ Exhibit N-4, Application, Appendix F, pp. 18, 19.

²⁰ Exhibit N-4, Application, p. 42, lines 21-22.

²¹ *Id.*

²² Gartner Report, pp. 9-10.

²³ NS Power has been maintaining Maximo at what it rates as a “High” (25/25) risk score since at least 2017. Exhibit N-5, NS Power response to CA IR-7(d).

²⁴ Gartner Report, p. 5.

1 Gartner’s observation that the additional cost is partially justified due to the age of the
2 existing solutions raises the question of whether NS Power may have waited too long after
3 the previous version Maximo software was declared obsolete to procure an upgrade. NS
4 Power justifies its timing as follows:

5 It can be consistent with standard industry practice to continue the use of on-
6 premises solutions beyond the date they are declared obsolete and unsupported
7 with the understanding that the decision does not introduce significant risk to
8 the Company. Maximo has reached end of life but risk has been mitigated with
9 third party, Maximo certified, support and with trained employees who have
10 experience in NS Power’s Maximo solution. Additionally, as noted in the
11 Application, “It has been approximately 11 years since the last major upgrade to
12 the WAM systems being upgraded or replaced under the Project. The timing of
13 the Project and corresponding upgrade and replacement of obsolete systems has
14 allowed NS Power to continue deriving benefit from these systems with minimal
15 capital investment over the years.”²⁵

16 While NS Power further claims that “there have not been extended system outages, data loss
17 events or unplanned/forced upgrades due to the support position with IBM,”²⁶ the METSCO
18 Report identified 29 instances when Maximo was unavailable in 2021 and other
19 performance incidents stretching back to at least 2019.²⁷

20 Based on this limited evidence, I think it is a reasonable question as to whether NS
21 Power’s decision to continue using Maximo for so long after IBM ceased support for version
22 7.1 has been prudent. The available evidence does not allow for a comparison of the benefit
23 of avoided capital investment with the additional costs, including performance incidents
24 and the increased implementation cost pointed out in the Gartner Report.

²⁵ Exhibit N-5, NS Power response to CA IR-7(a).

²⁶ Exhibit N-5, NS Power response to CA IR-7(b).

²⁷ METSCO Report, p. 12.

1 **C. Economic Analysis**

2 **Q: Please summarize NS Power’s economic analysis (EA) comparing the project**
3 **against a “technological obsolescence upgrade only option” (Option B).**

4 A: NS Power compared the proposed project against Option B, which consists of de-risking the
5 existing technology by upgrading Maximo and Accruent G4 to a “supported on-premises
6 state.”²⁸

7 The 15-year NPV cost of the proposed project is \$71.2 million, compared to \$40.3
8 million for Option B. After adjusting for \$42.7 million in projected benefits attributed to
9 “new WAM system functionalities and process improvements” and a “budget challenge”
10 offset of \$3.8 million, the proposed project has a net benefit of \$8.0 million.²⁹

11 **Q: What is your opinion of Option B?**

12 A: It is difficult to form an opinion about whether Option B is actually a viable option with
13 reasonable cost estimates. One concern is that Option B may represent planning to accept a
14 high degree of risk. NS Power has been maintaining Maximo at what it rates as a “High”
15 (25/25) risk score since at least 2017.³⁰ While Option B includes costs to upgrade Maximo
16 and G4 to a “supported on-premises state,”³¹ it is unclear what level of risk reduction would
17 be achieved.

18 Unfortunately, the METSCO Report does not clearly address the feasibility of Option
19 B. While it states that Maximo V7.1 is obsolete and Accruent G4 (version 11) is becoming
20 less supported and its integration with an upgraded version of Maximo could have issues, it
21 is not clear whether the Option B upgrades would reduce risks to a reasonable level.

22 Another concern with Option B is that although the cost elements are broken out by
23 line item, NS Power has not justified those costs with further evidence.

24 **Q: What is your opinion of NS Power’s projected benefits?**

25 A: Although NS Power has provided little evidence to justify the estimates for the projected
26 benefits of the proposed software procurements, it does provide descriptions of the “drivers”
27 of the cost estimates, as summarized in Table 1.

²⁸ Exhibit N-5, NS Power response to CA IR-1, Attachment 1, p. 1.

²⁹ Exhibit N-4, Application, p. 38, Figure 11; Exhibit N-7, NS Power response to NSUARB IR-13, Attachment 1.

³⁰ Exhibit N-5, NS Power response to CA IR-7(d).

³¹ Exhibit N-5, NS Power response to CA IR-1, Attachment 1, p. 1.

1 **Table 1: WAM System Functionalities and Process Improvements (\$millions)**³²

| Savings Driver | OM&G | Distribution Capital | Total Savings |
|---|----------------|----------------------|----------------|
| Efficient Planning | \$ 1.4 | \$ 10.4 | \$ 11.8 |
| Increased Productivity | \$ 1.5 | \$ 9.9 | \$ 11.4 |
| Route Optimization | \$ 3.0 | \$ 5.5 | \$ 8.5 |
| “Maximo material pricing alignment with Oracle inventory costs” | \$ 1.0 | \$ 4.7 | \$ 5.8 |
| Other | \$ 5.0 | \$ 0.1 | \$ 5.1 |
| Total | \$ 12.0 | \$ 30.7 | \$ 42.7 |

2
3 NS Power has provided no evidence that leads me to either dispute or endorse its
4 benefit calculations. Each benefit depends on assumptions that are not explained beyond
5 such generalizations as:³³

- 6 • “T&D Inventory working capital reduced by \$2M,” without any information on how
7 much inventory working capital NS Power forecasts in Option B, or how NS Power
8 estimated the reduction in inventory.
- 9 • “Fuel savings through reduced travel related to route optimization,” without any
10 explanation of how NS Power estimated the hours of route-optimization savings.

11 It is thus impossible to reach any conclusion regarding the reasonableness of these
12 estimated savings. There are similar difficulties with assessing the reasonableness of the
13 other assumptions that drive NS Power’s benefit forecast.

14 Nonetheless, there is significant value in NS Power’s benefits calculations. NS Power’s
15 evidence, including the bid evaluations and contracts, states that the upgraded software
16 offers the potential for more efficient planning, increased productivity, and better route
17 optimization.³⁴ By quantifying those benefits, NS Power has provided a degree of
18 accountability for delivering those savings.

19 **Q: How can the forecast savings be verified?**

20 A: The measurement and verification of the forecast savings involves counting work *not*
21 performed, reduced contract costs, reduced inventory working capital, and the like. This is
22 similar to the measurement and verification of energy efficiency or the recently approved
23 time-varying pricing (TVP) pilot, which involves measuring energy *not* consumed.

³² Exhibit N-7, NS Power response to NSUARB IR-13, Attachment 1. “Drivers” are selected phrases included by NS Power in the “Detail” column.

²⁵ Fuel savings are further explained as “Ariel Trucks gain a total of 6,027 engine hours a year in fuel savings.” Exhibit N-7, NS Power response to NSUARB IR-13, Attachment 1.

³⁴ It is entirely unclear what “Maximo material pricing alignment with Oracle inventory costs” might refer to and why it will lead to cost savings.

1 By closely tracking key indicators, it should be feasible to measure and verify whether
2 the total dollar savings forecast is achieved, particularly as NS Power expects the benefits to
3 phase in over several years. Compared to annual benefits in 2025, NS Power expects 38% of
4 the benefits in 2023 and 60% of the benefits in 2024.³⁵

5 **Q: What do you recommend with respect to measurement and verification of the**
6 **project benefits?**

7 A: I recommend that the Board direct NS Power to engage an independent consultant to
8 develop a measurement and verification plan. NS Power should submit the measurement
9 and verification plan by early 2023 to ensure that appropriate key indicators are being
10 tracked. The final report from the independent consultant should be submitted in early
11 2026.

12 I would also encourage NS Power to utilize the same consultant to provide advice on
13 maximizing the benefits obtained from the WAM and FSM systems. At NS Power's
14 discretion, this could involve formal deliverables, or simply informal advice based on the
15 consultant's observations during the process of designing the measurement and verification
16 plan and then completing the final report.

17 The Board and customers would benefit from such measurement and evaluation in
18 two ways. First, the process provides accountability for a \$71.2 million investment. If NS
19 Power is not able to verify that the benefits it anticipated occurred, then NS Power should
20 be required to explain the outcome. The Board could then take whatever action it deemed
21 appropriate in response to the findings.

22 Second, the process provides NS Power with the opportunity to track the effectiveness
23 of its implementation, highlight lessons learned, and build upon realized savings by
24 potentially identifying further savings to the additional benefit of customers.

25 **Q: Do you have any other concerns with NS Power's estimate of project benefits?**

26 A: Yes. NS Power's project benefits estimate includes an offset of \$3.8 million that is described
27 as "Corporate Budget Challenge Offsetting Opex Benefits."³⁶ The \$3.8 million (present
28 value) total is derived from a \$379,382 Opex reduction in 2023, escalated at 2% per year for
29 the full 15-year period of analysis.³⁷ The \$3.8 million is distributed across four of its benefit

³⁵ Exhibit N-7, NS Power response to NSUARB IR-13, Attachment 1.

³⁶ *Id.*

³⁷ *Id.*

1 categories, auto-scheduling & optimization (67%), contractor management (8%), inventory
2 management (14%), and digital timesheets (10%), but NS Power’s evidence does not explain
3 how these four benefit categories were identified or how the percentage allocations were
4 determined.³⁸

5 I interpret the “Budget Challenge” as representing something like a contingency on the
6 benefits estimate. If that is NS Power’s intent, I agree that a project benefit estimate should
7 include a contingency similar to one that is utilized for the project cost estimate.

8 The \$3.8 million benefit “contingency” represents about 9 percent of the \$42.7 million
9 in forecast benefits. For comparison, NS Power has selected a project cost contingency of
10 approximately 21 percent, based on the project being between Decision Gates 4 and 5 for a
11 Class 3 project maturity.³⁹ The benefit “contingency” should be recognized as being based
12 on cost estimates developed with more limited information, perhaps at a level of Class 4,
13 which would typically have a higher contingency than Class 3 such as 30 percent.

14 If one assumed a 30 percent project benefit contingency, rather than the 9 percent that
15 NS Power appears to have used, then the “Budget Challenge” offset would be about \$12.8
16 million. Applying this \$12.8 million offset in place of the \$3.8 million offset to NS Power’s
17 EA alternatives analysis would result in shifting the \$8.0 million net benefit to a \$1.0 million
18 net cost.

19 **Q: Do your findings regarding the “Budget Challenge” suggest that the Board**
20 **should direct NS Power to refile a more cost-effective alternative?**

21 A: That is not my recommendation based on the evidence I have reviewed. One reason is that
22 as I discussed above, I am skeptical as to the viability of the “de-risking” alternative
23 presented as “Option B.” The percentage capital cost contingency used for “Option B” is
24 actually slightly *lower* than the one used for the project, even though the planning for
25 “Option B” is considerably less mature than for the proposed project. It would be
26 appropriate to use a much higher contingency value given the lack of pricing for the required
27 software integration services and unscoped performance capabilities. A 30-50 percent
28 contingency for “Option B” would increase its costs by [REDACTED]⁴⁰

³⁸ *Id.* Some additional description is offered in Confidential Exhibit N-4, Application, Appendix H, p. 8, but it is not particularly helpful.

³⁹ Exhibit N-4, Application, p. 29, lines 3-6.

⁴⁰ Exhibit N-4, Application, Appendix H, p. 4.

1 Another reason that NS Power’s proposal is better justified is that NS Power may be
2 able to leverage Salesforce Field Service for additional operational benefits beyond those
3 discussed in its Application, as discussed in Section IV below.

4 Thus, while it is probably more reasonable to increase the 9 percent “Budget
5 Challenge” to a figure closer to 30 percent, the evidence I have reviewed so far justifies the
6 project. I place more weight on the strength of the competitive procurement process used to
7 select each of the three key elements included in this Application than on the feasibility of
8 “Option B.”⁴¹

9 While my finding that the “Budget Challenge” might have been better set at \$12.8
10 million rather than \$3.8 million is not a sufficient reason to reject NS Power’s proposal, it
11 does further emphasize the uncertainty in NS Power’s project benefit estimate. This
12 uncertainty is further support for my proposal that the Board require NS Power to hire an
13 independent consultant to measure and evaluate the actual project benefits during the first
14 three years of project implementation.

15 **IV. Potential Additional Applications for WAM and FMS Software**

16 **Q: Does NS Power’s Application consider all potential uses of the WAM and FMS**
17 **software?**

18 A: No. Several use cases identified by SCE (as noted in Section III.A) such as vegetation
19 management and predictive modeling to increase field safety, are not included in NS Power’s
20 current implementation plan for Salesforce Field Service.

21 For example, while Maximo will be used to improve assignment of vegetation
22 management work to contractors, NS Power states that it will not use Salesforce to schedule
23 and manage its external contractors.⁴² As noted in Table 1, increased productivity and route
24 optimization are among the largest potential benefits for NS Power’s internal resources. SCE
25 is using Salesforce to achieve these same benefits among its vegetation management
26 contractors.

27 There are likely some significant differences between SCE and NS Power’s vegetation
28 management programs. SCE required better scheduling and management of external

⁴¹ The Board may wish to examine the confidential information in rows 4 and 5 in Exhibit N-4, Application, Appendix D, p. 5.

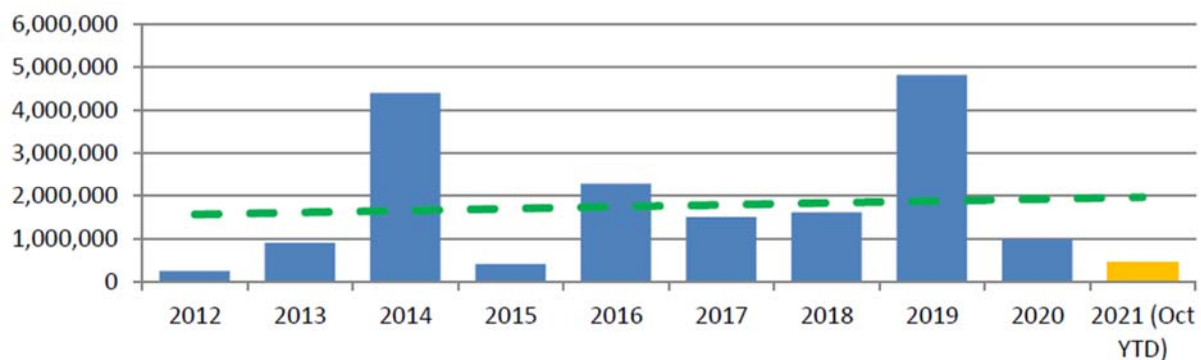
⁴² Exhibit N-5, NS Power response to CA IR-6.

1 contractors because its vegetation management activities were being driven by overlapping
2 priorities (e.g., routine trimming, responding to fallen trees, and enhanced trimming to
3 reduce wildfire risk) and operations in remote areas. Coordination among multiple crews
4 hired through different contractors introduced a higher level of complexity than NS Power's
5 vegetation management program might experience in typical circumstances.

6 Of course, vegetation management activities represent substantial costs to NS Power
7 and should be considered for further efficiencies. Enhanced vegetation management is the
8 largest track in NS Power's Customer Reliability Strategy, with a 5-year estimated spend of
9 \$34 million. If NS Power were able to realize savings of 10% in contractor costs with route
10 optimization and other productivity increases, that would represent \$3.4 million in
11 additional benefits.

12 Similarly, major storms frequently require NS Power to ramp up its vegetation
13 management activities to a very high level. This likely requires coordination among more
14 crews. As one crew meets with delays, it may be efficient to re-assign another nearby crew
15 to take some of its scheduled work. As shown in Figure 1, major storms drive up service
16 interruption hours. Utilizing route optimization and other productivity measures on a
17 routine basis could enable NS Power's vegetation management resources to respond more
18 quickly and efficiently to major storms, resulting in cost savings and improvements in
19 reliability metrics.

20 **Figure 1: Customer Hours of Interruption Due to Tree Contact⁴³**



43 Exhibit N-1, NS Power 2022 ACE Plan, M10366, p. 158, Figure 79.

1 **Q: Are there any other potential uses of the WAM and FMS software missing from**
2 **NS Power’s Application?**

3 A: Yes. First, NS Power could also extend Salesforce Field Service to support the scheduling,
4 dispatch, and tracking of transmission work. NS Power states:

5 At this time Field Service will not be used for the scheduling, dispatch, and
6 tracking of transmission work as it is conducted using external contractor
7 resources. Rather, WAM systems, including IBM Maximo, Schneider Electric
8 Designer XI and ESRI GIS, will continue to support transmission activities with
9 integrations across these systems.⁴⁴

10 As discussed in Section III.C, NS Power expects significant savings in distribution O&M and
11 capital costs. Similar savings opportunities may exist for its transmission work.

12 Second, NS Power has indicated that it cannot currently track the breakdown of costs
13 in its Routine D0005 (Unplanned Replacement of Deteriorated Equipment) into its two
14 components: replacement of equipment that has caused an outage by actually failing and
15 replacement of equipment identified in an inspection as being deteriorated.⁴⁵
16 Understanding the variability in this routine and assessment of the effectiveness of
17 inspection programs requires that NS Power be able to determine how the costs are split
18 between these categories. For example, in M10182, NS Power suggested that the 35%
19 overrun in D0005 for 2020 was due to “exposure to high winds, combined with the
20 cumulative effect of storm activity from the past several years.”⁴⁶ NS Power’s inability to
21 disaggregate the costs makes it impossible to test NS Power’s explanation of the
22 overspending, or track the use of replacement equipment. It is also impossible to determine
23 whether inspections identify significant amounts of deteriorating equipment, and even
24 consider the cost-effectiveness of those programs.

25 In describing the capabilities of WAM system, the METSCO Report says that “The
26 analysis necessary to make sound decisions on asset maintenance and renewal depends on
27 detailed, accurate information about the key attributes for each asset. Examples of key

⁴⁴ Exhibit N-5, NS Power response to CA IR-6.

⁴⁵ Exhibit N-10, NS Power Reply Submission, T&D Routines ATO M10182 and M10183, p. 5.

⁴⁶ Exhibit N-1, NS Power Work Order, M10182, p. 2.

1 attributes include: ...Maintenance, repair, and replacement history [and] Failure history.”⁴⁷

2 METSCO says that the WAM should be capable of:

3 ...facilitating successful asset management analysis and decision making to
4 ensure the desired asset performance, [including]:

- 5 • Identification of asset failure root causes.
- 6 • Deficiency and failure trending (age, manufacture, operating
7 environment, etc.).
- 8 • End of life trending.
- 9 • Maintenance effectiveness.
- 10 • System reliability gap analysis.⁴⁸

11 These capabilities should allow NS Power to track what equipment was replaced, what it was
12 replaced with, and whether the replacement was triggered by failure or inspection.

13 **Q: Do you recommend revisions in NS Power’s implementation plan to include**
14 **these potential uses?**

15 A: Not at this time. I have included this information for two reasons.

16 First, these potential additional benefits provide further support for my conclusion
17 that the benefits of NS Power’s proposed WAM and FMS systems are likely to be greater
18 than the costs.

19 Second, during the annual ACE Plan proceedings, the Board may wish to inquire as to
20 whether the software acquired in the proposed project might help reduce costs related to
21 vegetation management, transmission work and tracking the unplanned replacement of
22 deteriorated equipment.

23 **V. Application of Contingency Guidelines**

24 **Q: Please summarize NS Power’s application of the Non-Binding Contingency**
25 **Guidelines.**

26 A: As shown in Figure 2, NS Power includes a 21.4 % contingency in its estimated costs. Even
27 though NS Power has obtained pricing for the WAM and FMS systems and its system
28 integration consultant, NS Power points out that, “design, configuration, testing, training
29 and deployment of a multi-vendor, multi-system, integrated information technology-based

⁴⁷ METSCO Report, pp. 10–11.

⁴⁸ METSCO Report, p. 11.

1 solution involving over 700 users presents inherent risks. Some risks are known as the
2 project is being planned and others are unknown and will only be known as the project
3 progresses.”⁴⁹

4 NS Power states that the project cost estimate is based on a development stage
5 between Decision Gates 4 and 5, and for a project filed at DG5, the Contingency Guidelines
6 state that the contingency range is 0-20%, so the 21.4% contingency is consistent with the
7 project development stage.⁵⁰

8 NS Power developed the 21.4% contingency based on contingencies that were
9 determined to be appropriate for each of several expense types, as shown in Figure 2. NS
10 Power also supported the \$10.7 million contingency with a scenario in which the project is
11 delayed by 5 months, a more complex integration is required, and an additional key
12 requirement is added. The costs resulting from the combination of these three risks were
13 estimated, including consulting, internal labor, computer hardware, and software
14 expenses.⁵¹

15 **Figure 2: Contingency by Cost Item**⁵²

| Expense Type | Project Forecast Total | Contingency % | Contingency \$ | Total Project Forecast Including Contingency |
|------------------------------------|------------------------|---------------|----------------|--|
| Consulting/ External Contractor | 29.9 | 25% | 7.5 | 37.4 |
| Internal Labour | 11.8 | 20% | 2.3 | 14.1 |
| Computer Hardware | 0.6 | 20% | 0.1 | 0.7 |
| Application Software | 2.2 | 20% | 0.4 | 2.6 |
| Other | 1.8 | 20% | 0.4 | 2.2 |
| AFUDC | 3.9 | N/A | N/A | 3.9 |
| Total | 50.2 | 21.4% | 10.7 | 60.9 |

16 ⁴⁹ Exhibit N-4, Application, p. 29, lines 11-14.

⁵⁰ Exhibit N-7, NS Power response to NSUARB IR-11(c).

⁵¹ Exhibit N-7, NS Power response to NSUARB IR-12.

⁵² Exhibit N-4, Application, pp. 29-30, Figure 9.

1 **Q: What is your opinion of NS Power’s development of its budget contingency?**

2 A: In the evidence I submitted for the 2022 ACE Plan proceeding, I noted that some of the key
3 steps in setting the contingency are:

- 4 1. Determining the maturity level of the estimate;
- 5 2. Determining the risk exposure facing the project; and
- 6 3. Determining the contingency.⁵³

7 With respect to the proposed project’s maturity level, although NS Power appears to
8 have created a checklist to classify project maturities,⁵⁴ NS Power did not present the
9 checklist in its evidence. Nonetheless, NS Power identifies a list of planning activities at DG4
10 and at DG5, suggesting that such a checklist may exist.⁵⁵

11 With respect to the risk exposure, although NS Power has not supplied a risk register
12 for the proposed project,⁵⁶ it has estimated costs associated with three well-defined project
13 risks.

14 Both the risk-factor-based contingency estimate and the application of varying
15 contingency factors by cost item also suggest some level of diligence in application of the
16 Contingency Guidelines.

17 Notably, the Application does not propose use of a project management reserve to
18 “address strategic project risk or scope items not yet identified.”⁵⁷ Accordingly, should NS
19 Power identify a strategic project risk or a major change to the scope, I would expect NS
20 Power to bring that information to the Board before proceeding to increase the project cost.

21 **Q: Is NS Power effectively implementing the non-binding contingency guidelines
22 in this Application?**

23 A: Yes. In contrast to my findings in the 2022 ACE Plan, the evidence I have summarized shows
24 that NS Power has minimally satisfied the intent of the Contingency Guidelines, even though
25 it has not provided all the relevant documentation, and much of the documentation (e.g.,
26 the risk analysis), was only supplied in response to an information request.⁵⁸

⁵³ Exhibit N-10, Evidence of John D. Wilson, 2022 ACE Plan (February 24, 2022), M10366, p. 24.

⁵⁴ Exhibit N-4, 2022 ACE Plan, M10366, NS Power response to CA IR-15, Attachment 1: Non-Binding Contingency Guidelines, (Hereafter, “Contingency Guidelines”) Attachment B.

⁵⁵ Exhibit N-7, NS Power response to NSUARB IR-11(b).

⁵⁶ Contingency Guidelines, pp. 18, 22; Exhibit N-4, 2022 ACE Plan, M10366, NS Power response to CA IR-9.

⁵⁷ Contingency Guidelines, p. 18.

⁵⁸ Exhibit N-7, NS Power response to NSUARB IR-12.

1 One area for improvement is documentation of any predetermined guidelines that NS
2 Power relied upon when setting the 20-25 % contingency level for each of the cost items in
3 Figure 2. While the risk factor analysis provides adequate support for the final contingency,
4 the specific contingency levels selected for each of the cost items is not supported by
5 reference to expert judgement or to predetermined guidelines.

6 Predetermined guidelines “may be as simple as providing a single contingency or float
7 value [or] complex tables or scoring mechanisms.”⁵⁹ For example, NS Power may have
8 analyzed past IT projects and determined that for projects whose consulting and external
9 contractor planning work is at Decision Gate 5, the associated costs increased (due to change
10 orders and the like) by an average of 25% above the DG5 cost estimate for an average (P50)
11 project outcome.⁶⁰

12 NS Power could improve the evidentiary support for its contingency value by
13 conducting a historical analysis of major IT projects at the DG4 and DG5 levels and
14 determining how actual costs compared to the estimated cost included in the project
15 Application, by cost item. To the extent that NS Power’s judgement is that the contingency
16 for cost items in this project should be set at a higher or lower value than the historical
17 average, NS Power could provide further explanation of the expert judgement justifying the
18 deviation.

19 **Q: What is your recommendation to the Board regarding contingency for this**
20 **project?**

21 A: I recommend that the Board approve the proposed contingency but encourage NS Power to
22 supply the following documentation in future applications, as recommended in the evidence
23 I filed in the 2022 ACE Plan proceeding:

- 24 4. Project maturity classification checklist;
- 25 5. Statement of the basis for the contingency guidelines including, as applicable:
 - 26 a. Predetermined guidelines—reference to or statement of documented basis for
27 use of a standard “single contingency” or other referenced practice;

⁵⁹ Contingency Guidelines, p. 5.

⁶⁰ This process is described in my evidence for the 2022 ACE Plan. Exhibit N-10, Evidence of John D. Wilson, 2022 ACE Plan (February 24, 2022), M10366, pp. 24-27. It appears that NS Power has completed consulting/external contractor planning work to a DG5 level; NS Power states, “Work advanced at Decision Gate 5 was the formalization of contracts and agreements related to services and software provided” by PwC, Maximo and Salesforce. Exhibit N-11, NS Power response to NSURB IR-11(b).

- 1 b. Subject matter expert judgement—documented reasons for the determination,
2 including a supporting risk register; and
3 c. Other, more technical methods—Supporting analysis as described in the
4 Contingency Guidelines.

5 **VI. Total Cost of Ownership for Information Technology (IT) Projects**

6 **Q: Has NS Power provided a total cost of ownership (TCO) estimate in this**
7 **Application?**

8 A: Yes. In addition to the project budget, NS Power’s Appendix H includes the EA I discussed
9 in Section III.C. The EA includes a 15-year estimate of ongoing operational costs, renewal of
10 licenses after the initial period, potential warranty extensions, and annual costs for
11 maintenance, support and subscriptions.

12 NS Power justifies evaluating this project using a fifteen-year lifetime,⁶¹ which is
13 consistent with the continuous service life offered by Salesforce Field Service and the
14 inclusion of major release upgrade costs for Maximo in the 15-year cost estimate.⁶²

15 **Q: What is your opinion of NSP’s TCO for this project?**

16 A: I am pleased to see a well-developed TCO for this project. Previously, in its 2021 Stakeholder
17 Engagement Report, NS Power stated that it would provide a TCO only if an “alternative is
18 identified that the Company confirms is technically feasible and not otherwise prohibitively
19 expensive” and then only “on request.”⁶³ In this case, the TCO was, appropriately, provided
20 with the Application. Furthermore, although the alternative included in the EA is confirmed
21 by NS Power to be technically feasible, there seems to be substantial risk associated with
22 “Option B.” As discussed in Section III.C, NS Power has been maintaining Maximo at what
23 it rates as a “High” (25/25) risk score since at least 2017.⁶⁴ Presenting information on
24 “Option B” adds value to the TCO analysis even if it might be inadvisable to continue with
25 such a risky option.

⁶¹ Exhibit N-11, NS Power response to NSURB IR-16(a).

⁶² Exhibit N-11, NS Power response to NSURB IR-2(a).

⁶³ NS Power, 2021 ACE Plan Stakeholder Engagement Report (October 1, 2021), M09920, p. 7.

⁶⁴ Exhibit N-5, NS Power response to CA IR-7(d).

1 **Q: Do you have any further recommendation to the Board on this topic?**

2 A: No. I do wish to call the Board's attention to the recommendation I submitted in my 2022
3 ACE Plan evidence. In that evidence, I recommend that the Board require NS Power to
4 submit a 10-year TCO for each IT project with a budget of over \$1 million, unless an EAM
5 has been prepared. The Board may wish to consider the TCO presented in this Application
6 as a model for what NS Power should present for each IT project with a budget over \$1
7 million, even if NS Power is not able to offer an "Option B."

8 **Q: Does this conclude your evidence?**

9 A: Yes.

10

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SUMMARY OF PROFESSIONAL EXPERIENCE

- 2019–Present* **Research Director, Resource Insight, Inc.** Provides research, technical assistance, and expert testimony on electric- and gas-utility planning, economics, and regulation. Reviews electric-utility rate design. Designs and evaluates conservation programs for electric utilities, including conservation cost recovery mechanisms and performance incentives. Evaluates performance of renewable resources and designs performance evaluation systems for procurement. Designs and assesses resource planning and procurement strategies for regulated and competitive markets.
- 2007-19* **Deputy Director for Regulatory Policy, Southern Alliance for Clean Energy.** Managed regulatory policy, including supervision of experts in areas of energy efficiency, renewable energy, and market data. Provided expert witness testimony on topics of resource planning, renewable energy, energy efficiency to utility regulators. Directed litigation activities, including support of expert witnesses in the areas of rate design, resource planning, renewable energy, energy efficiency, and resource procurement. Conducted supporting research and policy development. Represented SACE on numerous legislative, utility, and private committees across a wide range of climate and energy related topics.
- 2001–06* **Executive Director, Galveston-Houston Association for Smog Prevention.** Directed advocacy and regulatory policy related to air pollution reduction, including ozone, air toxics, and other related pollutants in the industrial, utility, and transportation sectors. Served on the Regional Air Quality Planning Committee, Transportation Policy Technical Advisory Committee, and Steering Committee of the TCEQ Interim Science Committee.
- 2000–01* **Senior Associate, The Goodman Corporation.** Provided transportation and urban planning consultant services to cities and business districts across Texas.
- 1997–99* **Senior Legislative Analyst and Technology Projects Coordinator, Office of Program Policy Analysis and Government Accountability, Florida Legislature.** Author or team member for reports on water supply policy, environmental permitting, community development corporations, school district financial management and other issues – most recommendations implemented by the 1998 and 1999 Florida Legislatures. Edited statewide government accountability newsletter and coordinated online and internal technical projects.
- 1997* **Environmental Management Consultant, Florida State University.** Project staff for Florida Assessment of Coastal Trends.

1992-96 **Research Associate, Center for Global Studies, Houston Advanced Research Center.** Coordinated and led research for projects assessing environmental and resource issues in the Rio Grande / Rio Bravo river basin and across the Greater Houston region. Coordinated task force and edited book on climate change in Texas.

EDUCATION

BA, Physics (with honors) and history, Rice University, 1990.

MPP, John F. Kennedy School of Government, Harvard University, 1992. Concentration areas: Environment, negotiation, economic and analytic methods.

PUBLICATIONS

“Urban Areas,” with Judith Clarkson and Wolfgang Roeseler, in Gerald R. North, Jurgen Schmandt and Judith Clarkson, *The Impact of Global Warming on Texas: A Report of the Task Force on Climate Change in Texas*, 1995.

“Quality of Life and Comparative Risk in Houston,” with Janet E. Kohlhase and Sabrina Strawn, *Urban Ecosystems*, Vol. 3, Issue 2, July 1999.

“Seeking Consistency in Performance Incentives for Utility Energy Efficiency Programs,” with Tom Franks and J. Richard Hornby, *2010 American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings*, August 2010.

“Monopsony Behavior in the Power Generation Market,” with Mike O’Boyle and Ron Lehr, *Electricity Journal*, August-September 2020.

REPORTS

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Houston Environmental Foresight Science Panel, *Houston Environment 1995*, Houston Advanced Research Center, 1996.

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Office of Program Policy Analysis and Government Accountability, *Best Financial Management Practices for Florida School Districts*, Report No. 97-08, October 1997.

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“Who’s Counting: The Systematic Underreporting of Toxic Air Emissions,” Environmental Integrity Project and Galveston Houston Association for Smog Prevention, June 2004.

“Mercury in Galveston and Houston Fish: Contamination by Neurotoxin Places Children at Risk,” Galveston Houston Association for Smog Prevention, October 2004.

“Exceeding the Limit: Industry Violations of New Rule Almost Slid Under State’s Radar,” Galveston Houston Association for Smog Prevention, January 2006.

“Whiners Matter! Citizen Complaints Lead to Improved Regional Air Quality Control,” Galveston Houston Association for Smog Prevention, June 2006.

“Bringing Clean Energy to the Southeastern United States: Achieving the Federal Renewable Energy Standard,” Southern Alliance for Clean Energy, February 2008.

“Cornerstones: Building a Secure Foundation for North Carolina’s Energy Future,” Southern Alliance for Clean Energy, May 2008.

“Yes We Can: Southern Solutions for a National Renewable Energy Standard,” Southern Alliance for Clean Energy, February 2009.

“Green in the Grid: Renewable Electricity Opportunities in the Southeast United States,” with Dennis Creech, Eliot Metzger, and Samantha Putt Del Pino, World Resources Institute Issue Briefs, April 2009.

“Local Clean Power,” with Dennis Creech, Eliot Metzger, and Samantha Putt Del Pino, World Resources Institute Issue Briefs, April 2009.

“Energy Efficiency Program Impacts and Policies in the Southeast,” Southern Alliance for Clean Energy, May 2009.

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“Renewable Energy Standard Offer: A Tennessee Valley Authority Case Study,” Southern Alliance for Clean Energy, November 2012.

“Increased Levels of Renewable Energy Will Be Compatible with Reliable Electric Service in the Southeast,” Southern Alliance for Clean Energy, November 2014.

“Cleaner Energy for Southern Company: Finding a Low Cost Path to Clean Power Plan Compliance,” Southern Alliance for Clean Energy, July 2015.

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“Seasonal Electric Demand in the Southeastern United States,” Southern Alliance for Clean Energy, March 2017.

“Analysis of Solar Capacity Equivalent Values for the South Carolina Electric and Gas System,” Southern Alliance for Clean Energy, March 2017.

“Solar in the Southeast, 2017 Annual Report,” with Bryan Jacob, Southern Alliance for Clean Energy, February 2018.

“Energy Efficiency in the Southeast, 2018 Annual Report,” with Forest Bradley-Wright, Southern Alliance for Clean Energy, December 2018.

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“Tracking Decarbonization in the Southeast, 2019 Generation and CO₂ Emissions Report,” with Heather Pohman and Maggie Shober, Southern Alliance for Clean Energy, August 2019.

“Seasonal Electric Demand in the Southeastern United States,” with Maggie Shober, Southern Alliance for Clean Energy, April 2020.

“Making the Most of the Power Plant Market: Best Practices for All-Source Electric Generation Procurement,” with Mike O’Boyle, Ron Lehr, and Mark Detsky, Energy Innovation Policy & Technology LLC and Southern Alliance for Clean Energy, April 2020.

“Monopsony Behavior in the Power Generation Market,” *The Electricity Journal* 33, with Mike O’Boyle and Ron Lehr (2020).

“Review of Nova Scotia Power’s 2020 Integrated Resource Plan,” prepared for the Nova Scotia Consumer Advocate, NSUARB Matter No. M08059, with Paul Chernick (January 2021).

“Implementing All-Source Procurement in the Carolinas,” prepared for Natural Resources Defense Council, Sierra Club, Southern Alliance for Clean Energy, South Carolina Coastal Conservation League and Upstate Forever, for submission in NCUC Docket E-100, Sub 165, and SCPSC Dockets 2019-224-E and 2019-225-E (February 2021).

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PRESENTATIONS

“Clean Energy Solutions for Western North Carolina,” presentation to Progress Energy Carolinas WNC Community Energy Advisory Council, February 7, 2008.

“Energy Efficiency: Regulating Cost-Effectiveness,” Florida Public Service Commission undocketed workshop, April 25, 2008.

“Utility-Scale Renewable Energy,” presentation on behalf of Southern Alliance for Clean Energy to the Board of the Tennessee Valley Authority, March 5, 2008.

“An Advocates Perspective on the Duke Save-a-Watt Approach,” ACEEE 5th National Conference on Energy Efficiency as a Resource, September 2009.

“Building the Energy Efficiency Resource for the TVA Region,” presentation on behalf of Southern Alliance for Clean Energy to the Tennessee Valley Authority Integrated Resource Planning Stakeholder Review Group, December 10, 2009.

“Florida Energy Policy Discussion,” testimony before Energy & Utilities Policy Committee, Florida House of Representatives, January 2010.

“The Changing Face of Energy Supply in Florida (and the Southeast),” 37th Annual PURC Conference, February 2010.

“Bringing Energy Efficiency to Southerners,” Environmental and Energy Study Institute panel on “Energy Efficiency in the South,” April 10, 2010.

“Energy Efficiency: The Southeast Considers its Options,” NAESCO Southeast Regional Workshop, September 2010.

“Energy Efficiency Delivers Growth and Savings for Florida,” testimony before Energy & Utilities Subcommittee, Florida House of Representatives, February 2011.

“Rates vs. Energy Efficiency,” 2013 ACEEE National Conference on Energy Efficiency as a Resource, September 2013.

“TVA IRP Update,” TenneSEIA Annual Meeting, November 19, 2014.

“Views on TVA EE Modeling Approach,” presentation with Natalie Mims to Tennessee Valley Authority’s Evaluating Energy Efficiency in Utility Resource Planning Meeting, February 10, 2015.

“The Clean Power Plan Can Be Implemented While Maintaining Reliable Electric Service in the Southeast,” FERC Eastern Region Technical Conference on EPA’s Clean Power Plan Proposed Rule, March 11, 2015.

“Renewable Energy & Reliability,” 5th Annual Southeast Clean Power Summit, EUCI, March 2016.

“Challenges to a Southeast Carbon Market,” 5th Annual Southeast Clean Power Summit, EUCI, March 2016.

“Solar Capacity Value: Preview of Analysis to Date,” Florida Alliance for Accelerating Solar and Storage Technology Readiness (FAASSTeR) meeting, Orlando, FL, November 2017.

“Making the Most of the Power Plant Market: Best Practices for All-Source Electric Generation Procurement,” Southeast Energy and Environmental Leadership Forum, Nicholas Institute for Environmental Policy Solutions, August 2020.

“Making the Most of the Power Plant Market: Best Practices for All-Source Electric Generation Procurement,” Indiana State Bar Association, Utility Law Section, Virtual Fall Seminar, September 2020.

“Resource Adequacy, Reserve Margin, & Seasonal Planning,” 2022 Georgia IRP Training and Roundtable Series, February 2022.

EXPERT TESTIMONY

2008 **South Carolina PSC** Docket No. 2007-358-E, surrebuttal testimony on behalf of Environmental Defense, the South Carolina Coastal Conservation League, Southern Alliance for Clean Energy and the Southern Environmental Law Center. Cost recovery mechanism for energy efficiency, including shareholder incentive and lost revenue adjustment mechanism.

2009 **North Carolina NCUC** Docket No. E-7, Sub 831, direct testimony on behalf of Environmental Defense Fund, Natural Resources Defense Council, Southern Alliance for Clean Energy, and Southern Environmental Law Center. Cost recovery mechanism for energy efficiency, including shareholder incentive and lost revenue adjustment mechanism.

Florida PSC Docket Nos. 080407-EG through 080413-EG, direct testimony on behalf of Southern Alliance for Clean Energy and the Natural Resources Defense Council. Energy efficiency potential and utility program goals.

South Carolina PSC Docket No. 2009-226-E, direct testimony in general rate case on behalf of Environmental Defense, the Natural Resources Defense Council, the South Carolina Coastal Conservation League, Southern Alliance for Clean Energy and the Southern Environmental Law Center. Cost recovery mechanism for energy efficiency, including shareholder incentive and lost revenue adjustment mechanism.

2010 **North Carolina NCUC** Docket No. E-100, Sub 124, direct testimony on behalf of Environmental Defense Fund, the Sierra Club, Southern Alliance for Clean Energy, and Southern Environmental Law Center. Adequacy of consideration of energy efficiency in Duke Energy Carolinas and Progress Energy Carolinas’ 2009 integrated resource plans.

Georgia PSC Docket No. 31081, direct testimony on behalf of Southern Alliance for Clean Energy. Adequacy of consideration of energy efficiency in

Georgia Power's 2010 integrated resource plan, including cost effectiveness, rate and bill impacts, and lost revenues.

Georgia PSC Docket No. 31082, direct testimony on behalf of Southern Alliance for Clean Energy. Adequacy of consideration of energy efficiency in Georgia Power's 2010 demand side management plan, including program revisions, planning process, stakeholder engagement, and shareholder incentive mechanism.

2011 **South Carolina PSC** Docket No. 2011-09-E, allowable ex parte briefing on behalf of Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever. Adequacy of South Carolina Electric & Gas's 2011 integrated resource plan, including resource mix, sensitivity analysis, alternative supply and demand side options, and load growth scenarios.

South Carolina PSC Docket Nos. 2011-08-E and 2011-10-E, allowable ex parte briefing on behalf of Southern Alliance for Clean Energy, South Carolina Coastal Conservation League, and Upstate Forever. Adequacy of Progress Energy Carolinas and Duke Energy Carolinas' 2011 integrated resource plans, including resource mix, sensitivity analysis, alternative supply and demand side options, cost escalation, uncertainty of nuclear and economic impact modeling.

2013 **Georgia PSC** Docket No. 36498, direct testimony on behalf of Southern Alliance for Clean Energy. Adequacy of consideration of energy efficiency in Georgia Power's 2013 integrated resource plan, including cost effectiveness, rate and bill impacts, and lost revenues, economics of fuel switching and renewable resources.

South Carolina PSC Docket No. 2013-392-E, direct testimony with Hamilton Davis in Duke Energy Carolinas need certification case on behalf of the South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. Need for capacity, adequacy of energy efficiency and renewable energy alternatives, and use of solar power as an energy resource.

2014 **South Carolina PSC** Docket No. 2014-246-E, direct testimony generic proceeding on behalf of the South Carolina Coastal Conservation League and Southern Alliance for Clean Energy. Methods for calculating dependable capacity credit for renewable resources and application to determination of avoided cost.

2015 **Florida PSC** Docket No. 150196-EI, direct testimony in Florida Power & Light need certification case on behalf of Southern Alliance for Clean Energy. Appropriate reserve margin and system reliability need.

2016 **Georgia PSC** Docket No. 40161, direct testimony on behalf of Southern Alliance for Clean Energy. Adequacy of consideration of renewable energy in Georgia Power's 2016 integrated resource plan, including portfolio diversity,

operational and implementation risk, analysis of project-specific costs and benefits (including location and technology considerations), and methods for calculating dependable capacity credit for renewable resources.

2019 **Georgia PSC** Docket Nos. 42310 and 42311, direct testimony with Bryan A. Jacob in Georgia Power's 2019 integrated resource plan and demand side management plan on behalf of Southern Alliance for Clean Energy. Adequacy of consideration of renewable energy in IRP, retirement of uneconomic plants, and use of all-source procurement process. Shareholder incentive mechanism for both renewable energy and DSM plan.

2020 **Nova Scotia UARB** Matter No. M09519, direct testimony with Paul Chernick in Nova Scotia Power's application for approval of the Smart Grid Nova Scotia Project on behalf of the Nova Scotia Consumer Advocate. Cost classification, decommissioning costs, justification for software vendor selection, and suggested changes to project scope.

Nova Scotia UARB Matter No. M09499, direct testimony with Paul Chernick in Nova Scotia Power's 2020 annual capital expenditure plan on behalf of the Nova Scotia Consumer Advocate. Potential to decommission hydroelectric systems, review of annually recurring capital projects, use of project contingencies, and cost minimization practices.

Nova Scotia UARB Matter No. M09579, direct testimony with Paul Chernick in Nova Scotia Power's application for the Gaspereau Dam Safety Remedial Works on behalf of the Nova Scotia Consumer Advocate. Alternatives to proposed project, project contingency factor, estimation of archaeological costs, and replacement energy cost calculation.

Nova Scotia UARB Matter No. M09707, direct testimony with Paul Chernick on Nova Scotia Power's 2020 Load Forecast on behalf of the Nova Scotia Consumer Advocate. Impacts of recession, application of end-use studies, improvements to forecast components, and impact of time-varying pricing.

California PUC Docket A.19-10-012, direct and rebuttal testimony with Paul Chernick in San Diego Gas & Electric's application for the Power Your Drive Electric Vehicle Charging Program on behalf of the Small Business Utility Advocates. Ensuring that utility-installed chargers advance California goal for electric vehicles. Budget controls. Reporting requirements. Evaluation, monitoring and verification processes. Outreach to small business customers.

California PUC Docket A.19-08-013, direct testimony in Southern California Edison's 2021 general rate case (track 2) on behalf of the Small Business Utility Advocates. Reasonableness of remedial software costs to be included in authorized revenue requirement.

Georgia PSC Docket Nos. 4822, 16573 and 19279, direct, rebuttal and surrebuttal testimony in Georgia Power Company's PURPA avoided cost review

on behalf of the Georgia Large Scale Solar Association. Reviewing compliance with prior Commission orders. Application of capacity need forecast in projection of avoided capacity cost. Calculation of cost of new capacity. Proposal of standard offer contract.

California PUC Docket A.19-11-019, direct, reply, responsive, and reply to responsive testimony with Paul Chernick in Pacific Gas & Electric's 2021 general rate case (phase 2) on behalf of the Small Business Utility Advocates. Cost of service methods. Rate design, including customer charges, demand charges, real time pricing tariffs, TOU differentials and periods.

Nova Scotia UARB Matter No. M09548, direct testimony on the audit of Nova Scotia Power's Fuel Adjustment Mechanism on behalf of the Nova Scotia Consumer Advocate. Reasonableness of fuel contract costs. Scope of study on dispatch practices. Impact of greenhouse gas shadow pricing. Compliance issues related to resource planning.

2021 **California PUC** Docket R.20-11-003, direct and reply testimony on rulemaking to ensure reliable electric service in the event of an extreme weather event on behalf of the Small Business Utility Advocates. Modifications to Critical Peak Pricing programs and Time of Use periods. Modifications to load management programs.

Nova Scotia UARB Matter No. M09898, direct testimony on Nova Scotia Power's Annually Adjusted Rates on behalf of the Nova Scotia Consumer Advocate. Effect of delays in power contract. Unit modeling assumptions. Variable capital costs. Application of Time-Varying Pricing.

Nova Scotia UARB Matter No. M09920, direct testimony on Nova Scotia Power's Annual Capital Expenditure Plan for 2021 on behalf of the Nova Scotia Consumer Advocate. Cost minimization. Project contingency. Economic analysis model. Analysis of specific projects.

Nova Scotia UARB Matter No. M09777, direct testimony on Nova Scotia Power's Time-Varying Pricing Tariff Application on behalf of the Nova Scotia Consumer Advocate. Effect of proposed TVP tariffs on load, capacity savings, and energy costs. Recommended CPP tariffs. Treatment of demand charges in TVP tariffs. Implementation and evaluation of TVP tariffs. Lost revenue adjustment mechanism.

South Carolina PSC Docket Nos. 2019-224-E and 2019-225-E, surrebuttal testimony on 2020 Integrated Resource Plans filed by Duke Energy Carolinas and Duke Energy Progress. All-source procurement process. Process for resolution of disputed issues in IRP proceedings.

California PUC Docket A.20-10-011, direct and reply testimony with Paul Chernick in Pacific Gas & Electric's Commercial Electric Vehicle Day-Ahead Hourly Real Time Pricing Pilot on behalf of the Small Business Utility

Advocates. Rate design for real time pricing tariff. Marketing to small businesses. Evaluation plan.

California PUC Docket R.20-08-020, direct and reply testimony with Paul Chernick in rulemaking to revisit net energy metering (NEM) tariffs on behalf of the Small Business Utility Advocates. Rate design for NEM tariff. Method for analyzing NEM tariff program.

California PUC Docket A.20-10-012, direct testimony with Paul Chernick in Southern California Edison's 2021 general rate case (phase 2) on behalf of the Small Business Utility Advocates. Cost of service methods. Rate allocation and design, including customer charges and real time pricing tariffs.

Nova Scotia UARB Matter No. M10176, direct testimony on Nova Scotia Power's Smart Grid Nova Scotia Solar Garden Pilot Rate Rider on behalf of the Nova Scotia Consumer Advocate. Addressing risks associated with future cost changes.

Nova Scotia UARB Matter No. M10110, direct testimony on Nova Scotia Power's Wreck Cove hydroelectric project on behalf of the Nova Scotia Consumer Advocate. Reasonableness of project and unresolved issues.

California PUC Docket A.19-08-013, direct testimony in Southern California Edison's 2021 general rate case (track 3) on behalf of the Small Business Utility Advocates. Reasonableness and prudence of remedial and replacement software costs to be included in authorized revenue requirement.

Nova Scotia UARB Matter No. M10197, direct testimony on Nova Scotia Power's Tusket Main Dam Refurbishment Authorization to Overspend application on behalf of the Nova Scotia Consumer Advocate. Whether the project should proceed and whether full cost recovery is justified.

Colorado PUC Proceeding No. 21AL-0317E, answer testimony in Public Service Company of Colorado's 2021 general rate case (phase 1) on behalf of Energy Outreach Colorado. Reasonableness of capital project costs, choice of test year, adjustment to load to reflect effects of pandemic.

2022 **California PUC** Docket A.21-05-017, direct testimony with Paul Chernick in Liberty Utilities Calpeco 2022 general rate case on behalf of the Small Business Utility Advocates. Marginal cost study, revenue allocation, rate design.

Nova Scotia UARB Matter No. M10366, direct testimony on Nova Scotia Power's Annual Capital Expenditure Plan for 2022 on behalf of the Nova Scotia Consumer Advocate. Alignment with IRP and new regulation. Cost minimization. Project contingency. Post-project review. Total cost of ownership. Economic analysis model. Decommissioning. Analysis of specific projects.

California PUC Docket A.21-10-010, direct testimony on Pacific Gas and Electric's proposed Electric Vehicle Charge 2 Program on behalf of the Small Business Utility Advocates. Program scale and unit costs. Cost controls. Cost Allocation.