

**NOVA SCOTIA UTILITY AND REVIEW BOARD**

**IN THE MATTER OF THE PUBLIC UTILITIES ACT**

- and -



**IN THE MATTER OF AN APPLICATION** by **NOVA SCOTIA POWER INCORPORATED**  
for approval of Capital Work Order CI# 47124 for its Advanced Metering Infrastructure  
Project in the amount of \$133,228,952

**BEFORE:** Peter W. Gurnham, Q.C., Chair  
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Steven M. Murphy, MBA, P.Eng., Member

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**FINAL SUBMISSIONS:** April 6, 2018

**DECISION DATE:** June 11, 2018

**DECISION:** Application approved subject to comments in this Decision. See paragraphs [221] to [223]

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## **1.0 INTRODUCTION and BACKGROUND**

[1] Nova Scotia Power Incorporated (NSPI, Utility or Company) made application to the Nova Scotia Utility and Review Board (Board) on October 19, 2017, for approval of capital work order CI# 47124 for its Advanced Metering Infrastructure (AMI) Project in the amount of \$133,228,952 (Application). NSPI also requested approval of: confidential treatment of certain information filed in support of the AMI Application; its Confidentiality Undertaking; and straight-line amortization of the undepreciated value of the retired meters over a five-year period commencing with completion of the AMI project.

[2] A Hearing Order was issued by the Board on October 26, 2017 advising that this matter would be considered in a paper hearing; approving NSPI's request for confidential treatment of identified portions of information filed in support of the AMI Application, its Confidentiality Undertaking, and providing a timetable for the proceeding.

[3] As required in the Hearing Order, a Notice of Public Hearing was published in the Chronicle Herald on Saturday, November 4, 2017.

[4] Notices of Intervention were filed by the Affordable Energy Coalition (AEC), Consumer Advocate (CA), Ecology Action Centre (EAC), EfficiencyOne (EOne), the Industrial Group, Municipal Electric Utilities of Nova Scotia Cooperative (MEUNSC), Nova Scotia Department of Energy (NSDOE), Roswall Inc., the Planetary Association for Clean Energy Inc. (PACE), and the Small Business Advocate (SBA).

## **2.0 ISSUES**

### **2.1 Economic Analysis**

#### **2.1.1 Project Costs**

[5] NSPI estimated that the capital cost of the AMI project will be \$133.2 million. Project elements included in this cost estimate consist of the supply and installation of

AMI meter equipment, communication network equipment, the AMI head end system and the meter data management system. Other capital cost components include IT system integration, internal NSPI labour, external consultants/contractors labour, customer engagement and experience non-labour expenses, other miscellaneous expenses, administrative overhead (AO), and an allowance for funds used during construction (AFUDC).

[6] The project capital cost estimate also includes a contingency amount of \$13.4 million, representing 11% of the pre-contingency capital cost. The specific contingency allowances associated with individual project cost elements range from 10% of costs for technology hardware, software and the head end system, to 15% of costs for internal and external labour, customer engagement expenses and IT integration/installation. NSPI indicated that these contingency amounts reflect the stage of development of each cost category. Provision for such contingencies is intended to recognize that costs which were not anticipated at the time of application for Board approval will likely arise over the course of the project.

[7] With respect to procurement of the proposed AMI system, NSPI joined a procurement consortium of other utilities with similar AMI requirements. The other members of this consortium include New Brunswick Power, Emera Maine and Tampa Electric Company. The consortium is not a buying group or legal entity, and each member company will retain complete control and independence over its individual investments and procurement decisions. NSPI has indicated that procurement of the proposed AMI system through this consortium gives it more negotiating power with AMI vendors. As a result, by participating in the consortium, NSPI indicated that it will save approximately

\$18 million over the life of the AMI project; savings that would not have been possible had the Company not participated in the consortium.

[8] In its Application, NSPI stated that the AMI project capital cost of \$133.2 million is equal to, or significantly better than, that which has been obtained by other, much larger, Canadian utilities who have recently installed AMI technology. To support this claim, the Company provided the following comparative analysis:

The Company recognizes that the different operating regimes, population densities, and information system platforms under which utilities operate impact information from utility comparisons. NS Power is seeking approval of the AMI Project based on its detailed cost support and procurement documentation. The comparative information below is provided to indicate, at a high level, that NS Power's cost estimates are reasonable and within what would be expected for, or lower than, an AMI project of this size and scale...

[Exhibit N-1, p. 53]

<b>Year deployment completed</b>	<b>2010</b>	<b>2012</b>	<b>2016</b>	<b>2017</b>	<b>2020</b>
<b>All-in Cost per smart meter (CDN \$)</b>	\$409	\$406	\$404	\$266	\$269
<b>Utility</b>	Ontario (including Hydro One)	Central Maine Power (CMP)	BC Hydro	Hydro Quebec	NS Power
<b>Smart meters installed (millions)</b>	4.8	0.6	1.8	3.8	0.5

[Exhibit N-1, p. 54]

[9] The EAC's expert, Dr. David Hill, also noted the following:

Direct comparison across different AMI initiatives is difficult, and must be treated with some caution because of different cost and benefit accounting, different scopes for system upgrades, and different vendor and timing conditions. However, Figure 1 summarizes information from the NSPI application and a recent market study.

... Figure 1 does not represent, and should not be considered, an in-depth analysis of the costs proposed in the NSPI or other applications. It does however, suggest the NSPI

proposal is in line with prudent procurement, and puts the NSPI application among the utilities with relatively low costs per meter.

[Exhibit N-13, Page 12]

[10] Full deployment of AMI is forecast to start in January 2019 and extend into Q3 of 2020, with final deployments and project closure anticipated by the end of 2020.

[11] NSPI estimated that AMI project costs will increase the present value of the Company's revenue requirements by \$169.8 million, offset by savings of \$207.9 million, representing a net benefit of \$38.1 million:

<b>AMI Revenue Requirement Cost (PV)</b>	<b>Change in Total Revenue Requirement \$M</b>
Deployment Capital (Present value of project capital cost of \$133.2M)	125.3
IT Hardware and Software Maintenance	23.4
Operations	11.0
Refresh Capital	10.1
<b>Subtotal Project Costs</b>	<b>169.8</b>

[Exhibit N-1, p. 66]

[12] NSPI argued that the estimated capital cost for the AMI project is well-supported and appropriate for the scope of the proposed project. In addition, the projected cost has been largely unchallenged by the Intervenor. In fact, the SBA's expert, Mr. Athas, stated:

Yes, the NS Power cost estimates for the meters is in line with what I have seen. NS Power has participated in a consortium to lower costs through aggregating purchasing to lower the costs of meters. The IT System costs also appear reasonable.

[Exhibit N-14, p. 10]

[13] However, several individual elements of the project cost were questioned by the CA and the EAC. Specifically, both parties questioned the costs associated with AFUDC. The CA (through its expert, Mr. Chernick) also expressed concern related to the inclusion of AO in the project's approved capital cost. AFUDC will be addressed in

subsequent sections of this Decision. The EAC also took issue with cost recovery of the undepreciated value of existing meters that are retired early (which will be addressed in a later section of this Decision), and the project contingency amount.

#### **2.1.1.1 Contingency**

[14] Dr. Hill did not suggest that the contingency amount put forward by NSPI was inappropriate. Instead, he recommended that any project cost approved by the Board should exclude the project contingency amount of 11% (\$13.4 million):

It is prudent to include potential contingency in conducting the economic analysis of the investment, but I suggest the approved project budget should not include the contingency amount. Further, I suggest that costs over the proposed budget should be justified, case by case, rather than be pre-approved under a general contingency platform.

[Exhibit N-13, p. 21]

NSPI argued that inclusion of a contingency amount in a capital approval application to the Board is part of the established regulatory process in Nova Scotia.

[15] NSPI addressed the proposed project contingency in its Application, describing both the need for, and the amount of, the contingency. In the Board's view, the justification for the contingency amount is reasonable. The Board, therefore, finds the proposed contingency amount to be acceptable. As is usual for NSPI capital approval requests, final project costs, including the use of contingency, are subject to scrutiny by the Board. Therefore, upon completion of the project, NSPI is directed to file a final cost application which provides the Board with a detailed accounting of any use of the contingency. Such accounting is to include identification of costs associated with each item spent under the contingency, as well as an explanation describing the reason for requiring each item.

[16] With respect to project costs, the Board finds that NSPI's procurement plan and cost analysis for the AMI project are sufficiently rigorous to conclude that the estimated project cost of \$133.2 million is reasonable. The Board also finds that the Company's benchmark cost comparisons to other recent AMI projects are of some use in determining that the overall estimated project cost is not unreasonable. The Board notes that the procurement process used by NSPI, together with the rigour of the Board's Capital Expenditure Justification Criteria (CEJC), ensures that the cost forecast is supported and that actual costs will be carefully scrutinized. If spending is higher than forecasted, the CEJC establishes the parameters within which the Company must return to the Board for an authorization to overspend. Should this be required, the Board can initiate such review as it considers appropriate.

## **2.1.2 Operational and Grid Modernization Benefits**

### **2.1.2.1 Meter Reading and Field Work Reduction**

[17] The largest forecast benefit of the AMI project is related to a reduction in meter reading and field work. This benefit is associated with a reduced need for manual meter reading and meter support staff. Field work reduction benefits are attributable to the ability to remotely read the AMI meters on demand, and to use the remote connect/disconnect switch, thereby reducing costs associated with manual meter reading, including fuel, vehicles and labour. NSPI has estimated that AMI will eliminate 99% of manual meter reading and 55% of other meter related service order field work. The Company has projected that these benefits will provide an annual cost savings of \$4.6 million, yielding a 20-year net present value (NPV) revenue requirement

reduction/savings of \$56.8 million. This saving offsets roughly one-third of the estimated total AMI project lifecycle costs.

[18] In response to Board IRs, NSPI indicated that implementation of AMI will result in a reduction of 72.5 full-time equivalent meter services staff from the current complement of 83.5. The Company also stated:

(c) NS Power based its estimate that 99 percent of manual meter reading field work will be eliminated through implementation of AMI based on representations of AMI system vendors as to their systems' performance that has been articulated in Service Level Agreements, which states a 99.5 percent read rate over a 30 day period. NS Power has forecast a 0.5 percent annual failure rate associated with damaged, defective or nonfunctioning meters, which brings the estimated automation of manual meter reading field work to 99 percent.

(d) NS Power used a bottom-up service order analysis to develop its estimate that 55 percent of other meter related service order field work would be eliminated through implementation of AMI. Service order types that would be automated with AMI were reduced while service order types not impacted by AMI were left intact...

[Exhibit N-8, RIR-6, pp. 1-2]

[19] This item has been unchallenged by the Intervenors. Additionally, the SBA's expert, Mr. Athas, concluded that NSPI's calculated NPV benefit associated with this item is based upon "rigorous estimation", which he defines as:

Rigorously Based benefits include savings mostly based on avoided cost of operations and equipment that would be needed without AMI technology. These benefits are objective, straight-forward to quantify, and require no customer behavior change.

[Exhibit N-14, p. 18]

[20] The Board finds the NSPI estimated benefits for Meter Reading and Field Work Reduction to be reasonable.

#### **2.1.2.2 Avoided Meter Replacement Costs**

[21] NSPI stated that a significant portion of its current meter inventory is at or near the end of its useful life. In response to Board IRs, the Company estimated that based upon an average end of useful life age of 20 years and 10 years for residential and

demand meters respectively, it currently has 252,116 residential and 7,018 demand meters in service that are at the end of their useful lives. This represents approximately half of the total meters that are currently in service. Given that these meters will need to be replaced, NSPI suggested that now is the appropriate time to adopt AMI.

[22] NSPI's economic analysis model (EAM) for the AMI project assumes that in the absence of AMI implementation, full replacement of existing residential and demand meters would require that 26,269 meters be replaced annually over the next 20 years. If AMI is implemented, this work would not be required, and the associated cost would, therefore, be avoided to the benefit of ratepayers. The Company has estimated that this benefit will provide a 20-year NPV revenue requirement saving of \$24.1 million.

[23] This item has been unchallenged by the Intervenors. Mr. Athas also concluded that NSPI's calculated NPV benefit associated with this item has been "rigorously estimated".

[24] The Board finds the NSPI estimated benefit for Avoided Meter Replacement Costs to be reasonable.

### **2.1.2.3 Savings from Load Balancing**

[25] In its Application, NSPI stated that AMI can provide the data to help balance loads more effectively, which can reduce the transformer and distribution system loss factor. By modeling peak loss reduction from balancing loads supplied from three substations, NSPI determined that an average of 1.37 kW for every MVA of substation transformer capacity could be saved. This loss reduction, plus reserve requirements, were estimated to result in peak capacity savings of 4 MW. In addition, NSPI estimated that annual energy savings of \$1.1 million would be available through load balancing.

[26] Using construction savings of \$1.5 million per MW of capacity, and \$9,000 per year in saved generation operating costs, NSPI calculated the 2022 value to be \$6.7 million. When this capacity savings was combined with energy savings, NSPI projected that the 20-year present value of revenue requirement savings would be \$18.7 million. This is the largest grid modernization benefit presented in the Application.

[27] The CA, SBA, and Board Counsel Consultant (Synapse) all questioned NSPI's projected savings from load balancing attributed to AMI.

[28] Mr. Chernick, on behalf of the CA, took exception to NSPI's approach of modeling three substations and extrapolating those results across all substations. In addition, the CA argued that load balancing can be, and is, undertaken when needed without AMI meters, so the projected savings should not be included as AMI benefits.

[29] The SBA classified savings from load balancing as "Soft Assumptions", meaning that they had logical reasoning, but were not entirely tested within NSPI's region. The SBA argued that the savings could be overestimated due to NSPI's use of peak load reduction applied to all hours of the year.

[30] Synapse raised several concerns regarding the AMI related savings from load balancing:

- No system data was provided to support NSPI's assertion that the modeled substations were representative of typical substations in Nova Scotia;
- No capital costs associated with transferring load onto other phases or circuits were included in the analysis;
- Benefits attributed to AMI should only include the difference between savings readily achievable using existing load balancing methods and savings achievable with AMI data; in addition, no indication was given regarding savings that could be achieved using current methods;
- Since load balancing savings can be achieved without AMI implementation, the economic analysis should have considered costs associated with other methods such as line sensors or other recording meters.

[31] In its Reply Evidence, NSPI conceded that load balancing can occur without AMI information, but also stated that the process will be much more efficient with AMI since it will provide greater accessibility, granularity, and seasonality of data over time, thereby resulting in better decisions on when and how best to balance the circuit load.

[32] In its Reply to Closing Submissions, NSPI confirmed that the three substations chosen to estimate load balancing savings are representative and referred to its response to CA IR-118 (a), which stated in part:

The three substations were chosen as geographic and load-type representative substations of the provincial network ... and are considered representative of typical substations on the NS Power system, representing urban, suburban and rural load types, with a variety of transformer sizes and customer counts.

[NSPI Reply to Closing Submission, p. 11]

[33] Regarding additional capital costs that may be required for load balancing, in its Reply Evidence, NSPI dismissed that concern by stating that load balancing only requires changing existing infrastructure from one phase to another, which could be accomplished by installing a new clamp, with an operational cost of about \$150 per load transfer. NSPI stated that additional capital costs could be integrated into proactive maintenance activities without driving additional costs.

[34] The Board acknowledges NSPI's contention that AMI data will result in more efficient load balancing decisions. However, the Board also accepts the concerns raised by Intervenors regarding NSPI's economic analysis. For example:

- since load balancing can, and is, currently undertaken without AMI, it is appropriate to only include the additional savings accrued through AMI data as a benefit of implementing AMI;
- although the Board understands that a significant amount of load balancing can be completed by reconnecting existing services among adjacent phases or circuits, there will undoubtedly be situations where capital investments will be incurred to build out additional phases or line extensions to enable effective transfer of load from heavily loaded phases and circuits;

- NSPI notes that additional capital costs could be integrated into proactive maintenance activities, which suggests that load balancing will be a multi-stage process, therefore the savings attributed to load balancing will also occur at various points in time, not all at once when the AMI facilities are put into service;
- since some circuit loading is currently more balanced than others, it may not be appropriate to broadly apply the estimated savings from three substations across all of NSPI's network.

[35] All of these factors suggest that NSPI's analysis lacks some depth, and likely presents an overstatement of savings. The uncertainty is with the level of savings that should appropriately be attributed to AMI implementation. In its Reply Evidence, NSPI attempted to temper the projected savings by assuming a pessimistic scenario of 25% reduction. Whether this sufficiently addresses the shortcomings in NSPI's analysis is unclear; however, the Board accepts that increased savings will be achieved from load balancing using the granular data provided through AMI implementation.

#### **2.1.2.4 Avoided Future Line Sensor Program**

[36] The second largest grid modernization benefit presented in the summary of cost savings is \$14.6 million, attributed to avoiding a future line sensor program. NSPI forecasted that four sensor locations would be needed on over 300 three-phase distribution circuits to facilitate monitoring and managing a more dynamic grid, which includes increased distributed energy resources (DER). The avoided capital cost for the sensors was estimated at \$13.7 million and the avoided annual communications cost was estimated as \$421,000. Combining both components created a 20-year present value revenue requirement savings of \$14.6 million.

[37] In responding to Synapse IR-30 and Board IR-17 and IR-18, NSPI stated that it based this analysis on the assumption that price parity with solar installations would occur in 2021, and that growth rates projected for the four years after parity is achieved

reflecting the experience in Massachusetts. The number of net meter installations on NSPI's system as of December 8, 2017 was 427, and this was estimated to increase to 15,808 by the year 2024. In response to Synapse IR-13, NSPI stated that installation of the sensors was modelled in 2021 to 2024, and that it determined that the majority of three-phase circuits in the province will require line sensor deployment in the future.

[38] Regarding this savings component, Intervenors mainly raised concerns with the aggressive growth in net meter installations projected by NSPI. Further, in the Board's view, NSPI's information supporting the number of circuits that will require line sensors, absent AMI, lacked robustness. However, this was largely unchallenged by the Intervenors in their Closing Submissions and the Board accepts that some level of savings from avoiding future line sensors can be attributed to AMI implementation.

#### **2.1.2.5 Reduced Storm Restoration Costs**

[39] NSPI argued that implementation of AMI will improve power outage identification and restoration efforts. In turn, the Company stated this will result in reduced storm restoration costs, and drive overall improvements in its system reliability:

Smart meters reduce power outage and restoration time, and are beneficial for single and multiple events. Grid resiliency, efficiency, and operational optimization are strong drivers for NS Power. An investment in AMI will enable NS Power to further reinforce and strengthen critical utility infrastructure before and during storms, reducing restoration costs and minimizing outages for NS Power customers.

[Exhibit N-1, p. 27]

[40] Because a smart meter will issue power-off and power-on messages "in real time", the Company said it can be made aware of an outage earlier and determine whether it affects only one, or more customers. This would improve its response time and the deployment of crews. Further, the restoration of power can be verified more

efficiently through the meter signals. NSPI claimed this would result in cost reductions and increase customer satisfaction.

[41] NSPI estimated the projected savings associated with reduced storm restoration costs using its historical average storm-related outage labour costs from 2013 to 2016. Over that period, NSPI had, on average, \$9.1 million annually in incremental storm-related outage restoration costs related to overtime labour, other travel-related expenses, and external crew costs. The Company has assumed that 10% of this cost will be reduced after deploying AMI. As such, NSPI estimates that \$908,000 of these annual incremental storm-related costs would be reduced with AMI implementation. This would amount to a reduction of \$11.5 million in NPV of revenue requirement over the 20-year AMI project period.

[42] The magnitude of the estimated cost savings associated with this AMI benefit has been challenged by the SBA's expert, Mr. Athas. He classified the NSPI estimated reduction in storm restoration costs resulting from AMI deployment as being founded on "Assumptions used without Basis". Mr. Athas defined this categorization as:

Benefits in 'Assumptions used without Basis' category include savings based on key assumptions that have not been tested. The benefits in this category either used assumptions from other regions or used a generic percentage of cost as savings.

[Exhibit N-14, p. 19]

[43] Using this categorization, Mr. Athas stated that NSPI had no evidence to support its assumption that the Company would save 10% of its annual incremental storm-related restoration costs by implementing AMI. Therefore, he suggested that since there was no basis for this cost savings claim, there is a risk that this benefit may not be fully realized. Given this risk, Mr. Athas presented an analysis where the NSPI estimated storm restoration cost savings resulting from AMI are excluded from the project's

cost/benefit model. This analysis effectively reduced the storm restoration cost savings benefit to zero.

[44] In response to IRs from the CA, NSPI noted that it is not aware of any accepted standards used to proxy avoided storm restoration costs resulting from AMI deployment. However, in response to Board IRs and in its Reply Evidence, NSPI indicated that it developed its assumption for a 10% storm restoration costs savings, in part, on an assessment of the US Department of Energy report entitled "Smart Grid Investments Improve Reliability, Resilience and Storm Responses". The Company also noted that New York State Electric and Gas Corporation and Rochester Gas and Electric Corporation recently cited a 10% reduction in storm related restoration costs resulting from AMI implementation.

[45] In its Closing Submission, the SBA stated that NSPI's Reply Evidence does not address the concern that the assumption used to develop the Company's storm restoration cost savings estimate has not been tested in NSPI's jurisdiction. The SBA then reiterated that such savings could be different than estimated by NSPI. In addition, the SBA suggested that:

... even if these benefits were realized at some point in time, there would be a lag between AMI meter installation and when benefits associated with reduced storm restoration costs are fully realized. This would reduce the present value of the benefits from this action to a fraction of what NSPI has included in the net present value analysis.

[SBA Closing Submission, p. 3]

[46] The Board concludes that the SBA's position appears to be speculative in nature. In contrast, NSPI has presented evidence to support the assumptions it used to develop its estimated storm restoration cost savings. The EAM also clearly shows, contrary to the SBA's position, that the Company included a six-month lag for the realization of this benefit.

[47] The Intervenors have not disputed that storm restoration costs saving will result from AMI implementation. The SBA suggested that the estimated savings may be different than as estimated by NSPI in its Application. The Board finds that the sensitivity analysis presented in NSPI's Reply Evidence effectively addresses this risk. Using the pessimistic assumptions in this analysis, there is still a positive economic benefit associated with reduced storm restoration costs. While the SBA's Closing Submission argued that the sensitivity analysis is unsubstantiated, no alternative scenario/sensitivity analysis was suggested. The Board finds that the assumptions NSPI used in its sensitivity analysis for reduced storm restoration costs are reasonable.

[48] Consequently, the Board finds the NSPI estimated benefits for Reduced Storm Restoration Costs to be reasonable.

#### **2.1.2.6 Reduced Unbilled kWh**

[49] In its Application, NSPI identified the net present value of the revenue requirement savings from a reduction in unbilled kWh at \$10.1 million dollars. NSPI estimated that about one-third of 1% of unbilled revenue could be recovered annually. Dr. Stephen George, the Company's expert, noted the estimate of unbilled kWh was based on a report from the Electric Power Research Institute, noting NSPI's approach was "sound, and if anything, conservative".

[50] The unbilled kWh are largely the result of tampering and theft. NSPI said that the new meters can detect and report on tampering. In addition, the management of data will enable the detection of "unusual usage patterns that could indicate theft".

[51] Mr. Athas concluded that this component of the benefits was based on rigorous estimation and did not dispute it. He noted that in addition to the fuel cost

associated with unbilled energy, there is a benefit “from collection of fixed costs associated with unbilled kWh”. However, Mr. Chernick commented as follows:

**Q: What reduction in unbilled revenue does NS Power count as a benefit in its analysis?**

A: The NS Power assumes that 0.333% of residential and commercial sales are unbilled, due to a combination of meter tampering (a portion of energy theft) and metering errors, and that all those sales can be captured by AMI and associated administrative efforts. NS Power counts only the fuel portion of the unbilled energy.

**Q: What concerns do you have with NSPs claimed NPV \$12 [sic] million benefit from eliminating unbilled fuel cost?**

A: NS Power claims as a benefit the entire fuel savings associated with reducing the unbilled sales. These are not necessarily reductions in the total costs to NS Power ratepayers, since the effect of the programs would be to get customers to pay for the energy they use, rather than reduce costs. The Avangrid report that NS Power provided as NSUARB IR-9 Attachment 1 describes these savings as improvements in fairness and excludes them from the cost-benefit analysis (pp. 209–210 of the attachment).

To the extent that NS Power can reduce theft, there is an argument for including that effect as a benefit to honest customers of Nova Scotians. In contrast, the correction of billing errors simply increases bills to a small number of customers with faulty meters and reduces bills to the other customers. While that is a desirable outcome, the increased bills to the first group of customers cannot be included as a benefit in the type of analysis that NS Power conducts.

**Q: What portion of the unbilled energy is due to theft, as opposed to malfunctioning meters?**

A: This is a difficult value to determine. Even for total unbilled energy, NS Power has no local data and relies on “industry benchmarks.” The Avangrid study assumes a larger total potential reduction in unbilled energy than NS Power does, and estimates that over half of the savings would be from eliminating under-registering meters (NSUARB IR-9 Attachment 1, p. 210). Hence, it seems generous to use half of NS Power’s claimed savings.

[Exhibit N-18, pp. 18-19]

[52] In its Reply Evidence, NSPI advised it had used a 10% decrease and increase in the benefit stated in the Application to look at pessimistic and optimistic assumptions, and still maintained a positive benefit for the reduction in unbilled kWh. NSPI noted Mr. Athas had commented favourably on the conservative assumption.

[53] The Board is satisfied that there are benefits from AMI which will result in a reduction of unbilled kWh because NSPI will be better able to detect theft of electricity and tampering with meters. Therefore, the Board accepts the NSPI estimate for this item.

### 2.1.2.7 Reduced Write-offs

[54] NSPI included a net present value of its revenue requirement reduction by \$7.3 million for reduced write-offs. While NSPI acknowledged that AMI will not eliminate bad debt, it said:

...with use of a remote disconnect switch, AMI can assist in reducing the accumulation of additional charges that may occur between the times a customer is eligible for disconnect to the time the customer is actually disconnected, all within Board-approved regulatory procedures. As a result, the amount of unrealized revenue written off as bad debt and allocated across customers will be reduced.

[Exhibit N-1, p. 28]

[55] NSPI reviewed statistics from Central Maine Power (CMP) on its write-off reductions from the use of AMI, and projected savings of approximately 10%, compared to CMP's 40% reported reduction. Dr. George opined this was a reasonable assumption.

[56] Mr. Athas, in his evidence, concluded that this was an "Assumption without Basis" because it was based on a comparison with another utility, and that all the benefit might not be achieved. However, in the Reply Submission of the SBA, Mr. Athas accepted the reduced write-off benefits, and moved them to his "Rigorously Estimated" category.

[57] Mr. Chernick accepted only the reduced fuel write-offs of approximately \$2 million in net present value.

[58] In addition, Mr. Chernick commented parenthetically on assistance to customers who are not able to pay their bills. Concerns about disconnection raised by AEC in relation to low-income customers, and the SBA, in relation to small businesses, are discussed in paragraphs [165] to [174] below.

[59] NSPI responded to Mr. Chernick's comments, saying that the reduction of bad debt is "a desirable and beneficial activity" for the Utility.

[60] The Board concludes that NSPI will see savings from a reduction in write-offs because it will be able to respond more quickly through AMI meters and avoid additional charges accumulating before disconnection. The Board finds that the benefit estimated by NSPI is conservative, and therefore reasonable.

#### **2.1.2.8 Reduced Single Customer Truck Rolls**

[61] NSPI stated that its records and interviews with its dispatchers indicate the Company responds to approximately 1,400 calls annually from customers incorrectly reporting they have a power outage. NSPI typically sends a two-man work crew to investigate these potential problems, which upon investigation turn out to be a power problem on the customer side of the meter (behind the meter). NSPI is not responsible for costs associated with correcting/repairing behind the meter issues. Instead, these costs rest directly with the affected customers. However, the Company still incurs the cost to dispatch a crew and truck to investigate the problem.

[62] With AMI, NSPI indicated that reported outages can be investigated “over the air” by the call center representative who receives a customer report. The Company can, therefore, use AMI to verify whether a reported outage is caused by a behind the meter issue. If it is, NSPI will not need to dispatch a work crew and truck to investigate. The Company argued, therefore, that AMI deployment will help avoid unnecessary truck rolls.

[63] NSPI’s EAM estimated the benefit associated with reduced truck rolls to be approximately \$380,000 per year. This amounts to a \$4.7 million NPV of revenue requirement saving over the 20-year AMI project period.

[64] The magnitude of the estimated cost saving associated with this AMI benefit was challenged by Mr. Athas. He classified the NSPI estimated savings associated with reduced truck rolls resulting from AMI deployment as being “Hard to Achieve”. Mr. Athas defined this categorization to include savings that may be vague and may not be realized at all. He suggested that benefits included in this category may not take place. Specifically, Mr. Athas indicated that he had concerns about the assumptions NSPI used to develop its estimated reduction in truck roll costs resulting from AMI implementation. Given these concerns, Mr. Athas presented an analysis where the NSPI estimated reduction in truck roll costs resulting from AMI are excluded from the project’s cost/benefit model. This analysis effectively reduces the related cost savings benefit to zero.

[65] In its Closing Submission, the SBA elaborated on these concerns:

NSPI's information does not alter the SBA's concern about the achievability of the benefits rather than the issue with the NSPI methodology in estimating a reduction in dispatch of equipment unnecessarily, as identified by Mr. Athas in his evidence. Although there may be reduction to the outage calls regarding 'behind the meter' customer issues with AMI meters in place, this may not result into the reduction in staff since there is no evidence that the geographic concentration of the reduced outages will actually be sufficient to allow a reduction in one truck and crew.

There is also no discussion as to how easily a personnel reduction could be made among the line crew population. What we do know is that it would be imprudent for NSPI to reduce its service forces by one truck and crew immediately upon completing the installation of the AMI systems. Since the reduction in unnecessary calls would need to occur, be analyzed to be sustainable and be followed by a review in asset and workforce requirements, savings would take a minimum of several years or longer to result in cost savings. They would not transpire immediately after the installation of AMI meters, as NSPI has assumed. This would reduce the present value of the benefits from this project to a fraction of what NSPI has included in the net present value analysis.

[SBA Closing Submission, p. 4]

[66] The Board finds that the evidence does not support the SBA’s position. The SBA’s position appears to be conjecture that the estimated benefits may not take place because AMI deployment may not result in cost savings associated with truck roll staff

reductions. NSPI, however, estimated cost savings benefits based on its records and direct experience with rolling trucks for behind the meter outages. Furthermore, in response to Board IRs, NSPI stated:

AMI will not likely result in direct staff reductions of personnel who respond to customer outage calls. AMI implementation will, however, result in related reduced costs by reducing overtime, labour premiums and contractor utilization, which is what results in the \$4.7 million present value of revenue requirement savings over the 20-year period.

[Exhibit N-8, RIR-11, p. 1]

[67] NSPI's EAM also shows that the Company included a six-month lag for the realization of this benefit.

[68] The Board finds, therefore, that NSPI's estimated truck roll reduction cost saving resulting from AMI deployment is reasonable.

#### **2.1.2.9 Avoided Future Distributed Generation Meters Operating Costs**

[69] The third grid modernization benefit presented in the summary of cost savings was \$4.4 million, attributed to avoiding cellular network communication operating costs associated with future distributed generation meters (i.e., net metering). That estimate was based on an aggressive growth of solar and other distributed generation sites beginning in 2019, and increasing to 35,000 by 2040. The largest increases were projected to occur in the four years following achievement of price parity between solar installations and NSPI's tariffs, estimated to be 2021. In its response to Board IR-17, NSPI stated that the current number of net meter customers, as of December 8, 2017, was 427, and its response to Board IR-19 stated that there are currently no annual costs associated with distributed generation meters.

[70] In its evidence, Synapse challenged NSPI's projected date for achieving price parity and the estimated growth rates for solar installations. Synapse stated that

the level of expected customer savings and the payback period associated with solar installations should be given greater consideration through further analysis. Pending the results of that analysis, Synapse recommended that a more conservative estimate of operating savings from avoided net meters should be assumed.

[71] The CA also challenged NSPI's projected solar growth and the basis for using Massachusetts as a comparator. Mr. Chernick stated that the solar market in Massachusetts was much more advanced than in Nova Scotia, and Massachusetts has a history of offering solar incentives which are greater than those in Nova Scotia. Mr. Chernick went on to state:

While the economics of behind-the-meter solar will continue to improve, the buildout of solar may occur much slower than NS Power assumes for the purposes of this proceeding.

I recommend reducing NS Power's estimate by 50%. Applying the experience in MA is not appropriate for the current solar market in Nova Scotia. This reduces the savings to \$2.2 million from \$4.4 million.

[Exhibit N-18, p. 17]

[72] In addressing the Intervenor concerns in its Reply Evidence, NSPI stated:

NS Power acknowledges that uncertainty exists with respect to the timing of the forecast benefits associated with avoided distributed generation metering costs. However, this is an area of increased activity.

...

Whether this benefit emerges largely in 2022, 2023 or 2024, for example, the effect on the present value benefit is largely the present value differential associated with a potential delay. Given this, it is reasonable that the variance from the NS Power forecast benefit will be relatively low, and for the purposes of the economic analysis, the forecast benefit is reasonable.

[Exhibit N-29, p. 43]

[73] The Board acknowledges the concerns raised by the Intervenors regarding the projected timing for achieving price parity and the estimated rate of growth for solar installations in Nova Scotia. The arguments presented by the Intervenors suggest that an adjustment should be applied to the savings forecast, and this is acknowledged by

NSPI. However, the 50% reduction proposed by Mr. Chernick has not been supported in his evidence. The Board accepts NSPI's position that the effect on the present value benefit is largely the present value differential associated with a potential delay, and the variance from the NSPI forecast benefit will be relatively low.

#### **2.1.2.10 Billing and Customer Care Efficiencies**

[74] In its Application, NSPI identified a net present value of a \$4.4 million reduction in revenue requirement resulting from billing and customer care efficiencies because of the implementation of AMI. The identified areas where such efficiencies will result were in the elimination of the need to estimate bills, final bill accuracy and ease of account transfer for customers who move, increased adoption of e-billing, and the ability of the customer and the customer care personnel to view information simultaneously, thus reducing time spent on calls.

[75] In response to Synapse IR-11, and IR-12, NSPI provided information on the number of estimated bills and calls relating to them that it receives annually, as well as other bill inquiries, which total about 5% of the contacts over the years from 2014-2016. It estimates that these will be reduced by 45% due to AMI.

[76] NSPI investigated the experience of several US utilities to assess their experience with savings related to billing and customer care, and concluded that about \$350,000 annually in labour costs to address these areas is a reasonable estimate.

[77] While Mr. Athas opined that there was a high probability that this benefit would not be achieved, and removed it from his calculation of the benefit of AMI as a whole, NSPI submitted that even if the benefit was zero, the project still represented a positive net present value.

[78] NSPI submitted its sensitivity analysis supported this benefit, and that there was no evidence to the contrary. The Board finds that, based on the reported evidence of the US utilities referred to by NSPI, there are likely to be benefits in billing and customer care efficiencies. The Board acknowledges that these benefits are not easily quantified, but concludes that NSPI's estimate is within a reasonable range.

#### **2.1.2.11 Improved Cash Flow**

[79] Regarding operational benefits associated with AMI, NSPI estimated that reducing the lag between the consumption measurement (meter reading) and bill issuance will produce annual savings of \$300,000. This was calculated assuming \$1.1 billion of residential and small commercial revenue, cost of capital of 6.96%, and reduced lag of 1.5 days. The analysis estimated a present value of revenue requirement savings of \$4.6 million over the 20-year period.

[80] Mr. Athas raised concerns about the benefits associated with improved cash flow. He stated that although AMI meters will reduce the meter reading time by 1.5 days, the benefits from improved cash flow may be hard to realize since customers still have the flexibility to pay their bills at any time before it is due.

[81] In responding to this concern, NSPI referred to the explanation in its Application. NSPI noted that currently meters are read manually within a window that targets three to five days of the expected reading date. However, AMI meters will be read daily, thereby shortening the bill processing cycle between the meter read and bill issuance by an estimated 1.5 days. This estimated reduction in the lag between consumption measurement and bill issuance results in the calculated 20-year net present value savings of \$4.6 million in revenue requirement.

[82] The Board finds NSPI's estimate to be reasonable.

#### **2.1.2.12 Avoided Operational Costs in Meter Reading**

[83] In fulfilling the current meter reading function, NSPI incurs annual costs associated with communication systems, handheld meter reading equipment, and supporting software. After AMI deployment, these components will no longer be required and NSPI estimated a net present value revenue requirement savings of \$1 million. This estimate was not challenged by the Intervenors, and the Board accepts it.

#### **2.1.2.13 Reduced Bill Processing Expense**

[84] Because AMI will enable more "digital engagement" between NSPI and its customers, it anticipates that there will be an increase in the number of customers who choose e-billing. This would reduce costs of postage, paper and printing. NSPI estimated that the current e-bill rate of 35% will increase by 2% annually, and calculated the saving in revenue requirement at a net present value of \$2.5 million.

[85] Dr. George noted, but did not comment further on, this specific estimate. Mr. Athas, however, identified this item as one of the benefits which would be "Hard to Achieve". He did not accept that this saving would be realized.

[86] In its Reply Evidence, NSPI said:

NS Power's avoided costs when a customer switches from a traditional paper bill to an e-bill is \$0.74 per bill including postage, paper, and printing costs. NS Power currently has an e-bill penetration rate of 35 percent. This estimate is based on customers being presented with e-bill messaging as a result of new tools and digital engagement as part of the overall AMI capital Application. The assumed savings is based on converting 1.25 percent of the total number of customers accessing the NS Power online portal and participating in the bill alert program. This conversion rate falls within digital benchmarks as outlined on NSUARB IR-12, Attachment 1, page 4.

[Exhibit N-29, pp. 63-64]

[87] In the responses to Board IR-4 and IR-12, NSPI said that it would be exposing customers to "e-bill prompts" when they access the web portal to review their

energy use as enabled by AMI. The Utility anticipates that this will result in more customers moving to e-billing from this exposure and that this would not occur without the implementation of AMI.

[88] NSPI submitted that the SBA had not provided any evidence to demonstrate that the benefit is miscalculated or inappropriate.

[89] The Board observes that in the response to Board IR-4, NSPI ascribed its claim of increased e-bill adoption because of AMI to “the ‘mere-exposure effect’: a psychological phenomenon by which people tend to develop a preference for things merely because they are familiar with them”. Consequently, the Board finds that the estimated benefit is speculative. The Board accepts that there will be some customers who will switch from paper billing to e-billing, but is not persuaded that the full benefit attributed to this item should be included as support for NSPI’s claimed benefits.

### **2.1.3 Behavioural Change Driven Benefits**

[90] In its Application, NSPI projected that 20.7% (\$43.1 million) of the total savings resulting from the AMI project will be driven by changes in customer behaviour. Without those savings, the net project benefits of \$38.1 million will not be realized.

[91] Within this grouping of benefits, NSPI has identified three cost saving programs, which are addressed below:

- Capacity savings from critical peak pricing -- \$27.0 million
- Energy conservation from bill alerts -- \$13.6 million
- Third party meter reading revenues -- \$2.5 million.

#### **2.1.3.1 Critical Peak Pricing Program to Shift Load**

[92] NSPI stated that hourly interval data made available with AMI meters will provide it with the flexibility to design time varying rates, or rates that can be bundled with

specific end-use applications, such as heat pumps and electric vehicles. One such illustrative program that NSPI chose to highlight is known as Critical Peak Pricing (CPP). That tariff charges higher prices during peak hours, when the demand on the system is quite high, as a means to encourage customers to shift their demand requirements away from the peak load period.

[93] NSPI estimated that an opt-in CPP tariff targeting peak period load reductions during the winter could produce savings of \$27.0 million in the net present value of revenue requirement over a 20-year period. That estimate was based on avoiding capital investment associated with 26 MW of generation capacity additions. The estimate assumed that 15% of residential customers would be enrolled onto the CPP tariff by 2022, and would collectively reduce their winter peak demand by 12.5%.

[94] In its Evidence, Synapse raised the following concerns with the CPP benefits projected by NSPI:

- The projected peak demand reductions attributable to CPP may overestimate what is reasonably achievable in Nova Scotia. Results from Ontario and Quebec suggest that winter peaking utilities may experience lower peak reductions than summer peaking utilities. A more optimistic assumption would be 6%, the same percentage reduction that was achieved in Quebec.
- NSPI's projected capacity deficit in 2022 is small and might not occur. The 2017 10-Year Load and Resources Outlook (load forecast) showed a slight capacity deficit of 15 MW beginning in 2022/23 and increasing to 31 MW in 2026/27. Based on that outlook, it is likely that the generation capacity would be deferred rather than completely avoided, thereby reducing the projected level of savings.
- The projected benefits are contingent on a tariff that has not yet been proposed.

[95] On page 2 of its closing comments, Synapse stated:

NS Power takes the position that it is unnecessary and impractical to design and submit a critical peak pricing (CPP) or other time varying rate (TVR) tariff before or at the same time as proposing the AMI investment...

However, NS Power's justification for the AMI investment rests on achieving significant benefits from CPP. For this reason, it is reasonable and appropriate to expect the Company

to provide regulators with a high degree of probability that the estimated benefits associated with CPP will be achieved.

...

NS Power has not provided any assurances that it will achieve the savings through CPP it claims in the economic analysis. Leaving the design of the CPP until later could result in a watered-down tariff that will not save as much energy as projected and will greatly reduce the projected benefit of the AMI investment.

[96] Mr. Chernick also raised similar concerns in his Evidence:

NS Power does not yet have a proposal for the CPP price, the length of the CPP periods, the amount of notice that NS Power will provide, the number of peak-day declarations per winter, or the conditions under which NS Power would declare a peak day.

...

NS Power assumes that Nova Scotia customers will respond to unknown CPP price signals under peak winter conditions to the same extent as southern California customers respond to price signals at summer peak conditions. This is not a reasonable assumption.

...

There does not appear to be any experience with the use of CPP during winter peaks. NS Power should operate a pilot program to determine customer response before using CPP savings to justify a full-scale AMI deployment.

[Exhibit N-18, pp.12-14]

[97] In his Closing Submission, the CA stated:

Without a pilot CPP program, NSPI has no basis for even its “pessimistic” assumption which reduces CPP related savings 50% from its base case.

In response to the critique that its CPP estimates are flawed, NSPI indicates “pending the Board’s approval of this application, NSPI will undertake an analysis to identify alternatives, and fully assess the benefit and impact of pricing changes across and within customer classes” (Reply, p. 34, lines 10-12). Notably, NSPI appears to be reversing the accepted process of determining whether an investment is beneficial before undertaking it. In effect, NSPI proposes to spend ratepayer money on the AMI build out and then determine whether it is likely to have real value.

[CA Closing Submission, pp. 2-3]

[98] In addressing the concerns raised by Intervenors, NSPI stated its results are based on facts, supported by a regression model using dozens of studies, and that there is no evidence provided by any party in this proceeding that demonstrates it is not accurate.

[99] NSPI also referred to the Direct Evidence of its expert, Dr. George, where he stated that sound empirical studies have regularly found peak period load reductions between 10% and 20% from dynamic critical peak pricing. Dr. George was not aware of any pilots or programs employing a dynamic critical peak pricing tariff in the winter, but found no reason to think that the percent peak period load reduction in the winter would be significantly different from the summer estimates.

[100] NSPI stated that its AMI pricing benefit is based on an objective industry analysis of activity in other jurisdictions and is supported by an electric industry pricing expert. In addition, its sensitivity analysis incorporated a more conservative scenario proposed by Synapse.

[101] Regarding the CA suggestion that a CPP pilot should be undertaken prior to Board approval of the AMI Application, NSPI stated:

For the purpose of this Application, it is largely irrelevant whether the forecast capacity savings is ultimately achieved through a CPP program or some other price offering or indeed, a suite of new time-of-use based price offerings across classes. Parties can be confident that by implementing the AMI system, the capacity benefits forecast in the Application will be realized. The Company's evidence demonstrates it is more likely that this forecast capacity benefit will be exceeded significantly, as opposed to not fully realized.

...

Pending the Board's approval of this capital project, the Company will develop its pricing plans and execute these in full collaboration with its customers and their representatives and other stakeholders.

[NSPI Reply to Closing Submissions, p. 15]

[102] At page 4 of its Closing Submission, the AEC raised concerns about the impact that time varying pricing tariffs could have on low income consumers:

If and when time of day pricing is introduced, it must be voluntary as has been stated within the proposal. Options must be designed with consideration of the impacts on low income customers. For instance, a high portion of low income households include people with disabilities who are home during the day, so they must have reasonably priced electricity in the day to ensure they can be well heated and stay healthy.

[103] The AEC also suggested that any Board Order approving the AMI Application should require NSPI, going forward, to report to the Board concerning measures included in the AMI business plans, pricing programs, and customer engagement programs which protect low income consumer access to electricity.

[104] The Board recognizes that NSPI's projected savings of \$27 million is an illustrative example based on empirical study results in other jurisdictions. The absence of a proposed tariff, and the conditions associated with such a tariff, clearly contribute to the concerns expressed by Intervenors regarding the achievability of those savings.

[105] The suggestion by Intervenors that peak demand reductions in summer peaking utilities might not be replicated in winter peaking utilities is a valid concern. Mr. Chernick expanded on this point in his Evidence:

In the summer, customers have considerable freedom to go outside (to the pool, for example) and allow the temperature of the home to rise. Summer peak conditions typically occur on sunny afternoons, when many customers are out of their homes and relatively indifferent to the thermostat setting; many people who would normally be at home have the option to leave the house (e.g., to go shopping), perhaps with children in tow. Winter peaks, in contrast, tend to occur on cold evenings, when outdoor activities are not attractive, dinner needs to be cooked and eaten, and children may need to be at home in bed. Turning down the thermostat and leaving home for four hours is likely to be an option for many fewer people for NS Power winter peak than a California summer peak.

[Exhibit N-18, p. 13]

[106] In the Board's view, although the level of projected savings attributed to CPP or similar initiatives may appear to be overstated, the potential does exist for some level of savings to be achieved. Furthermore, NSPI has stated in its Reply to Closing Submissions that "The Company's evidence demonstrates it is more likely that this forecast capacity benefit will be exceeded significantly, as opposed to not fully realized."

[107] The Board also acknowledges the concerns raised by the AEC regarding possible impact of time varying pricing programs on low income consumers, and

recognizes that development of such programs and tariffs would be based on voluntary customer enrolment.

[108] In its June Compliance Filing, NSPI is directed to advise the date by which it will file the time varying pricing tariffs.

### **2.1.3.2 Increased Energy Conservation - Bill Alerts**

[109] Another behavioural driven change that NSPI highlighted is linked to a proposed new bill alert service that will provide customers with more frequent information on usage and costs. NSPI estimated that this program will reach 90% of customers who have provided email addresses by 2022, and those customers will save 0.75% of annual consumption. That reduction in energy consumption and the associated reduction in generation capacity requirements has been projected to reduce revenue requirement by \$13.6 million in net present value over the 20-year period.

[110] In its Evidence, EOne argued that NSPI is in a conflict of interest regarding development and operation of energy conservation programs, and that operation of those programs violates the *Public Utilities Act (Act)*, specifically, s. 79(3)(e). That issue is addressed separately in this Decision.

[111] EOne also raised concerns regarding shortcomings in NSPI's analysis and inclusion of benefits associated with the proposed Bill Alert program:

NS Power made several assumptions regarding expected Bill Alert program savings for the Application, some of which were adapted from the BTA program operated by SoCal Gas. The assumptions made in this adaptation are significant, and indicate a serious risk that the expected results may not be achieved.

[Exhibit N-16, p. 10]

**The assumptions employed to estimate Bill Alerts savings are broad and *prima facie* should not be relied upon to support the projected savings.** [Emphasis in original]

[Exhibit N-16, p. 16]

[112] Specific areas of concern addressed by EOne included the following:

- Annual savings -- NSPI based its projected savings on early results from the SoCal Bill Tracker Alerts (BTA) program and applied those savings over a period of 22 years; however, the BTA program did not produce significant winter savings in its fourth year, which suggests to EOne that the impact of such a program may be limited to a few years.
- Customer groups -- The customer group targeted by the SoCal BTA program was not the average residential customer, as proposed by NSPI. Customer usage and demographic effects were significant in their impact on the resulting BTA savings.
- Fuel type -- The differences in end-uses for natural gas in California and electricity in Nova Scotia were not analyzed. EOne suggested that SoCal Gas customers may have a greater ability to create winter energy and demand reductions than electricity customers in Nova Scotia.
- Climate zone -- California and Nova Scotia are in different climate zones and the differences in the ability and willingness of SoCal Gas and NSPI customers to reduce winter heating consumption was not analyzed.
- Housing stock -- Comparison of the housing data in both regions was not undertaken, but may have an impact on the savings results.
- Measurement season -- NSPI applied the SoCal BTA winter savings percentage reductions to the full year of electricity consumption in Nova Scotia, but measured savings over the summer period for 2013-2014 California BTA program were not statistically significant.
- Supplemental materials -- The SoCal program included weekly emails as well as paper mail-outs, however, those components do not appear to be included in NSPI's proposal.

[113] In responding to the concerns raised by EOne regarding the benefits associated with the Bill Alert program, NSPI stated that those concerns were fully addressed by its expert, Dr. George, in its Reply Evidence.

[114] Responding to EOne's statement that significant savings were not achieved in the fourth year of the California BTA program, Dr. George noted that statistically significant savings at the 95% confidence level were achieved during the first three years, while the fourth year results were statistically significant at the 90% confidence level. Dr. George went on to state that a review of Home Energy Report (HER) programs showed

that savings from those programs grow sharply across the first two years and then typically plateau, but fifth and sixth year evaluations indicated that savings from ongoing programs continued.

[115] In response to EOne's concern that results from the California program were attributed to a targeted group of higher usage customers, Dr. George conceded that comparison on a similar basis in Nova Scotia would reduce the projected savings. However, he countered that NSPI only used a savings percentage of 0.7% instead of the four-year average of 1.0% from the SoCal Gas program. If 1% was used, then the savings would be higher.

[116] Regarding EOne's other concerns related to fuel type, climate zone, housing stock, measurement season, and supplemental materials, Dr. George agreed that the EOne claims were accurate. However, he suggested that although there were no statistically significant summer savings at SoCal Gas, electricity customers may have more opportunity to reduce usage in the summer than in the winter. He also stated that an American Council for an Energy-Efficient Economy (ACEEE) review of HER programs found that electric savings attributed to behavioural conservation programs were nearly always equal to or higher than gas savings.

[117] The Board understands there may be some variance in savings but finds NSPI's estimate to be reasonable.

### **2.1.3.3 Third Party Meter Reading Revenues**

[118] The third behavioural driven savings that NSPI highlighted is focused on providing meter reading services to local municipalities, mostly water utilities. Revenue

generated from this service was estimated to reduce NSPI's revenue requirement by a net present value of \$2.5 million over the 20-year period.

[119] In responding to Board IR-21, NSPI stated that this saving will result from selling services to 16 utilities, primarily water utilities, over the 2022 to 2033 time period. Expanding further on this, NSPI explained that it would buy, install, and maintain meters for the utility customers, and provide daily files of meter reading and messages to the utilities.

[120] In his testimony, Mr. Athas classified the third party meter reading revenues as "Hard to Achieve" and stated that it is highly probable this benefit may not materialize. In its Closing Submission, the SBA stated that this benefit is entirely contingent on municipalities and other third parties agreeing to use NSPI's AMI system. Also, the SBA contended that NSPI provided very little information to support its savings estimate, and suggested there would be less risk associated with those revenues if NSPI could provide information on the level of municipal and third party interest in using its AMI system.

[121] In addressing this concern, NSPI agreed that there is variability around this benefit estimate but noted that the variability was captured in its sensitivity analysis. NSPI also restated that it had exploratory conversations with other utilities regarding the service that it could offer with AMI.

[122] It appears to the Board that this is in the preliminary stages of development and it may be premature to include savings associated with this initiative.

## **2.2 Life of AMI Meters**

[123] NSPI's EAM for the proposed AMI system assumes a 20-year life for the AMI meters:

The AMI Project will be deploying the newest generation of smart meters. The electricity meter combines robust smart metering functionality with high-performance communications capabilities. The meter contains software components that can be remotely upgraded over the network and sufficient hardware capabilities, including memory and processing capacity, to allow for ongoing software upgrades over the life of the meter. These design elements, along with adherence to industry standards, ensure the asset meets the defined requirements for the 20 year life, which the vendor has tested and confirmed. The following utilities in Canada that have recently deployed AMI have used 20 year project lives: BC Hydro (2016), Hydro Quebec (2017) and EPCOR (2017).

[Exhibit N-1, pp. 60-61]

[124] NSPI supported its claim for a 20-year meter life by referencing the meter manufacturer's "Accelerated Life Test Report" for the proposed meters. The results of this testing indicate that the meters:

...meet[s] the required 20 year lifetime with 90 percent reliability at End of Life (EOL) and 0.5 percent Yearly Failure Rate (YRF). The results of high temperature, temperature cycling, high temperature/high humidity and meter farm test all tested positive and confirmed the 20 year lifetime.

[Exhibit N-8, RIR-32, p. 1]

[125] In response to IRs from the CA and in its Reply to closing comments of Synapse, the Company also described its proposed plan to continually upgrade the underlying computing and communication technology of the AMI system over its 20-year term. This plan includes an IT hardware refresh every three years, meter replacements at a rate of 0.5% per year, and network refreshment at a rate of 1% per year and 100% in 2030. The Company argued that its plan will enable the 20-year meter life to be consistently achieved. The costs associated with this plan are included in the Company's EAM.

[126] The assumption of a 20-year meter life has been disputed by both the CA and Synapse. In response to Board IRs, Mr. Chernick presented evidence showing the AMI meter lives used by 13 other North American utilities. The meter lives used by these utilities ranges from 7 to 20 years, with most using 15 years. Mr. Chernick also indirectly

argued about meter life by focusing on the likely meter replacement rate, and suggested that annual AMI meter replacement costs will be higher than those identified by NSPI.

[127] Synapse argued that the assumed AMI meter life should be shorter than 20 years. Synapse stated that this assertion is based on the following:

- AMI meters are likely to have a much shorter life than analog meters due to their reliance on information and computing technology, component failure, and risk of technology obsolescence;
- The AMI meters proposed by NSPI only have five-year warranties; and
- Other jurisdictions use a more conservative, shorter, useful AMI meter life to mitigate risks associated with technological obsolescence or component failure.

[128] Synapse also stated that the Board should not rely solely on the meter manufacturer's test data to confirm whether the meters will last 20 years. Synapse suggested that such test results should not be given the same weight as independent third-party test results. Synapse agreed, however, with NSPI that the proposed AMI system incorporates features to mitigate some of the risk associated with premature product obsolescence. It also noted that technology advancements in AMI are rapidly evolving. Synapse suggested that this will result in a high likelihood that a better product will be available in 15 years, rendering the currently proposed AMI system obsolete before the end of its 20-year term. Synapse, therefore, maintains that a more realistic assumption for meter life is 15 years.

[129] In response to Mr. Chernick's Evidence, NSPI's Reply Evidence presented a graphic comparing the meter counts, country of filing and meter life used by the thirteen utilities referenced by Mr. Chernick in his response to Board IR's. The graphic also contained similar information for the three Canadian utilities referenced by NSPI in its Application. NSPI summarized the information contained in the graphic as follows:

- 73% of AMI meters deployed by these utilities were assigned a 20-year life;
- Excluding Maryland, 83% of these meter deployments used a 20-year meter life; and
- 99% of the meters deployed by the Canadian utilities used a 20-year meter life.

[130] In response to Synapse's concerns, NSPI, in its Reply Evidence, stated:

- AMI has been deployed for approximately 50 percent of U.S. electricity customers and approximately 70 percent of Canadian electricity customers. The technology is proven.
- The suggestion that warranty length is indicative of useful life is not accurate and no evidence has been put forth that suggests the length of commercial warranty period is an indicator of useful life. NS Power has purchased thousands of meters with a 3 year warranty that last for many years beyond the warranty period (often well exceeding 20 years).
- It appears the suggestion to use a shorter meter life in the economic analysis is not based on the physical lives of the assets in service but rather on the suggestion that a newer/better AMI solution might develop before the end of the 20-year AMI meter life.
- However, if a new AMI solution emerges prior to reaching the 20 year service life of the meters, and a business case can be developed by NS Power to establish that replacement provides even further cost savings to customers, then NS Power will evaluate such an opportunity. In other words, new AMI systems would only be introduced before the end of the 20-year meter lifecycle of the first AMI system if the incremental benefits of introducing the replacement AMI system before the 20 year life exceed the incremental costs of the early introduction. This adds to the value of this investment. It does not detract from it.

[Exhibit N-29, p. 46]

[131] The CA's Closing Submission noted that NSPI's Reply Evidence provided no response to describe why six of the utilities identified by Mr. Chernick in his response to Board IRs used AMI meter depreciation rates for a period shorter than 20 years. The information presented by NSPI, referenced above in paragraph [129], has not been challenged by the Intervenors. The Board finds NSPI's evidence persuasive.

[132] The validity of the meter test results from the proposed meter manufacturer was not contested by any of the Intervenors. No other independent meter test results were presented before the Board. The Board finds, therefore, that the meter test results from the proposed meter manufacturer support NSPI's assumption that the meters will

have a 20-year life. The Board also finds that NSPI's proposed plan to continually upgrade the underlying computing and communication technology of the AMI system will help to enable a 20-year meter life.

[133] The Board agrees with NSPI that the warranty period for the proposed AMI meters is not necessarily reflective of useful life, which can extend well beyond the expiration of a warranty period.

[134] As noted above, NSPI stated that replacement of the proposed AMI system, prior to reaching its 20-year service life, would only be considered if the benefits of doing so would exceed the costs. In its Closing Submission, Synapse suggested that this could result in the currently proposed equipment becoming stranded assets. The Board agrees with NSPI that in such a case, any potential issue of stranded assets would be an accounting issue consideration, rather than an issue that would need to be evaluated in a future economic analysis.

[135] Synapse maintained that a 20-year meter life is too long, and suggested a more realistic value of 15 years. The evidence presented in this matter shows that some North American utilities have assumed meter lives of 15 years or less in their respective AMI economic analyses. However, the Board is not persuaded by the evidence that a 20-year meter life is an unreasonable assumption.

[136] This notwithstanding, even when a 15-year meter life is assumed in NSPI's EAM (and all other EAM assumptions remain the same as the 20-year meter life scenario), the Company's response to Board IR-49 shows that there would still be a net benefit to ratepayers of \$17.7 million in NPV of revenue requirement saving over the life of the project.

[137] The Board finds that NSPI's assumption of a 20-year AMI meter life is reasonable and appropriate.

### **2.3 AFUDC**

[138] Dr. Hill, on behalf of the EAC, recommended the Board not allow the inclusion of AFUDC estimated at \$1.5 million. He argued the deployment and operational implementation of meters is different in nature from the construction of a power station where there might be a significant lag between the project initiation and the asset becoming used and useful:

Given the ability to place the meters into use as they are deployed, I do not see a rational [sic] for the request for AFUDC.

[Exhibit N-13, p. 10]

[139] In its Reply Evidence, NSPI acknowledged that Dr. Hill is correct, that the meters are placed in service as they are deployed. NSPI indicated that AFUDC is only accrued during the preliminary engineering portion of the project and will cease once the first meters are placed in service and depreciation expense begins to be incurred. NSPI indicated that as the period from project start to the first meter being placed in service is greater than two months, in accordance with the Board's accounting policies, NSPI proposed to capitalize the financing costs, citing Accounting Policy 6240.

[140] The Board agrees that NSPI's request for AFUDC in the AMI capital project complies with the Board's approved accounting policies and the Board has not made any adjustment in this respect. AFUDC will terminate once the first meters are placed in service.

## **2.4 Electricity Efficiency and Conservation Programs**

[141] Efficiency One is the current franchise holder for electricity efficiency and conservation programs to be provided to NSPI pursuant to the *Act*. It provides programs and information for interested customers from all NSPI customer classes. Earlier in this Decision, the Board discussed NSPI's Bill Alert program, anticipated to result in increased energy conservation. EOne expressed concerns in its evidence and submissions about the respective roles of EOne and NSPI in energy conservation programs enabled by AMI. It submitted that "...any utility-operated energy conservation program offered to the general public will materially interfere with the operation of the ENS franchise and is therefore not in the best interest of ratepayers".

### **2.4.1 Design and delivery of conservation programs by EOne**

[142] EOne said its concerns "...can be appropriately addressed by requiring any new energy conservation programs enabled by the AMI technology to be designed by the ENS franchise holder, and by providing the franchise holder with access to the AMI system to support design and operation of those programs." It asked the Board to "direct that all energy efficiency and conservation programs enabled by the AMI technology are to be designed and operated by the ENS franchise holder."

[143] EOne wants to avoid confusion for electricity customers about who they should seek advice from for such programs, and to ensure that evaluation costs of its programs are not unnecessarily increased. It also noted the regulatory oversight of its programs, and submitted that, if NSPI is permitted to operate energy efficiency programs such as Bill Alerts, it should be subject to the same rigorous degree of oversight.

[144] In its evidence, Synapse expressed concern that NSPI had not addressed co-ordination with EOne. This concern was echoed by Dr. Hill on behalf of EAC. In his evidence, he described this as “the most serious deficiency” in the Application. He opined that such co-ordination could result in greater savings for customers.

[145] Dr. Hill recommended that Board approval of the AMI project include a condition requiring “a specific, written agreement from NSPI to work directly with EOne and other stakeholders to develop a detailed plan on how energy efficiency and AMI services will be integrated”. He recommended that the agreement be in place within two weeks, and the plan completed within six months. Dr. Hill also said that the plan should “consider how AMI can be used to improve the accuracy and efficiency of evaluation, measurement and verification for efficiency programs”.

[146] In its Reply Evidence, NSPI responded to EOne and Dr. Hill’s concerns, saying:

Discussions have not taken place between NS Power and E1 with respect to which party will undertake which programs associated with AMI or how information acquired through the AMI system will be shared. This is not required for the Board to make a Decision with respect to this capital application as the benefits are enabled by the investment regardless of who delivers the program. Resolution of those issues will be dealt with after the Board’s Decision in this matter.

...

In order to best serve this regulatory process, it is critical that the focus of all parties remain on the Application before the Board. The Company has provided its responses to Information Requests by the parties associated with its engagement with E1. The Company understands the legislative provisions under which both utilities operate....

NS Power confirms that it is committed to ensuring that the potential benefits offered by AMI are fully realized for customers and those benefits, both articulated in the Company’s Application and yet to be identified, will be pursued diligently, working with all parties, including E1. However, this work can only be undertaken once the Board has approved the underlying investment. To do otherwise is not the best use of scarce resources and a potential distraction from the primary question before the Board...

[Exhibit N-29, pp. 82-83]

[147] EOne is not generally opposed to AMI, despite concerns it expressed about whether NSPI will achieve the projected level of energy and cost savings. Additionally, NSPI's response to EAC IR-7, which indicated a willingness to collaborate, was welcomed by EOne.

[148] In Closing Submissions, EOne and EAC reiterated the concerns raised in their evidence. EAC submitted that the "most direct benefit to consumers" from AMI is from efficiency and conservation activities. It went on to say that collaboration between NSPI and EOne would maximize those benefits, with EOne "taking the lead" in designing the services.

[149] EOne asked the Board to order that design and delivery of conservation programs enabled by AMI be undertaken by EOne to ensure that the provision of such programs and services not conflict with the provisions of the *Act*, which give it exclusive right to supply them.

[150] Further, in its Reply Submission, EOne fully supported the recommendations of EAC, regarding collaboration; however, it concluded that the agreement on a plan, and the associated timetable, are not required, considering ongoing collaboration between NSPI and EOne.

[151] NSPI submitted it is not necessary for the Board to direct further engagement with EOne to approve the AMI project, and confirmed its commitment to work with EOne and other stakeholders. It said that if "a resolution cannot be achieved consistent with the legislation", a separate process could be engaged. The Board agrees.

#### 2.4.2 Access to AMI network data

[152] In its Decision on EOne's request that NSPI share customer names, emails, and usage data [2017 NSUARB 174], the Board determined that the information is to be shared to enable EOne to provide NSPI with DSM programs as prescribed by s. 79 of the *Act*.

[153] EOne stated it requires "broad access to the AMI network" to ensure it can fulfill its role in the delivery of DSM services. It understands that AMI will provide significantly more data than what is currently available. This would allow EOne to better identify, develop and deliver those services or activities. It noted in its evidence that it was pleased that NSPI had indicated a willingness to share AMI data, and looked forward to co-ordinating its receipt. In its Closing Submission, EOne asked the Board to direct that it be given broad access to the AMI network data by NSPI.

[154] Dr. Hill, on behalf of EAC, fully supported ensuring the information be made available to EOne for it to carry out its responsibilities.

[155] Ms. Napoleon, of Synapse, said:

The information obtained from AMI could be used to more effectively target energy efficiency offerings. Without a framework for sharing data with EfficiencyOne, the benefits that customers would experience and the cost savings to the utility system from implementation of AMI may be unnecessarily limited.

[Exhibit N-15, p. 25]

[156] She went on to refer to the Board's Decision, noted above, and said:

In light of the Board order, I recommend that NS Power and EfficiencyOne revisit the fields for data transfer, given that AMI will produce more data than are currently available to NS Power. If NS Power and EfficiencyOne cannot reach an agreement about data transfer protocols, they should apply to the Board.

[Exhibit N-15, p. 26]

[157] NSPI said in its Closing Submission that, in this Application, it was not for the Board to determine how the sharing of data should take place; it suggested that be

dealt with in a separate process after the Board's decision on the Application, if NSPI and EOne could not resolve the matter.

[158] The Board finds that the AMI data will provide useful and important information to EOne in carrying out its responsibilities as franchise holder for electricity efficiency and conservation activities. The Board is satisfied, as it was in its earlier decision on sharing of information, that access to the data will put EOne in the same position as NSPI, as the legislation intended.

[159] The Board concludes that EOne and NSPI are prepared to collaborate to determine how best this access or sharing can be accomplished. The Board encourages them to address this issue in a timely manner, and agrees with NSPI that should they be unable to resolve this issue, an application should be made to the Board.

### **2.4.3 Creating an AMI Advisory Committee**

[160] Dr. Hill suggested that an AMI advisory committee be established:

I also recommend that the Board strongly consider requiring the creation of an advisory committee (or standing working group) that has a well-defined and ongoing reporting responsibility on implementation, progress toward goals, description of issues, and identification of efficiency and innovative service opportunities. In my opinion and experience, a multi-party process with clear communications, and with adaptive strategies that define roles and responsibilities, plans, and metrics significantly improve the chances for cost-effective implementation of regulatory decisions. Including non-utility stakeholders and ratepayers in this group should provide an important additional impetus for the AMI initiative to fully maximize its potential benefits. The DSM Advisory group may serve some of these functions.

[Exhibit N-13, pp. 22-23]

[161] In its Closing Submission, the EAC asked the Board to order such a committee to "access all the benefits available and include all stakeholders' concerns".

[162] Ms. Napoleon agreed that such a committee could be beneficial, if properly structured, facilitated, and accountable to the Board. NSPI rejected her comments, claiming that they were not pertinent to the Application.

[163] EOne, however, submitted that an additional designated committee is not required, and the existing DSM Advisory Group could fulfill the role. NSPI did not comment on such a committee in its Closing Submissions, but said it is committed to work with EOne and other stakeholders.

[164] The Board has considered the establishment of working groups composed of NSPI and interested stakeholders useful in other aspects of the electricity system. They can provide a forum for discussion of matters of interest or concern outside the formal regulatory process. Accordingly, the Board accepts the suggestion espoused by EAC (and Dr. Hill, its expert) that an advisory committee should be engaged to address issues arising out of the implementation of AMI. For the time being, the Board considers that this function can be undertaken by the current DSM Advisory Group; should the participants in that Group consider that a separate committee be established to deal with AMI issues, that should be brought to the Board's attention for further consideration.

## **2.5 Affordable Energy Coalition submission re impact on low income consumers**

[165] The AEC asked several IRs of NSPI about what research had been undertaken to examine the impact of AMI on low income customers, as well as how disconnection and security deposit practices would affect them. It also sought information on: prepayment programs; access to the information generated by smart meters where customers had no internet access at home; and the ability of landlords to sub-meter.

[166] NSPI said it had undertaken research locally, including focus groups. It also said that the current Regulations, approved by the Board, regarding disconnection procedures, and security deposits would not change. Should any changes be required after AMI implementation, approval would have to be sought from the Board. NSPI also

described other means of access to the smart meter information if a customer did not have a home internet connection.

[167] NSPI said it had not considered prepayment programs but would receive input from parties.

[168] The AEC did not file evidence in this matter. Informed by the NSPI responses, the AEC outlined its concerns in its Closing Submission. It said that NSPI had not conducted sufficient research into the negative impact of smart meters on low income customers, pointing to issues arising in the United Kingdom and Ontario.

[169] Further, the AEC said that disconnections would be made easier because of the ability to remotely disconnect customers, and recommended changes to NSPI's Regulations to limit the ability to disconnect in certain circumstances, as well as reporting to the Board. It also offered comments on prepayment programs and time of day usage tariffs.

[170] In its Reply Submission, NSPI said that AMI does not make it easier to disconnect a customer for non-payment, as all the Regulations will remain in place; AMI merely reduces the costs of disconnection. It outlined the safeguards in place for customers. NSPI rejected AEC's submission that any approval of the AMI project should be conditional; however, it said if the project is approved, it would consider the comments regarding prepayment programs and time of day usage.

[171] Synapse agreed with AEC that protections should be considered for low income customers; however, Ms. Napoleon said they might impact the economics of the project. NSPI responded that as there is no evidence from AEC, the Board should disregard Ms. Napoleon's comments.

[172] The SBA, in its Reply Submissions, endorsed the submissions of the AEC, as small businesses share some of the same concerns.

[173] The Board is satisfied that the approval of the AMI project will not displace the current Regulations on disconnection procedures and security deposits. They protect low income customers and will not change unless NSPI applies to, and receives approval from, the Board. In such a case, the Board will invite submissions from interested stakeholders, including the AEC.

[174] The Board does not consider it necessary to include in its Order approving the project "...a requirement for NSPI to report back to the Board concerning measures for the protection of access to electricity for low income consumers in the development of the AMI 'business plans,' pricing programs, and customer engagement programs, going forward", as suggested by the AEC. However, the Board directs NSPI to take into account the concerns of low income customers, as well as small business customers as expressed by the SBA, as it implements AMI, and to consider the comments regarding time of day usage tariffs and prepayment programs as they may impact such customers.

## **2.6 Depreciation of Retired Meters**

[175] NSPI requested recovery of the undepreciated costs of the existing meters on a straight-line basis over five years, including return.

[176] Ms. Napoleon argued that while it may be reasonable to allow NSPI to recover the cost of the meters, ratepayers should not have to pay a return on rate base for meters that have been removed from service:

**Q. Do you think NS Power's proposal is reasonable?**

A. Not entirely. While it may be reasonable to allow NS Power to recover the costs of these meters, ratepayers should not have to pay for a return on the meters that have been removed from service.

Q. **Please explain why it is not appropriate for NS Power to earn a return on the undepreciated meters.**

A. Because the meters will have been removed from service, they are no longer used and useful. It would not be appropriate for customers to be assessed both the cost and a return on an asset that is no longer used and useful. Effectively, allowing recovery of and on both the existing meters and AMI meters would allow two sets of meters in rate base, which would create double recovery of metering costs.

[Exhibit N-15, p. 27]

[177] Dr. Hill also objected to NSPI's request to recover the undepreciated costs for meters that are retired early:

The investment in new meters makes economic sense, and the company's current rates cover the costs for existing meter infrastructure and operations. Asking to continue to recover costs for the meters that have been replaced is a sunk cost, and not one that should be borne by ratepayers.

[Exhibit N-13, pp. 21-22]

[178] NSPI argued that the decision to pursue and install the existing meters was a prudent practice and to disallow their request would be inconsistent with established regulatory practice in Nova Scotia. NSPI cited Accounting Policy 6350 which allows NSPI, with the approval of the Board, to recover the undepreciated capital cost of a retired asset over a five-year period, or over some other reasonable period, in order to enhance rate stability. The operative portion of this policy is that it is with approval of the Board.

[179] The Board agrees with Ms. Napoleon and Dr. Hill that NSPI should not earn a return on assets that are no longer used and useful. The Board does, however, agree that the underlying cost of the asset (i.e., the retired meters), not including return on equity, is appropriate for recovery over a reasonable period of time and accepts NSPI's recommendation of five years. The Board, therefore, approves recovery of the underlying cost of the retired meters, including debt costs, however, not including equity return, over the five-year period recommended by NSPI. If NSPI, after reviewing this Decision, would

prefer to have an altered time period for depreciation, it can make that request of the Board.

## **2.7 Opt-out provision**

[180] NSPI stated in its Application that smart meters will be the standard for its customers; however, it acknowledged that some customers will not wish to be served by them, but would prefer to continue with manually read meters. It estimated, based on the experience in other jurisdictions, that about 1-2% of customers would choose to opt-out.

[181] The continuation of manual meter reading means continued associated costs. NSPI said that these costs need to be recovered from the customers who choose non-standard service, rather than across the whole customer base. It provided evidence of additional charges from other jurisdictions, which ranged from \$5.00 to \$32.40 per month. NSPI's analysis of the cost of non-standard meter reading resulted in per meter cost of \$18.83 bi-monthly, or \$9.42 per month.

[182] Dr. George opined that allowing customers to opt-out is a standard industry practice, as is charging those customers for the full cost of maintaining and reading the non-standard meters.

[183] NSPI proposed that, since no charge would apply to customers before the AMI project is completed, customers would be given the opportunity to opt-out. It would then apply to the Board to establish the charge and terms for non-standard meter service once the number of customers opting-out is clearer. In its Application, it sought input from the Intervenors on this proposal.

[184] The Utility did not oppose giving customers the opportunity to retain non-standard meters, but maintained that the charges for this should be determined upon

completion of the AMI project. NSPI noted in its Reply Evidence that those parties who filed evidence did not object to an opt-out, and the application of a charge, although there was disagreement about the costs.

[185] Mr. Chernick said that NSPI had overestimated the incremental cost of serving those customers who opt-out as it had not accounted for the avoided costs of not having to install a new smart meter. Additionally, he did not accept NSPI's estimates of the time required to read non-standard meters. He also opined that there should not be a surcharge to those customers.

[186] In its response to Board IR-3(h), Dr. Hill, on behalf of the EAC, explained the opt-out rate applied in Vermont was initially about 5%, reducing to about 4% several years later. He noted that by law in that state, a utility is not permitted to charge an opt-out fee.

[187] Mr. Athas favoured the establishment of a rate which would reflect the actual costs. He also submitted that NSPI should communicate with its customers to understand why they want to opt-out and minimize the numbers choosing to do so.

[188] In its Closing Submission, NSPI repeated its position that the recovery of costs for non-AMI service be determined once the implementation of the project is complete.

[189] The DOE said in its Closing Submission:

### Concerns of Nova Scotians

As a preliminary point, the Department would like to clarify that the health, safety or similar concerns of citizens should be treated respectfully, independent of their validity to the regulatory process. To this end, the Department suggests that NSPI identify the costs associated with opting-out upfront, *before* customers are presented with a decision, rather than partway through the roll-out as NSPI has suggested in their reply evidence. This would ensure that customers are in possession of the facts before they are asked to make a decision, and would help build trust around the transparency of the process. [Emphasis in original]

[DOE Closing Submission, p. 1]

[190] Board Counsel consultant, Ms. Napoleon of Synapse, in her Reply Submission, agreed with the DOE suggestion that the costs of opting-out be determined before a customer decides to do so.

[191] However, NSPI, in its Reply Submission, said:

It remains the Company's position that customers who do not want to take AMI service should have the opportunity to take a non-standard service option, with the associated cost recovery to be determined once the AMI project implementation is complete.

Without having completed the AMI roll-out and understanding fully the number of customers opting for non-standard service and the locations of these customers, it will not be possible to develop a high quality cost estimate and, if appropriate, a charge for this service. For this reason and subject to UARB approval, the Company does not intend to apply a charge for non-standard service until the AMI roll-out is complete and customers can be provided with the appropriate cost information to fully inform their decision.

The Company believes this approach is consistent with the DOE's perspective.

[NSPI Reply Submission, p. 39]

[192] In its reply to the Synapse Reply Submissions, NSPI reiterated its position and suggested that, as Mr. Chernick has questioned the calculations which NSPI had done to estimate the charge, "...any attempt to calculate a charge in advance of actual customer number and cost figures being available would be highly contested". NSPI went on to say:

...This would be avoided by developing the charge after the AMI roll-out has largely been completed and parties understand the volume and locations of customers electing to take nonstandard service....

[NSPI Reply Submission, p. 18]

[193] The Board is concerned that waiting until “roll-out” is complete to develop a charge is misconceived. As pointed out by the DOE, a customer should know how much opting-out is going to cost, as that may well be a factor in the decision whether to retain a non-standard meter. The Board agrees that there is a cost to the continued use of those meters, assuming meter reading costs for non-AMI meters are excluded in the next rate case.

[194] Therefore, the Board finds that customers should be permitted to opt-out and continue with a non-standard meter. The Board urges NSPI to consider if there are means by which the costs might be minimized, e.g., by reducing the frequency of readings.

[195] The Board finds that any charge for opting-out should be known before a customer is required to make the decision to have a smart meter installed or not. NSPI is directed in a Compliance Filing to set out the charge and the frequency, and any other relevant terms, no later than August 31, 2018. If NSPI is unable to do so, the Board will establish a process to determine the charge.

[196] The Board received over 40 letters of comment from members of the public expressing concerns about the installation of “smart meters” under the AMI project. Many of the writers identified concerns about issues of privacy, safety, and health, which are addressed in the Section 2.8 of this Decision. However, the Board observes that many of the writers expressly stated that they do not want the meters installed at their locations; in essence, they are opting-out.

[197] The Board notes that it does not want these individuals to be misled into believing that such communication with the Board is sufficient to deter NSPI from

installing the meters. Therefore, NSPI is directed in the August 31<sup>st</sup> Compliance Filing to provide its detailed plan of how it will inform customers of the process to opt-out of installation of the meters under the AMI project, in addition to the determination of the charge for opting-out noted above.

## **2.8 Data Privacy, Health and Safety**

[198] As noted in the previous section, the Board received many letters of comment regarding smart meters which expressed concerns about the privacy and security of data transmitted, concerns about the impact of the operation of the meters on human health, and concerns about the safety of the meters themselves. The Board observes that its role is to determine whether the proposed AMI project is a prudent investment by NSPI. While the Board's concern generally is with the economics of a project, it is charged under s. 18 of the *Act* with the general supervision of the utility:

**18** The Board shall have the general supervision of all public utilities, and may make all necessary examinations and inquiries and keep itself informed as to the compliance by the said public utilities with the provisions of law and shall have the right to obtain from any public utility all information necessary to enable the Board to fulfil its duties.

[199] Accordingly, the Board will address these concerns individually.

### **2.8.1 Privacy and Security of Data**

[200] According to the Application, the meters in the AMI network will be supplemented by cellular meters, for customers in "extremely remote" locations. Cellular meters "...would connect via a secure path on a public wireless network as opposed to NS Power's AMI network" and customers using them are said to have "the same level of privacy and security protections as a customer accessing NS Power's AMI network directly."

[201] NSPI stated it will be using industry-best practices and security standards to protect both the infrastructure and customer data from cyber threats, physical threats and data loss. Regarding the privacy of customer data, NSPI said in its Application:

Data collected by smart meters will not contain personal information such as names, account numbers or addresses. The data will include an identifier, which will be associated with an individual customer account once that data enters NS Power's system. The information transmitted will include meter status, event information and usage that will be protected by security certificates and end-to-end encryption. This protected data will be transmitted through secure channels for processing in secured facilities. NS Power will comply with all legal requirements regarding the privacy, protection and disclosure of personal information.

...

NS Power will comply with federal and provincial legal requirements regarding the protection of personal customer information. NS Power has evaluated its technology vendors and adopted best practices from other jurisdictions to ensure the protection of customer data.

Smart meters will only communicate a meter number, electricity usage and event information. No names, addresses or other personal information will be communicated over the AMI network. It is the same information displayed on conventional analog meters, but will now be transferred to NS Power through a secure and automated process. The electricity use data is protected by security certificates and end-to-end encryption. This protected data is transmitted through secure channels and processed in secure facilities. Access to personal information is restricted by access control policies, which are monitored to ensure compliance.

To help address possible concerns around data privacy, information on the security of smart meters will be provided throughout the customer engagement process. Details include the type of information smart meters collect, the level of data encryption provided through NS Power's AMI network, compliance with Measurement Canada standards and NS Power's adherence to legal requirements regarding the privacy and protection of personal information.

...

This information will be shared with customers to further inform them on the privacy and security of smart meters. Customer Care and outreach staff will also be expected to address any and all customer questions or concerns.

[Exhibit N-1, p. 62, pp. 78-79]

[202] In responses to IRs, NSPI described how it addressed security and privacy concerns in the RFP process, and outlined its Customer Engagement Plan.

[203] Mr. Athas stated that he was not aware of any privacy issues if the AMI data is properly handled.

[204] The only other Intervenor to raise any privacy or security concerns was PACE. It noted concerns about who the smart data would be available to, and for what purposes, as well as the potential for cyber security and hacking risks. It also noted concerns of whether NSPI will have sufficient insurance in place to cover any liability from any risks which might result from the implementation of AMI.

[205] NSPI reiterated in its Reply Evidence that no personal data is transmitted through the AMI network, and re-affirmed its commitment to abide by all applicable legal requirements.

[206] The Board finds that NSPI has taken appropriate steps to address cyber security and related risks in selecting the meters it intends to employ. The Board also finds that NSPI is committed to, and must, comply with legal requirements for the collection, use and protection of the data generated by the meters. The Board is satisfied that no personally-identifiable data, such as names and addresses, will be collected, but only the meter number, usage, and event information.

### **2.8.2 Health and Safety Concerns**

[207] In its Application, NSPI said that it has investigated and researched the smart meters to be used in the AMI project. It said they "...do not pose health risks and meet Canadian safety standards". NSPI said:

In 2014, Underwriter Laboratories issued the "Standard for Safety for Electric Utility Meters", UL2735. This standard contains requirements for the electric shock, fire, mechanical and radio frequency emissions safety aspects for smart meters. NS Power will only install meters that meet this standard.

[Exhibit N-1, pp. 79-80]

[208] NSPI also stated that the smart meters it intends to install are the result of advances in metering technology. Safety requirements and standards have evolved as

smart meter technology has developed. The meters will meet the requirements of Measurement Canada. NSPI addressed the evolution of smart meters in response to CA IR-83.

[209] In response to Board IR-36, NSPI said it had researched AMI implementation and learned lessons from Ontario and Saskatchewan. In particular, it said that Saskatchewan had “suspended its deployment of electric AMI meters in 2014 after defects were found in the meters during deployment”, noting that the meters did not meet the Underwriter Laboratories (UL) standard.

[210] The Company also provided information from Health Canada regarding radio frequency emission standards, and the safety of smart meters in the Application. NSPI intends to provide information about health and safety concerns as part of its Customer Engagement Plan.

[211] PACE filed evidence relating to risks to human and animal health and safety from electromagnetic fields created by smart meter installations. It noted fire and safety issues, and urged the Board not to rely on the UL certification. As part of its evidence, PACE included several appendices with references to scientific studies and reports from various jurisdictions. It recommended an auditing and reporting program be a condition of approval, should the Board decide to permit the NSPI project to proceed.

[212] Mr. Athas stated he did not feel qualified to address any health concerns, but said that they had not been an issue of any parties in a proposed AMI project in which he had previously been involved.

[213] Roswall stated:

### **Safety Concerns**

- During the comment period on this Matter, there have been many concerns expressed over the safety of these devices [sic]. NSP states in their submission that the meters installed under this project will be certified to UL 2735 - Standard for Electric Utility Meters. UL is a trusted certification body that qualifies for use under the Canadian Electrical Code and the Nova Scotia Electrical Installation and Inspection Act.
- We are concerned that questioning or challenging the electrical certification bodies is outside the scope of this application and could set a dangerous precedent for future utility efforts in Nova Scotia, which can ultimately harm ratepayers.

[Exhibit N-17, p. 2]

[214] In its Reply Evidence, NSPI noted that neither Mr. Chernick nor Ms. Napoleon of Synapse had raised any concerns about health related to AMI in their evidence. It urged the Board to "...take comfort that the meters will meet the required standards..." and to reject the PACE recommendations as inappropriate and unnecessary.

[215] The Board observes that many of the letters of comment refer to possible health and safety hazards of smart meters. Customers who have expressed a decision to "opt-out" refer to these concerns as their reasons for the decision. The Board understands that these customers have expressed their honest concerns.

[216] The Board finds that NSPI plans to install only smart meters which meet all appropriate standards, including UL, Health Canada, and Measurement Canada. It expects NSPI to comply with such standards and requirements. The Board agrees with Roswall and NSPI that it is not the role of the Board to question such standards and requirements.

[217] The Board directs NSPI to ensure that all available information regarding the standards and requirements be made available to its customers as part of the Customer Engagement Plan; further, NSPI is directed to ensure that its customer service staff are familiar with the information and will make it available to any customer who

wishes to have it at any time, whether prior to “opting-out”, or otherwise. The Board considers this necessary to ensure that customers can make fully informed decisions.

## **2.9 Awarding costs to EAC**

[218] EAC noted that it is a charitable organization and requested that it be granted costs. It provided details of the costs it sought to recover in its Closing Submission.

[219] Section 6(2) of the Board’s *Costs Rules* provide:

**6 (2)** The Board may consider awarding costs against a utility to non-profit, public interest intervenors with limited financial resources who

- (a) have a substantial interest in the proceeding;
- (b) will be affected by the proceeding;
- (c) participate in the hearing in a responsible way; and
- (d) contribute to a better understanding of the issues by the Board.

[220] The Board considers the evidence of Dr. Hill, the EAC consultant, helpful in understanding the implementation of AMI in other jurisdictions, and as it relates to energy efficiency and conservation. The Board directs NSPI to consult with EAC regarding recovery of costs; should they be unable to reach a satisfactory resolution, NSPI and EAC may apply to the Board for consideration of an appropriate award of costs. The Board notes it would be unlikely to award costs for EAC staff’s time.

## **3.0 SUMMARY AND CONCLUSION**

[221] While the Board, as noted in the Decision, has concerns with some of NSPI’s assumptions, on balance the Board finds that the AMI technology is proven and will deliver many of the benefits claimed by NSPI. In the circumstances, the Board approves Capital Item #47124 for its Advanced Metering Infrastructure Project in the

amount of \$133,228,952 in accordance with Section 35 of the *Act* subject to the findings in this Decision, including:

- There will be no return on the undepreciated value of retired meters;
- Customers will be allowed to continue to take non-standard meter service;
- NSPI is to establish and file by August 31, 2018, any cost of opting-out of AMI technology and continuing with non-standard meter service;
- In its June Compliance Filing, NSPI is directed to advise the date by which it will file the time-varying pricing tariffs; and

[222] The following directives are also included in the Decision:

- (i) NSPI is directed to provide a detailed accounting of the use of the contingency. Such accounting is to include identification of costs associated with each item spent under the contingency, as well as an explanation describing the reason for requiring each item;
- (ii) NSPI is directed to take into account the concerns of low income consumers, as well as small business customers, as it implements AMI and to consider the comments of the AEC and SBA regarding time-of-day usage tariffs and prepayment plans as they impact on such customers;
- (iii) NSPI is directed, in its August 31<sup>st</sup> compliance filing, to provide its detailed plan of how it will inform customers of the process to opt-out of installation of meters under the AMI Project;
- (iv) NSPI is directed to ensure that all information regarding the health and safety standards and requirements be made available to customers as part of the Customer Engagement Plan, and that NSPI customer service staff are familiar

with the information and will make it available to any customer who desires it, whether prior to opting-out or otherwise.

[223] The first Compliance Filing is due June 26, 2018.

**DATED** at Halifax, Nova Scotia, this 11<sup>th</sup> day of June, 2018.

  
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Peter W. Gurnham

  
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Roberta J. Clarke

  
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Steven M. Murphy