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March 23, 2021

VIA ELECTRONIC FILING
Mr. Bernard Logan, Interim Clerk
c/o Document Control Center
State Corporation Commission of Virginia
Tyler Building - First Floor
1300 East Main Street
Richmond, Virginia 23219

RE: Commonwealth of Virginia, ex. rel. State Corporation Commission, Ex Parte: In the matter of baseline determination, methodologies for evaluation, measurement, and verification of existing demand-side management programs, and the consideration of a standardized presentation of summary data for Virginia Electric and Power Company Case No. PUR-2020-00156

Dear Mr. Logan:

Enclosed for filing in the above-captioned proceeding is the Direct Testimony of Mark James, filed on behalf of the Virginia Energy Efficiency Council.

The testimony consists of 35 pages of questions and answers, plus a cover page and a Table of Contents. Included with Mr. James's testimony are three attachments: MJ-1, C.V. of Mark James; MJ-2, Interrogatory Responses of Virginia Electric and Power Company; and MJ-3, EM&V Data Collection from DNV GL Reports.

Mr. James's Direct Testimony and Attachments are being filed in a public version only.

If you should have any questions regarding this filing, please contact me at (434) 924-4776, or via email at cjaffe@law.virginia.edu

Regards,

Cale Jaffe

cc: Parties on Service List
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CERTIFICATE OF SERVICE

I hereby certify that the following have been served with a true and accurate copy of the Direct Testimony of Mark James and Attachments MJ-1, MJ-2, and MJ-3 by electronic mail and by deposit in the U.S. Mail, first class, postage prepaid:

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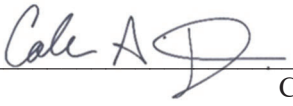
DATED: March 23, 2021



Cale Jaffe
University of Virginia School of Law

COMMONWEALTH OF VIRGINIA, *ex rel.*	)	
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STATE CORPORATION COMMISSION	)	
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Ex Parte: In the matter of baseline determination, methodologies for evaluation, measurement and verification of existing demand-side management programs, and the consideration of a standardized presentation of summary data for Virginia Electric and Power Company	)	Case No. PUR-2020-00156

Direct Testimony of Mark James

on Behalf of the Virginia Energy Efficiency Council

March 23, 2021

Witness Direct Testimony Summary

Witness: Mark James

Title: Senior Research Fellow and Adjunct Professor,
Institute for Energy and the Environment, Vermont Law School

Summary:

The Virginia Energy Efficiency Council ("VAEEC") presents the testimony of Mark James, who provides an analysis of methods for establishing baselines for energy efficiency programs, measuring savings attributable to those programs, and developing user-friendly reporting requirements on energy savings and program investments. Mark James is an Adjunct Professor and a Senior Research Fellow in the Institute for Energy and the Environment at Vermont Law School.

VAEEC has intervened in this docket to advocate for reasonable, unbiased, and achievable methods for evaluating energy efficiency program savings and spending in Virginia. By promoting cost-effective evaluation measures and clear reporting, VAEEC seeks to enhance transparency with respect to demand-side management ("DSM") programs and mandated savings targets.

Mr. James discusses recommendations for Evaluation, Measurement, and Verification ("EM&V") practices, EM&V spending, establishing DSM program baselines, and instituting a DSM dashboard (to be updated quarterly) along with an annual summary. Specifically:

1) Mr. James recommends the use of reasonable and unbiased estimates of energy and demand savings, including the use of deemed savings; leveraging the stakeholder group to develop a consensus on methods for EM&V; and incorporating spillover benefits into the calculation of net savings for DSM programs.

2) Mr. James reviews best practices for managing EM&V costs and underscores the benefits of treating EM&V as a portfolio-level expense in a discussion on EM&V spending.

3) Mr. James emphasizes that baselines should be established through engagement with the stakeholder group and joining the Mid-Atlantic Technical Reference Manual.

4) Finally, Mr. James concludes that implementation of a standardized, quarterly "dashboard" to present data on program activities, as well as an annual summary containing audited and finalized savings for DSM programs, are necessary to ensure compliance with targets under the Grid Transformation and Security Act and the Virginia Clean Economy Act.

ATTACHMENTS:

MJ-1: C.V. of Mark James
MJ-2: Interrogatory Responses of Virginia Electric and Power Company
MJ-3: EM&V Data Collection from DNV GL Reports

I. INTRODUCTION

Q1. Please state your name, title, and employer.

A. My name is Mark James. I am Senior Research Fellow in the Institute for Energy and the Environment and adjunct professor at Vermont Law School ("VLS") located at 164 Chelsea St., South Royalton, Vermont 05068.

Q2. What is the Institute for Energy and the Environment?

A. The Institute for Energy and the Environment is home to the energy law and policy programs at VLS. The Institute hosts a nationally recognized energy law and policy program, with the largest selection of academic courses on clean energy in the country and a full-time energy law clinic. The Institute is also a center for cutting-edge research on the transition to a clean energy economy. The Institute has participated in research projects using data analytics to improve low-income energy efficiency programs, enabling the integration of home energy efficiency ratings into multiple listing services, and identifying the impact of energy poverty on low-income households.

Q3. Please summarize your professional and educational experience.

A. I am a Senior Research Fellow in the Institute for Energy and the Environment, and I hold an L.L.M. degree in Energy Law from VLS. I earned a B.Sc. in Ecology, with honors, from the University of Toronto and a J.D., with an environmental specialization, from the University of Ottawa.

In March 2019, I was one of several authors on a comprehensive report published by the North Carolina Clean Energy Technology Center and the Upper Coastal Plain Council of Governments, *Powering Energy Efficiency and Impacts: A Data-Driven Project Supporting Low-Income Households in Northeastern North Carolina.* In December 2019, I delivered a presentation to the National Association of State Energy Officials and National Association of Regulatory Utility Commissioners on energy assurance and resilience. I have written academic articles on renewable energy, net metering, and grid security, and completed work focused on low-income energy assistance programs. I have

also completed numerous grant-funded projects, including leading a research team on a multi-year SunShot Plug-and-Play project to commercialize adhered solar PV panel technology, and I have developed and taught a course on energy efficiency at VLS.

Most of my current work explores cybersecurity for electric distribution utilities and stakeholder governance practices in wholesale electricity markets. I am the lead author on a major, two-phase report published by the Institute for Energy and the Environment and commissioned by Protect Our Power, *Improving the Cybersecurity of the Electric Distribution Grid* (Phase I published April 2019; Phase II published November 2019).

A copy of my C.V. is included as **Attachment MJ-1.**

Q4. What is the purpose of your testimony?

A. The purpose of my testimony is to underscore the Virginia Energy Efficiency Council's ("VAEEC") perspective, based on industry and stakeholder experiences, on the best means for evaluating how baselines are determined, defining how Demand-Side Management ("DSM") program savings are measured, and reporting savings in a way that is meaningful and transparent for average consumers, the energy efficiency industry, and the Commission.

Q5. Why did the VAEEC elect to intervene?

A. VAEEC has nearly 100 members, including energy-efficiency businesses, individual citizens, non-profit affiliates, and local governments, as well as natural gas companies and electric utilities. (As explained in VAEEC's Notice of Participation, Dominion Energy is a VAEEC member.) A core component of VAEEC's mission is to represent the voice of the energy-efficiency industry before the Commission and other regulators. For this reason, VAEEC has intervened in recent cases related to energy efficiency, including several Dominion Energy dockets (PUE-2016-00111, PUR-2017-00129, PUR-2018-00168, and PUR-2019-00201) and one Appalachian Power docket (PUR-2017-00126).

Q6. Please elaborate on the VAEEC's interest in this proceeding.

A. Sound policies for Evaluation, Measurement, and Verification ("EM&V") of energy savings from DSM programs, as well as for the accounting of the costs of those programs, help to improve program accountability and direct resources to where they are most productive and most needed. Recognizing that requirements imposed on Dominion Energy may likely be imposed on other Virginia utilities in the future, VAEEC seeks to ensure that decisions made in this docket will be reasonable and achievable, while providing high quality, transparent, and actionable data about programs.

Right now, improving the EM&V of DSM programs is especially important for measuring progress toward the binding targets of the Virginia Clean Economy Act ("VCEA"). The VCEA was one of several new pieces of legislation enacted in 2020 that makes significant changes to energy regulation in Virginia. Perhaps most relevant to this proceeding, Virginia law now requires investor-owned utilities to meet energy efficiency targets before constructing any new electricity generation facilities that emit greenhouse gas pollution.

Q7. Please provide your understanding of the origins of this proceeding.

A. Under Virginia law, the Company may come forward no more than once a year with a petition for approval of costs related to their DSM programs.[1] Dominion sought approval for its Phase VIII DSM petition in PUR-2019-00201. This current docket grew out of the Commission's final order in that Phase VIII docket.

Q8. Did you participate in that previous docket (PUR-2019-00201)?

A. Yes, I did. I filed testimony on behalf of VAEEC. One of the issues we raised was improving the visibility of the Company's investment in DSM programs and measuring the performance of those programs. We, along with the Environmental Respondents, suggested presenting this information in a 'dashboard' format. The Environmental Respondents proposed a template for the dashboard that we supported. We argued that the increased transparency would create opportunities for greater stakeholder engagement.

Q9. How did the Commission resolve that docket?

[1] VA. CODE § 56-585.1 A 5 c.

A. The Commission approved several DSM programs that had been proposed by the Company, but also found that "more rigorous evaluation, measurement, and verification is necessary to ensure that the programs are, in actual practice, the proximate cause of a verifiable reduction in energy usage".[2]

Q10. What guidance did the Commission give parties for this proceeding?

A. The Commission initiated this proceeding to consider issues such as "the determination of baselines, the measurement of savings for Dominion's current DSM programs, and the creation of a standardized 'dashboard' for reporting energy investments and savings".[3]

II. OVERVIEW OF RECOMMENDATIONS

Q11. Have you had the opportunity to review Dominion's initial filing in this docket?

A. Yes, I have. And I would like to thank the Company for their commitment to updating their EM&V efforts where needed. For example, I commend the Company and DNV GL for using "deemed" savings estimates where appropriate. I also agree with the Company on its use of properly developed Technical Reference Manuals ("TRMs") in setting baselines, which help build confidence in the gross and net savings calculations. In particular, the Company is correct in leveraging the Mid-Atlantic TRM for many common assumptions in evaluating efficiency measures. I also support the Company's use of non-Virginia data as appropriate. All of these approaches are effective ways of reducing EM&V costs for ratepayers and putting more money into on-the-ground DSM programs.

Q12. Do you have any recommendations for further improving the EM&V process?

A. One theme of my testimony is the incorporation of more transparency into all facets of EM&V, and to continue existing efforts that are already building confidence in DSM programs as a reliable and predictable component of Virginia's clean energy future. To give one example, there is a lot of useful data in the DNV GL reports, but that data could be presented in an easier-to-read format, as I discuss later in my testimony. A quarterly

[2] Final Order at 15, Petition of Virginia Electric and Power Company for Approval of its 2019 DSM Update, PUR-2019-00201 (July 30, 2020).
[3] *Id*. at 19.

dashboard and an annual summary on EM&V findings would help expand transparency. Transparency can also be improved by publishing data quickly, updating data regularly, making the data easier to understand, and defaulting to labeling data as public.

Q13. Why is transparency important to the development of energy efficiency resources?

A. Transparency enables effective oversight of ratepayer investments. Transparency also improves and enhances stakeholder involvement in designing, implementing, and evaluating energy efficiency measures. Transparency fuels the adoption of best practices in EM&V, which can reduce conflicts when EM&V data are produced. Ultimately, customers and the energy efficiency industry should benefit from quicker ramp-up of successful programs and earlier acknowledgment of underperforming programs.

Q14. How is your testimony structured?

A. My testimony includes recommendations for four areas related to the EM&V of DSM programs: (I) EM&V practices; (II) EM&V spending; (III) Establishing baselines; and (IV) DSM quarterly dashboard and annual summary. In addition, I have highlighted a few of Dominion Energy's public interrogatory responses, which are collected in **Attachment MJ-2**. Examples of Dominion's EM&V data collection and reporting from public EM&V reports are presented in **Attachment MJ-3**.

Q15. Based on your analysis, do you have any comments on the Company's EM&V practices as described in the DNV GL Testimony?

A. Yes. In the Order Initiating Proceeding, the Commission stated that it must have confidence in the attributable savings of the Company's DSM programs and confidence in the methodologies used to calculate the savings. If the Company abides by the basic structure outlined by DNV GL, then the Commission should have confidence that the results presented in future energy efficiency proceedings represent high-quality attributable savings estimates that demonstrate that the programs are the proximate cause of a verifiable reduction in energy usage. That said, I do have recommendations for improvement, which are detailed below in each of the four sections of my direct testimony.

III. DISCUSSION OF EM&V PRACTICES

Q16. What is your general recommendation for EM&V practices?

A. My general recommendation for EM&V practices is to focus on *reasonable and unbiased* estimates of energy and demand savings using agreed-upon methods to balance the cost of data collection and evaluation against the benefits of obtaining more precise data. Pursuing extreme precision can be very expensive without providing a commensurate level of value. Here, Dominion deserves credit for using the Mid-Atlantic TRM, which is an especially useful resource.

Q17. What elements constitute a "reasonable" and "unbiased" approach to EM&V?

A. At a minimum, a reasonable and unbiased approach to EM&V means first following accepted industry EM&V best practices, which the Company is already doing in many respects. There is no need for Virginia to reinvent the wheel when decades of research have gone into efforts across the country to improve EM&V. In the Company's testimony, DNV GL cited several key industry documents that they use to evaluate, measure, and verify energy savings.[4] The list includes resources published by the U.S. Department of Energy, the State and Local Energy Efficiency Action Network, the National Renewable Energy Laboratory, and the U.S. Environmental Protection Agency ("EPA"). The resources cover the development of technical reference manuals, establishing baselines for commercial and industrial energy efficiency programs, and estimating net savings.

A reasonable and unbiased approach to EM&V can also deliver transparency and objectivity by using the stakeholder group to gain agreement in advance on the methods and protocols that will be used, while also providing for sufficient Commission oversight. An unbiased approach would account for the good and the bad of any program under review. For example, it would account for the "spillover" savings benefits that many DSM programs see, while also acknowledging "free ridership" issues where they occur.

[4] Initial filing of Virginia Electric and Power Company: EM&V Background and Information Report at 2.1, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).

Q18. How does EM&V feed into other activities that are reviewed by the Commission?

A. EM&V is a critical step in quantifying the value of energy efficiency and thus identifying its resource potential. The resource potential for energy efficiency is relevant to Dominion's integrated resource planning ("IRP") process. In Dominion's most recent IRP, one intervenor criticized Dominion's use of "a 'generic' block of energy efficiency programs" as a placeholder for DSM resources, finding that the IRP "show[ed] us how much energy efficiency savings Dominion needs to achieve, but it offer[ed] no 'plan' on how to achieve it."[5] Creating unbiased and reasonable estimates of energy savings would help resolve this intervenor's concern, and would allow for demand-side management resources to compete with supply-side resources to meet Dominion customers' future energy needs.

Q19. Based on your analysis of the Company's initial filing, are there aspects of the Company's savings methodologies that you support?

A. Yes. Company Witness Feng explains the Company's approach to deemed savings calculations on page 24 of the DNV GL Report sponsored in her Direct Testimony. Deemed savings are an important and widely used method of program tracking. A recent study conducted by the American Council for an Energy-Efficient Economy ("ACEEE") found that 97 percent of states use deemed savings in program tracking to some extent: 7 percent of states used only deemed savings, 38 percent relied primarily on deemed savings, and 52 percent used a mix of deemed savings and metered data. And of course, deemed savings reduce the cost of EM&V, which reserves a greater portion of funding to deliver program services.

Q20. Is there a concern that deemed savings are inferior to measured savings?

A. I am not concerned by the use of deemed savings; I support them where they are appropriate. To begin, it may be useful to clarify that "deeming" a certain value for a particular component of program savings does not mean simply "making up" some number. A "deemed" value in this context is an input based on the best available

[5] Direct Testimony of Karl R. Rabago on behalf of Appalachian Voices at 15 (Q 26), *In re:* Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to VA. CODE § 56-597 *et seq.*, PUR-2020-00035 (Sept. 15, 2020).

information and agreed upon by the entities responsible for establishing the deemed values in that jurisdiction. As evidenced by the widespread use of deemed savings estimates around the nation, there are tremendous benefits in terms of cost and time saved by deeming certain inputs into EM&V. The key is to ensure that deemed values are reasonable and supported by evidence. Furthermore, deemed savings are highly transparent, as it is industry practice to publish deemed savings values or deemed formulas in spreadsheets, searchable databases, or other similar resources.[6] The information used to produce the deemed savings is, by design, easy to verify.

Q21. Please say more about the use of deemed savings in Virginia.

A. In the Order Initiating Proceeding for this docket, the Commission reiterated that data from non-Virginia jurisdictions or sources are generally considered the "least preferable way to measure energy savings."[7] Though that is the statutory prescription for Virginia,[8] it is not necessarily true that non-Virginia data are less accurate or inapplicable to programs in the Commonwealth. There are often opportunities to take advantage of information from other states that have invested resources into the evaluation of energy efficiency measures. These opportunities can save money for the Company's customers by avoiding duplicative research in Virginia. Proper use of deemed values can also support utility planning and program design, which in turn helps to create market certainty for energy efficiency service providers.

Any decision as to whether a particular methodology is inferior or superior must involve a consideration of the relative costs as well as benefits. It is impractical to attempt to always evaluate programs based solely on directly measured data from a utility's own customers. Simply put, the costs of insisting on using measured data in all cases greatly outweigh the benefits. Chasing precision does not significantly reduce the risk and uncertainty of EM&V

[6] U.S. Environmental Protection Agency, *Guidebook for Energy Efficiency Evaluation, Measurement, and Verification* 22 (June 2019), https://www.epa.gov/sites/production/files/2019-06/documents/guidebook_for_energy_efficiency_evaluation_measurement_verification.pdf.

[7] Order Initiating Proceeding at 7, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Aug. 28, 2020).

[8] 20 VA. ADMIN. CODE § 5-318-40.

estimates; it diverts dollars away from program delivery without creating a commensurate benefit.

Q22. When would use of deemed savings *not* be appropriate?

A. For data elements where there is a particular need or where there is not sufficient information to develop reasonable deemed values, direct measurement should be used. I recommend conducting impact evaluations for programs where the use of measured savings will provide the highest value and then agreeing upon ways to achieve reasonable and unbiased stipulated or deemed savings for other programs where impact evaluation will yield only marginal incremental benefits.

Q23. How should the Company determine when to rely on deemed savings?

A. I recommend that the Commission and the Company use deemed savings for simple, well-defined energy efficiency projects or measures, where uncertainty around average unit savings is low, and where average operating characteristics are well known. The Commission should use the U.S. EPA Guidebook for Energy Efficiency Evaluation, Measurement & Verification in determining when to accept deemed savings estimates. Importantly, the Guidebook does not support a requirement to develop "state-specific" or "utility-specific" baselines. Instead, it advises:

> "To increase transparency, document the deemed savings values and formulas in a freely available database or spreadsheet (*e.g.,* a TRM) that is accessible on a public website, specifies the conditions for which each deemed savings value or formula may be applied (*e.g.,* climate zone; building type; and implementation strategy, such as retrofit, replacement on failure, or new construction), and specifies the source of each deemed savings value or formula."[9]

Based on the recommendations in the Guidebook, the Commission should ensure that:

[9] U.S. Environmental Protection Agency, *Guidebook for Energy Efficiency Evaluation, Measurement, and Verification* 22, 24 (June 2019), https://www.epa.gov/sites/production/files/2019-06/documents/guidebook_for_energy_efficiency_evaluation_measurement_verification.pdf.

1) These values are only applied where the energy efficiency projects or measures are similar to the projects or measures for which the values were developed, and the appropriate baseline for that project or measure is used;

2) The Company updates deemed values on a going-forward basis when a database or TRM is updated based on new information;

3) Savings formulas allow adjustment for independent variables that affect energy use as relevant, such as outdoor temperature and occupancy levels in a building; and

4) Savings values and formulas are reviewed periodically (*e.g.,* every 3-5 years depending on the measure) and updated as needed to reflect more recent data.

My review of the Company's filings find that their process generally reflects these recommendations.[10]

Q24. How would the Commission or the Company determine when to rely on utility- and Virginia-specific data?

A. A TRM would provide a guide for these decisions. I recommend that Virginia join the Mid-Atlantic TRM or, if necessary, develop a TRM specifically for the Commonwealth. Engineers evaluating Dominion's programs already defer first to the Mid-Atlantic TRM, then factor in utility- and Virginia-specific data where appropriate, such as when there are project- or site-specific variables like climate, operating hours, or baseline conditions.[11] Creating a TRM for Virginia or joining the Mid-Atlantic TRM would provide greater uniformity in evaluation across all Virginia utilities and would further increase transparency and communication.

[10] Initial filing of Virginia Electric and Power Company: EM&V Background and Information Report at 23, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).

[11] State and Local Energy Efficiency Action Network, *SEE Action Guide for States: Guidance on Establishing and Maintaining Technical Reference Manuals for Energy Efficiency Measures* 13 (June 2017), https://www7.eere.energy.gov/seeaction/system/files/documents/TRM%20Guide_Final_6.21.17.pdf.

Q25. A TRM might recommend using deemed savings or partially deemed savings, instead of measured values, in some instances. What is the difference between deemed savings and partially deemed savings?

A. "Deemed savings" is a term widely understood by EM&V practitioners to encompass pre-established, empirically supported estimates of energy and/or peak demand savings attributable to energy efficiency measures or programs. These deemed savings values are used to provide estimates of program impact when certain threshold conditions are met (*e.g.,* verification of measure installation). "Partially deemed savings" describes cases where one or more (but not all) of the variables necessary for the calculation of energy and/or peak demand savings are estimated. For example, the Company might deem the "hours of operation" for a building when calculating savings from a program to promote high-efficiency commercial lighting. The use of partially deemed savings helps lower the cost of EM&V for customers, while still ensuring that appropriate and well-documented estimates of savings are provided.

Q26. How does the Company use both types of measures?

A. Deemed and partially deemed measures are critical elements of the Company's EM&V practices. In its filing, the Company stated that its approach to deemed savings was actually using "partially deemed savings values" as opposed to "fully deemed savings."[12] In this methodology, measure life and net-to-gross "deemed factors" have come from the program design and represent an average weighted program-level measure life.[13] The Company intends to conduct direct measurement and verification or comparison group analysis of its energy efficiency programs in the future, as appropriate.[14]

The tracked savings reported by DNV GL on behalf of the Company are produced using deemed savings calculations to estimate record-level and customer-specific savings that use a mix of utility- or Virginia-specific parameters from the customer and/or from other

[12] Initial filing of Virginia Electric and Power Company: EM&V Background and Information Report at 24, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).
[13] *Id.*
[14] *Id.*

jurisdictions.[15] The tracked savings are eventually studied through primary evaluation studies.[16]

The Company uses partially deemed savings in every measure and program identified in the Order Initiating Proceedings except for the smart strip measure in the Non-residential Prescriptive Program.[17] The Company relies on DNV GL to determine when to use a deemed or partially deemed measure.[18] DNV GL defers to partially deemed measures as much as is reasonable. This position aligns with the source TRM's methodology for calculating savings.

Q27. How could the stakeholder group assist in developing consensus for EM&V methods and protocols?

A. Under the VCEA, the stakeholder group has already become a forum that brings together customers, the Commission staff, the utility, and other regular participants in regulatory dockets. The stakeholder group could focus more intentionally on presenting and discussing options for EM&V methods and protocols as well as their relative costs and benefits. With the newly established EM&V subgroup, the stakeholder process offers the opportunity for transparent presentation and discussion of options outside of a Commission proceeding. The recommendations generated by the EM&V subgroup would still be subject to Commission approval, but the products of the stakeholder group would be created through a transparent, collaborative, and consensus-driven process. Furthermore, using the stakeholder group allows for greater participation from interested parties and energy efficiency experts.

Q28. Are there any other EM&V policies that you would like to address?

[15] *Id.* at 24-25.
[16] *Id*. at 24.
[17] Interrogatories to the Virginia Electric and Power Company by the Virginia Energy Efficiency Council (Second Set) at Question #8, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (March 4, 2021).
[18] *Id.* at Question #9.

A. Yes, I would like to specifically address the Company's policy to include free ridership in its calculation of net savings, while improperly excluding spillover effects.[19] The *exclusion* of spillover (energy savings spurred by the presence of an energy efficiency program but not counted as a direct impact of the program – *e.g.,* not directly installed or rebated by the program) and the *inclusion* of free ridership (savings that were paid for by the program but which would have occurred in the absence of it) will undervalue energy efficiency by lowering net savings and the net-to-gross ratio attributed to the program. This will produce biased cost-effectiveness test results.

Q29. Please explain what you mean by "spillover" effects.

A. Spillover is the energy or demand savings caused by the presence of a program that goes beyond the program-related gross savings of the participants, and that are generated without the financial or technical assistance of the program.[20] Spillover can stem from participants and non-participants.

Participant spillover is the additional energy savings created when the influence of a program leads a program participant to independently install additional measures or take other energy-saving actions after having participated in the program.

Non-participant spillover refers to the energy savings generated when a non-program participant installs a measure or takes an action because of the program's influence but is not recorded as an action caused by the program. This could include other customers who hear about efficiency measures from customers who did participate, or from contractors who change their practices because of the program and increase the marketing and use of high-efficiency measures. Utility energy efficiency programs can often have these broader "market effects" and EM&V practices should account for them.

[19] Initial filing of Virginia Electric and Power Company: EM&V Background and Information Report at 9, 51-52, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).

[20] State and Local Energy Efficiency Action Network, *Energy Efficiency Program Impact Evaluation Guide* 5-1 (Dec. 2012), https://www7.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf.

Q30. Please explain free-ridership effects.

A. Free riders are the program participants who would have undertaken a program activity or installed a program measure even in the absence of the program.[21] Free riders still reduce their electricity consumption, but their "free-ridership" savings are not attributable to an energy efficiency program.

Q31. How does the Company's decision to exclude spillover effects and include free ridership affect savings calculations?

A. Gross savings are the changes in energy use and demand that result from program activities, regardless of why the participant was motivated to take the action.[22] Net savings are the total change in energy use that is attributable to an energy efficiency program.[23] To calculate net savings, we start with the gross savings and adjust for what would happen without the program (free riders) and for add-on program impacts like spillover.[24]

Net-to-gross ratios are used to convert gross savings into energy efficiency savings. The free ridership effect decreases the net-to-gross ratio while spillover increases the net-to-gross ratio.[25] If only spillover is excluded from the calculation of net savings, then the ratio will produce inaccurately low program savings estimates. DNV GL wrote in its Report that most of the evaluations it has planned for the Company use a code or standard baseline together with a net-to-gross factor.[26] Omitting spillover from the calculation of the net-to-gross factor will improperly lower savings estimates and make energy efficiency programs appear less cost effective than they really are.

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[21] Daniel M. Violette & Pamela Rathbun, *Chapter 21: Estimating Net Savings—Common Practices, in* National Renewable Energy Laboratory, *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures* 3 (2017), https://www.nrel.gov/docs/fy17osti/68578.pdf.

[22] American Council for an Energy-Efficient Economy, *Toolkit: Evaluation, Measurement, and Verification* (Feb. 5, 2020), https://www.aceee.org/toolkit/2020/02/evaluation-measurement-verification.

[23] State and Local Energy Efficiency Action Network, *Energy Efficiency Program Impact Evaluation Guide* 5-1 (Dec. 2012), https://www7.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf.

[24] *Id.*

[25] Erin Malone et al., *State Net-to-Gross Rations: Research Results and Analysis for Average State Net-to-Gross Ratios Used in Energy Efficiency Savings Estimates* 5-6 (Jan. 23, 2015), http://www.synapse-energy.com/sites/default/files/NTG-Research-14-053.pdf.

[26] Initial filing of Virginia Electric and Power Company: EM&V Background and Information Report at 18, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).

Q32. Are there examples of established methodologies that account for spillover and free ridership?

A. Yes. The National Renewable Energy Laboratory ("NREL") has compiled a comprehensive list of different net savings calculation methodologies that can be applied to energy efficiency programs.[27] The trend in EM&V practices is to include estimates of the different spillover effects and different types of free ridership in net savings calculations and to adjust the treatment of each at the program level based on program-specific conditions.[28] Deciding how to measure and weigh spillover and free ridership impacts at the program level allows for individual consideration of the certainty of spillover and free ridership measurements for a given program and how to include them in the calculation of net savings. There is no single definition of net savings; a one-size-fits-all approach to considering spillover impacts ignores the nuance that exists within and between energy efficiency programs.

Q33. Do you have recommendations for how the Company should address spillover?

A. I recommend adopting EM&V practices that perform assessments of the certainty and risk in valuing spillover and free ridership when setting baselines for each measure. Concerns about the risk and uncertainty of energy savings can be addressed by having the stakeholder group evaluate and recommend methods for estimating spillover. Confidence in the accuracy of the savings can be managed by assessing the quality of the data that is available to produce the spillover estimates and by selecting an estimation methodology that reduces uncertainty.

IV. DISCUSSION OF EM&V SPENDING

Q34. Please explain why it is necessary to focus on EM&V spending in this proceeding.

A. Every dollar spent on EM&V is a dollar that cannot be spent on providing actual program services to customers. A requirement to use only Virginia-specific data or a rejection of

[27] Daniel M. Violette & Pamela Rathbun, *Chapter 21: Estimating Net Savings—Common Practices, in* National Renewable Energy Laboratory, *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures* 11-64 (2017), https://www.nrel.gov/docs/fy17osti/68578.pdf.

[28] *Id.* at 6.

deemed savings estimates can drive up EM&V costs without always providing a commensurate improvement in EM&V data. Such an inefficient use of resources is especially relevant given that EM&V costs count towards the DSM program spending targets in the Grid Transformation and Security Act ("GTSA").

Q35. Dominion's annual EM&V spending is approximately 3-7 percent of its annual DSM budget. How does that level of spending compare to identified best practices in other utility DSM programs?

A. Amounts in that range should be reasonable, with the higher end reserved for years with more extensive evaluations. This range of reasonable spending is affirmed by multiple studies of utility EM&V spending. The Consortium for Energy Efficiency compiles reports on budgets, expenditures, and savings in electric and natural gas DSM programs. The reports on EM&V spending in 2013, 2015, and 2018 found that spending varied from year to year and ranged between 2 and 6 percent of total DSM program budgets.[29]

Q36. What are best practices for managing EM&V costs?

A. Best practices for managing EM&V costs consider both the risk of uncertainty in evaluated savings and the cost of evaluating savings. Continuous increases in EM&V will not always produce commensurate increases in benefits. There is a point where the costs of EM&V spending will eventually outstrip the incremental benefits of reducing the uncertainty in savings estimates. Best practices in EM&V employ cost-saving EM&V practices where appropriate. TRMs provide the value of previous evaluation efforts while maintaining the flexibility to adapt to local- or utility-specific conditions such as lifespan estimates for specific measures, operating hours, baseline conditions, and local climatic conditions.[30] Best practices for cost management that I recommend are:

[29] Consortium for Energy Efficiency, *2013 State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts* 39 (2014), https://library.cee1.org/system/files/library/11350/CEE_2013_Annual_Industry_Report.pdf; Consortium for Energy Efficiency, *2015 State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts* 46 (2016), https://library.cee1.org/system/files/library/12628/CEE_2015_Annual_Industry_Report.pdf; Consortium for Energy Efficiency, *2018 State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts* 45 (2017), https://library.cee1.org/system/files/library/13981/CEE_2018_AnnualIndustryReport.pdf.

[30] *Id.* at 8-11; State and Local Energy Efficiency Action Network, *SEE Action Guide for States: Guidance on Establishing and Maintaining Technical Reference Manuals for Energy Efficiency Measures* 13 (June 2017), https://www7.eere.energy.gov/seeaction/system/files/documents/TRM%20Guide_Final_6.21.17.pdf.

1) Using agreed-upon deemed values for certain EM&V inputs, often available from accepted TRMs;[31]

2) Adapting a TRM to regional or utility-specific conditions, as necessary. TRMs contain standardized, state- or region-specific deemed savings calculations for well-established energy efficiency measures and can be used for projected and claimed savings;[32] and

3) Regularly updating TRMs to capture the most current available data.

Q37. How do EM&V and hard spending caps for each program interact with each other?

A. EM&V and hard spending caps on programs interact with each other in two critical ways that limit program and portfolio flexibility.

First, hard program caps prevent program funding from being shifted to high-performing programs based upon the results of EM&V analyses. Removing the hard caps would permit more flexibility to increase funding in high-performing programs and programs where customer demand has exceeded available funding. Having the flexibility to alter the disbursement of approved funds can boost the energy savings generated from the portfolio without imposing additional costs on customers.

Second, the level of scrutiny and the type of EM&V used to evaluate savings vary from program to program. A hard cap on spending results in a program with heightened scrutiny and higher EM&V costs having less funding available for the deployment of that specific program. Having flexibility to share and deploy the EM&V budget across all programs in

[31] Northeast Energy Efficiency Partnerships, *Mid-Atlantic Technical Reference Manual Version 10* 9 (May 2020), https://neep.org/sites/default/files/media-files/trmv10.pdf.

[32] State and Local Energy Efficiency Action Network, *Energy Efficiency Program Impact Evaluation Guide* xviii, 8-4 (Dec. 2012), https://www7.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf.

the portfolio allows a utility to maintain a high level of confidence in the energy savings of the portfolio without limiting the ability to deliver services.

Q38. Why should EM&V be a portfolio-level expense?

A. Industry best practices account for EM&V as a portfolio-level expense because doing so facilitates flexibility in energy efficiency program offerings and allows for expenses to be aligned with reporting practices. EM&V efforts can often be cross-cutting in terms of which programs they affect. Funds spent documenting baseline conditions in a market, *e.g.,* measuring no-treatment comparison groups, can be used to assess impacts in multiple programs. EM&V costs vary by year, even within the same program, which means that program-level spending will reveal significant swings that are an accepted result but may unnecessarily cause confusion during the review of the Company's efforts. Having flexibility to adjust the allocation of EM&V resources allows the Company and its program vendors to respond to changing conditions.

V. SETTING DSM PROGRAM BASELINES

Q39. Why is there a need to establish DSM baselines?

A. The inherent challenge with the evaluation of energy efficiency programs is that there is no simple "meter" to record the kilowatt-hours saved. As a result, evaluating programs requires the estimation of a "counterfactual" – what would have happened in the absence of the program – to compare with what actually happened.

This "what would have happened" condition is often referred to as a "baseline." Baselines are essential to determining the energy savings produced by a program, and good EM&V principles and practices are necessary to estimate them.

One can never know with absolute certainty the precise amount of energy saved from an energy efficiency program. Fortunately, utilities and utility regulators are used to dealing with uncertainty. For example, there are uncertainties surrounding energy demand forecasts and uncertainties involving projections about future fuel prices. As in those other

areas of utility business, the key is to apply fair and reasonable assumptions and methods to the task of determining a best estimate. By following industry best practices, the Commission can create confidence in savings measurements and reduce risks and uncertainty.

The use of properly developed TRMs in setting baselines can help increase the Commission's confidence in the gross and net savings calculations. The results provided by appropriate EM&V methodologies can then be used to support utility, regulatory, and legislative decisions on program spending, efficiency targets, and performance incentives.

Q40. What recommendations do you have for establishing baselines?

A. Joining the Mid-Atlantic TRM would be especially helpful in establishing baselines. I also recommend up-front engagement with stakeholders before an EM&V report is drafted. Early stakeholder engagement has the potential to reduce conflicts, and is consistent with the broader goal of increased transparency in EM&V.

Q41. Based on your analysis of the Company's initial filing, are there aspects of the Company's process for determining baselines that you support?

A. Yes. As detailed on pages 5 and 6 of the Direct Testimony of Company Witness Frost, the Company has made improvements to setting baselines from which gross and net energy savings can be measured. As I understand it, the Company will be bringing DNV GL into the process earlier so that the consultant can review a proposed baseline before the program goes to the Commission for approval. The earlier involvement of DNV GL makes sense, as it should help independently set a baseline that will be used for early phases of program evaluation. This is an important step in the right direction toward providing clear baselines from the outset and enhancing the reliability of savings estimates.

Q42. In the order establishing this proceeding, the Commission asked participants to comment on the process for establishing baselines for each of Dominion's currently active DSM programs and for each measure within a program. Do you have any concerns about the process for establishing baselines?

A. While the establishment of baselines is important, I am concerned that it could become an overly burdensome, resource-intensive process that would exceed the normal operating parameters of a regulatory docket. I would propose that the Commission use the Mid-Atlantic TRM for its detailed, common assumptions in evaluating efficiency measures.

Alternatives to joining the Mid-Atlantic TRM would be more time consuming. One approach would be to establish a framework, a set of principles, and an objective process run by the stakeholder group to develop a Virginia-specific TRM. An even more burdensome option would be to require Commission approval up front for every individual baseline used in every measure, year after year. Clearly, the most efficient process would be to leverage the expertise that has been brought to bear in developing the Mid-Atlantic TRM, which then could be reviewed in the existing Virginia stakeholder groups.

Q43. Should the stakeholder group still be involved in determining baselines?

A. Yes. To further increase confidence in baselines, the stakeholder group would be able to review and provide oversight of the Company's process and proposed baselines. By using the Mid-Atlantic TRM for this purpose, the stakeholder group would avoid an unnecessarily burdensome process of developing and approving the specifics of every measure-specific or program-specific baseline.

Q44. Turning to a specific example of baseline-setting, Dominion stated that no energy efficiency measures are treated as early replacement. How could that affect the calculation of energy savings for appliance programs?

A. If the Company is using market codes as the baseline for calculating energy savings, it is likely undercounting program savings. Energy efficiency programs incentivize the replacement of older, less efficient appliances. The replacement can happen at the end-of-life of the appliance or while the appliance still has effective useful life remaining[33] —a difference that should be acknowledged in the establishment of baselines for calculating energy savings. The timing of replacement of the appliances produces different amounts

[33] State and Local Energy Efficiency Action Network, *Energy Efficiency Program Impact Evaluation Guide* 7-3 (Dec. 2012), https://www7.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf.

of energy savings and thus these options should be treated differently for the purposes of calculating energy savings produced by appliance programs.

Q45. Why does it matter if a program uses market codes as the baseline for measuring savings for appliance programs or treats the measure as an early replacement?

A. EM&V should accurately represent the savings produced by a program so that energy efficiency can be fully utilized as a resource for Company planning and procurement decisions. If the program is encouraging replacement of appliances or equipment before the end of the useful lifespan, then the savings produced by the program should be calculated in two parts.[34] For the first part (the period of what would have been the system's remaining useful life), the savings are the difference between the energy efficiency of the replaced item (the baseline) and the replacement item. For the second part (the time beyond what would have been the system's useful lifetime), a proper baseline would be the existing code or standard for that item at that point in time *(i.e.,* the time when the original equipment is expected to have failed and been replaced). Using a baseline higher than that actual existing condition (*e.g.,* a code or efficiency standard) as the baseline during that first period can underestimate the actual savings from replacing that item, and thus lower the overall energy savings estimate for the program.

VI. QUARTERLY DSM DASHBOARD & ANNUAL SUMMARY

a. General principles

Q46. Please summarize your view of the Company's approach to a DSM "Dashboard."

A. I am encouraged by Dominion's willingness to supply data through a standardized format that makes information more transparent and accessible to consumers, stakeholders, and the Commission.

In the final order from the Company's Phase VIII petition for approval of new DSM programs, the Commission agreed with VAEEC and Environmental Respondents that a standardized presentation of data would assist in the efficacy of DSM programs. On page

[34] *Id.*

5 of his Direct Testimony in this docket, Company Witness Frost has proposed using the reporting template developed by Environmental Respondent Witness Jim Grevatt in PUR-2019-00201. While I agree with the Company that Mr. Grevatt's proposal is an excellent starting point, I would recommend additional measures to enhance its capability in measuring progress toward a variety of statutory objectives. It is essential to have the correct measures reported, but it is also important how the data are presented and made accessible.

Q47. Can you explain some of the changes you would make to the Company's proposal?

A. I recommend that the Commission require the Company to provide data in two ways.

First, an efficiency "dashboard," updated on a quarterly basis, should provide a program-by-program snapshot on key program activities, which will be useful for tracking how its portfolio is progressing during the year.

Second, the Company should provide an annual summary in conjunction with the Company's annual EM&V filing, which should contain the audited and finalized savings for the DSM programs. Each of these documents would provide important information about program status and accomplishments.

I would ask the Commission to expand the data points included in the Company's reports. The quarterly dashboard and annual summary should include progress toward statutory targets, plus other data points relevant to assessing program- and portfolio-level performance. A geographical presentation of program data could also assist in program targeting.

Q48. How would the dashboard and annual summary differ?

A. A dashboard would be a fluid presentation of information that is important to monitor and track on an ongoing basis. The dashboard would provide frequently updated statistics on program activity and performance. For example, participation numbers and program spending are two central metrics that would be important to track. Other elements would

be items such as the number of measures installed and number of rebates issued. By contrast, an annual summary would report ultimate compliance (at year end) with mandated spending and energy savings targets as established by the GTSA and the VCEA. The annual summary would be updated and refreshed when the Company completes its annual EM&V reporting requirements. The quarterly dashboard and the annual summary, as discussed later in my testimony, should both be made publicly available online in easily accessible formats.

Q49. How would deploying a dashboard and an annual summary enhance Dominion's DSM programs?

A. The most important function of the dashboard would be to provide timely feedback on the progress of each program during the year. The dashboard would immediately improve transparency into the performance of the Company's DSM program and foster opportunities for stakeholder engagement. Improving baselines and savings methodologies can take a substantial amount of time—the Company estimates that certain rigorous studies to collect more utility-specific or Virginia-specific data could take two to three years.[35] Deadlines for achieving DSM investment and savings goals under both the GTSA and VCEA are quickly approaching. Since the Company already monitors program data monthly and conducts regular quality control, my recommendation would combine existing data management practices with increased transparency to improve the delivery of DSM programs.

The annual summary would complement the Company's EM&V reporting requirement. As Company Witness Frost explained, Dominion reports finalized savings that have been audited and verified[36] in its annual EM&V report published in May. These finalized savings would be the information included in the annual summary, which should be clearly laid out at the beginning of the report in addition to being publicly available online.

[35] Initial filing of Virginia Electric and Power Company: EM&V Background and Information Report at 45-46, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).

[36] Initial filing of Virginia Electric and Power Company: Testimony of Nathan J. Frost at 3, *Ex Parte*: In the matter of baseline determination, PUR-2020-00156 (Nov. 6, 2020).

While an updated EM&V report incorporating a clear summary of progress on statutory goals would be sufficient to ascertain compliance with the GTSA and VCEA mandates, it does not offer the granularity necessary for continuous improvement of ongoing DSM programs. The quarterly dashboard would provide updates on program expenditures, program participation, and other metrics that would be important indicators for assessing how programs are progressing. The dashboard information would not need to undergo the same level of detailed analysis as the finalized savings, but it would still provide important and timely updates on program progress. It would also increase transparency into the Company's DSM programs. The annual summary would focus more on overall program impacts, including calculation of cumulative demand and energy savings.

Q50. Would the quarterly dashboard and annual summary interact with Dominion's annual EM&V report and DSM docket?

A. Yes. Both the dashboard and the annual summary could be used to improve Dominion's compliance with existing reporting requirements. Dominion has an annual EM&V reporting requirement that was originally established by the Commission in Case No. PUE-2009-00081, with additional reporting ordered by the Commission in Case No. PUR-2017-00047.[37] Performance indicators are used to evaluate individual programs and the DSM portfolio. The cumulative participation, net energy savings, and net peak demand reductions are used as inputs for other processes such as the Company's integrated resource planning and program performance incentives.[38]

I also think it is important for the Commission to establish dates by which the dashboard updates and annual summaries would be filed. To begin, I recommend that the annual summary be posted by March 1st of each year, which should allow sufficient time to calculate estimated impacts from the prior calendar year. Quarterly dashboards would then be filed based on that timeframe: on June 1st, September 1st, and December 1st. Of course, these filings would include a caveat that the "official" final results would be filed with the

[37] Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy) Volume 1 at 1, Petition of Virginia Electric and Power Company for approval to implement demand-side management programs, PUR-2018-00168 (May 15, 2020).
[38] *Id.* at 3.

detailed EM&V reports each May. The particular dates selected are less important than making sure the dates are included in an order from the Commission. That way, all parties know if a filing is pending or if a deadline has been missed.

Q51. Does Dominion have other reporting requirements or statutory targets that could be shared on the quarterly dashboard?

A. Starting in 2021, the Company will be required, as established in the Virginia Code § 56-596.2c, to use a third-party evaluator to perform EM&V to determine: total annual savings; the annual and lifecycle net and gross energy and capacity savings for each program; related emissions reductions for each program; other quantifiable benefits for each program; total customer bill savings that the programs and portfolios produce; and utility spending on each program including associated administrative costs.[39] The Company is also required to ensure that at least 15 percent of its proposed energy efficiency programs are designed to benefit low-income, elderly, or disabled individuals or veterans.[40] Information on program activities and accomplishments during the year that relate to those goals should be included in the quarterly dashboards, and the overall verified and reconciled results should be provided in the annual summary.

Q52. Would the dashboard or annual summary significantly alter or increase the Company's data collection practices?

A. No. My recommendation seeks to use data that the Company is already collecting and is focused on making the existing data more transparent, useable, and accessible to stakeholders and the public at large.

The data points that I recommend including in the quarterly dashboards and annual summary are not data points that would require the Company to perform new measurements or collect new information. Rather, the data points I suggest are routine tracking elements that should already be collected by the Company as part of its program monitoring and EM&V filing requirements. Furthermore, many of the data presentation

[39] VA. CODE §56-596.2 C.
[40] VA. CODE §56-596.2 A.

methods that I am proposing are methods that the Company has already employed in its EM&V reports.

Q53. How should data be included in the annual summary?

A. The annual summary should be used as an opportunity to take the most relevant data that are often included in EM&V reports, and repackage that data in a way that is easy for a layperson audience to understand. Examples of Dominion's EM&V data collection and reporting are presented in **Attachment MJ-3**. These examples show that the DNV GL reports already provide cumulative, comparative, annualized program progress for active programs, but that the data might be hard for a utility customer to decipher.[41]

The quarterly dashboards could provide data on expenditures and gross participation numbers. There are also data that the Company reports for each month on energy and capacity savings.[42]

The annual summaries would add in total annual net energy savings (kilowatt-hours per year), along with cumulative and lifetime net energy savings. Annual summaries could also provide detailed information on individual program performance. While the Company may already be providing a lot of that annual data across a wide range of variables covering costs, participants, energy savings (kilowatt-hours per year), demand reduction (kilowatts), and program performance (cost for energy savings achievements and cost for demand reduction achievements),[43] I recommend that the Commission require these data be provided in a more easily accessible way.

Presenting the data in an easy-to-read format is an important goal for both the annual summaries and the quarterly dashboard updates.

[41] Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy) Volume 1 at 6, Petition of Virginia Electric and Power Company for approval to implement demand-side management programs, PUR-2018-00168 (May 15, 2020).
[42] *Id.* at Volume 2, 37-51; Volume 3, 37-51.
[43] *Id.* at Volume 1, 88-89.

Q54. What programs should be reported in the dashboard and annual summary and for what length of time should the Company provide data?

A. My recommendation is that any program contributing to the GTSA or VCEA targets should be included in the dashboard, and information for each year that a program was or is in operation should be included in the annual summary. Since the GTSA targets were implemented in 2018, before the VCEA targets, it is reasonable to include program data dating back to at least the Company's 2018 DSM portfolio. This level of transparency would allow parties to see how effective a program was for years prior to and after inclusion in the statutory compliance period.

b. <u>Data frequency</u>

Q55. Why do we need to have program performance data reported more frequently?

A. Right now, utilities in Virginia submit annual evaluation reports. The Commission, customers, other stakeholders, and utilities themselves need to have data available more often so they can assess the effectiveness of programs. I recommend that the Commission, in any future Order Approving Programs, grant the utilities some flexibility in redirecting resources as necessary. If a program is outperforming expectations, stakeholders should be able to observe that and recommend to the utility or the Commission that the program should be expanded. Similarly, if a program is underperforming expectations, more frequent data will bring possible problems to light.

For existing programs that have already been approved, a utility would have to petition the Commission to adjust a program or seek permission to shift funding to other programs producing greater savings. Going through an evidentiary hearing just to make these kinds of adjustments would impose unnecessary delays on DSM rollout. Going forward, I recommend that the Commission grant utilities some upfront flexibility to be able to shift a portion of an approved budget (*e.g.,* 10 percent to 15 percent) between programs based on EM&V data, without having to come back to the Commission for a new approval. Especially given the ambitious goals set out in the GTSA and the VCEA, regulators,

utilities, and stakeholders will need to move quickly and monitor programs closely to ensure targets are met.

Q56. Have you examined the reporting requirements for EM&V in other states?

A. Yes. I have reviewed reports or requirements from California, Connecticut, Delaware, Maryland, Massachusetts, New York, Rhode Island, Vermont, and the District of Columbia. Many of these jurisdictions are leaders in energy efficiency, with reported electricity savings in excess of 1.2 percent of statewide sales and up to 2.5 percent of statewide sales.[44] In many jurisdictions, data are reported more often than just once a year. Some states—California and Connecticut—require that at least some program metrics are reported monthly.[45] Three states—Massachusetts, New York, and Rhode Island—collect data quarterly.[46] In Delaware and Maryland, program administrators must submit biannual program snapshots,[47] and in Vermont, data are reported annually.[48]

Q57. Which of those states require program administrators to provide data in a standardized format, like a template or a dashboard?

A. Several states mandate that program evaluation data are reported in a standardized format, though the level of detail required varies. In Vermont, DSM programs are provided by energy efficiency utilities, and the Vermont Department of Public Service is responsible for conducting program evaluations.[49] The annual reports in Vermont contain simple, clear tables that display the gross energy saved, winter demand reduction, and summer demand reduction, as well as the realization rate for each of these metrics, along with other useful

[44] Weston Berg et al., American Council for an Energy-Efficient Economy, *The 2020 State Energy Efficiency Scorecard* 32 (2020), accessible at https://www.aceee.org/research-report/u2011.

[45] California Public Utilities Commission, *Energy Efficiency Policy Manual* 33 (April 6, 2020); Connecticut Department of Energy and Environmental Protection, *2021 Plan Update to the 2019-2021 Conservation & Load Management Plan: Appendix C. Compliance Orders* (March 1, 2021).

[46] MASS. GEN. LAWS ch. 25 § 22(d); Order Authorizing Utility-Administered Energy Efficiency Portfolio Budgets and Targets for 2019-2020, In the Matter of Utility Energy Efficiency Programs, State of New York Public Service Commission Case 15-M-0252 (March 15, 2018); Annual Energy Efficiency Plan for 2020 Settlement of the Parties at 80, *In Re:* The Narragansett Electric Company d/b/a National Grid Annual Efficiency Plan for 2020, Rhode Island Public Utilities Commission Docket No. 4979 (October 15, 2019).

[47] 7 DEL. ADMIN. CODE 2105; Order No. 88696, Public Service Commission of Maryland Case Nos. 9153, 9154, 9155, 9156, and 9157 (July 27, 2018).

[48] VT. STAT. ANN. tit. 30 § 209 (j)(4)(F)

[49] *See, e.g.*, Vermont Department of Public Service, *Report to Verify Efficiency Vermont 2019 Savings Claim* 8 (2020).

data. Maryland is a jurisdiction that has specified 104 different tables for use in reporting energy efficiency programs, including high-level tables that show gross energy and demand savings for all programs, as well as detailed tables for each type of efficiency program, with metrics tailored to the program type.[50]

Program administrators in Massachusetts[51] and New York file evaluation data in a standardized spreadsheet template. In New York, the spreadsheet also contains historical data submissions.[52] This uniform format is another effective method for presenting data in an easy-to-digest way. National Grid's filings in Rhode Island contain a consistent summary table that displays targets and results by program.[53] Delaware does not mandate a reporting format, but it does specify the data points that must be reported for each program.[54]

Q58. Which metrics are most often included in annual EM&V reports to public utility commissions?

A. Annual program energy savings are the most common metric reported on summary EM&V reports. Each state I examined included this essential measure. Lifetime program energy savings were less common, though still reported in five of the states. Lifetime savings were measured as either savings over the life of the measures or savings over the course of a program cycle. Annual program demand savings were also common, appearing on reports in seven states. Lifecycle program demand savings were on summary reports in three states. Non-energy indicators of program activity are also often reported: five states included actual program expenditures in their reporting requirements, and four states included a count of participating customers.

[50] Staff's Proposed EmPOWER Maryland Reporting Templates for the 2015-2017 Reporting Cycle, Maryland Public Service Commission Case Nos. 9153, 9154, 9155, 9156, and 9157, Maillog Number 165078 (2015).
[51] *See* Order Adopting Energy Efficiency Annual Report Template, Massachusetts Department of Public 08-50-C (May 5, 2011).
[52] *See, e.g.,* Q2 2020 Con Edison Clean Energy Dashboard Scorecard, N.Y. Dept. of Public Service Case 18-M-0084 (Aug. 31, 2020).
[53] National Grid Electric and Gas Energy Efficiency Programs 2020 Quarterly Reports – First Quarter, R.I. Public Utilities Commission Docket 4979 (Aug. 4, 2020).
[54] 7 DEL. ADMIN. CODE 2105.

In addition, other states' reports show program evaluation measures as levels as well as in terms of realization rates or alongside the forecast for the metric. This is a best practice that Virginia should require. Rather than showing figures in isolation, providing the context of the measure's target value helps the reader to judge more easily how the program is performing.

It is less common for summary reports to show programmatic details or assumptions made in the evaluation process. A more comprehensive model was put forth by the Northeast Energy Efficiency Partnerships ("NEEP") in 2014. NEEP's Model EM&V Methods Standardized Reporting Forms use a series of checklists and tables to standardize the presentation of a program's energy savings data *and* the EM&V methods used for the program.[55]

c. Portfolio-level indicators

Q59. What are the priorities for reporting of portfolio-level data?

A. An important function of the annual summary will be to provide portfolio-level information in addition to program-level information. Again, portfolio-level data are important for transparency purposes, as they help to track the goals set out in the GTSA and the VCEA, as well as the statutory requirement that 15 percent of spending on energy efficiency programs be allocated to programs designed to benefit low-income, elderly, or disabled individuals or veterans.[56] Portfolio-level data will also be useful to the Commission in establishing the post-2025 energy savings targets.

Some key metrics that the annual summary should include:

i. Energy savings from all programs as a share of total sales;
ii. Demand reduced from all programs;
iii. Total spending on all DSM programs;
iv. The above measures grouped by residential and commercial program; and

[55] Northeast Energy Efficiency Partnerships, *Model EM&V Methods Standardized Reporting Forms* (July 2014).
[56] VA. CODE § 56-596.2.

v. The share of total spending on DSM programs designed to benefit low-income, elderly, or disabled individuals or veterans.

Incorporating portfolio-level data would also make it easier to aggregate data across utilities to provide a picture of how DSM is doing in Virginia as a whole and in light of statutory mandates. This would be especially useful if Virginia decides to implement a statewide dashboard website, as I recommend below.

d. <u>Program-level indicators</u>

Q60. Moving to the program level, what data should be on the annual summary for each program?

A. First, the annual summary should show key metrics and indicators that measure progress toward the program's goals, and thus the achievement of the statutory targets established by the GTSA and VCEA. Second, the dashboard should contain metrics that facilitate analysis of program performance. The annual summary should include data for each of the following metrics:

1. Energy savings;
2. Demand savings;
3. Program budget;
4. Program funds spent;
5. Percentage of program funds spent;
6. Participants;
7. Participation rate (share of eligible population); and
8. Cost per customer.

Q61. Why are these metrics essential for inclusion in the annual summary?

A. Monitoring and tracking program progress over an entire year is the most important function of the annual summary. The Company has statutorily mandated energy savings targets and program spending requirements. The annual summary will allow regulators,

legislators, and other interested parties to evaluate the Company's progress towards those statutory mandates.

The ability to evaluate and compare programs at a glance through clear, consistent reporting of program-level data is a major advantage of specifying a required reporting format. Showing only portfolio-level data in the quarterly dashboard or the annual summary can hide programs that are underperforming and may be bad investments.

In the annual summary, there is the opportunity to provide more granular detail than would be available in the dashboard. Many of the same data that are shown at the portfolio level should be repeated at the program level: energy saved, demand reduced, and program spending are all key to understanding a program's success. Additionally, a measure of participation—such as the share of the eligible population that is participating in the program—can help indicate if a program is on track with its forecast or if a program has reached a saturation point and should be phased out.

Q62. How can the Company use this data to adapt their approach to energy efficiency programs to achieve deeper savings per participant?

A. In my testimony in PUR-2019-00201, I talked about how introductory programs with shallow savings potential could be leveraged to enroll customers in programs with higher commitments but deeper savings. At the same time, the Environmental Respondents' testimony in PUR-2019-00201 expressed concern that this approach could lead to customer confusion and fatigue.[57] Gaining insight into the value of specific programs might assist the Company in focusing its efforts and creating a more structured system for introducing and scaling up programs.

Q63. Should the dashboard and the annual summary contain geographical analyses?

[57] Direct Testimony of Jim Grevatt on behalf of Environmental Respondents at 32, Petition of Virginia Electric and Power Company for Approval of its 2019 DSM Update, PUR-2019-00201 (March 20, 2020).

A. Yes. Geographical analyses of the delivery of DSM programs could increase transparency into where programs are offered and how programs might be targeted to address grid congestion and other infrastructure needs.

Q64. Could geotargeting help increase program participation, effectiveness, or equity?

A. Yes. As I explained in my testimony in the prior docket, PUR-2019-00201, geotargeting can be an especially useful tool in DSM.[58] The Company's annual EM&V report already identifies the top areas in Virginia for energy savings and peak savings.[59] Identifying the top-performing areas is the first step to understanding the factors that affect program participation and effectiveness. The geographic granularity of the EM&V analysis can lead to identifying program design elements that can drive the most valuable savings. Furthermore, it can uncover opportunities for targeted programs to defer transmission and distribution system investment. Geotargeting decisions should also be informed by equity considerations. Mapping program participation rates allows the Company and its vendors to identify underserved areas and to refine outreach activities to ensure that all the Company's customers benefit from the program offerings.

Q65. Do you have any other recommendations on program-level elements that should be included in the dashboard?

A. The Company submits individual DSM programs to the Commission for review and approval. The proposals include forecasted energy or peak demand savings, forecasted participation levels, and a program-specific budget.[60] For some programs, participation levels are not a relevant metric because the program targets specific measures or mid-stream participants.[61] In those cases, a different measure of program uptake may be required. Each of those elements should be available on the dashboard and they should be

[58] Direct Testimony of Mark James on behalf of the Virginia Energy Efficiency Council at 30, Petition of Virginia Electric and Power Company for Approval of its 2019 DSM Update, PUR-2019-00201 (March 20, 2020).

[59] *See e.g.*, Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy) at 252, Petition of Virginia Electric and Power Company for approval to implement demand-side management programs, PUR-2018-00168 (May 15, 2020).

[60] *See e.g.*, Direct Testimony of Michael T. Hubbard at MTH-Schedule 2, Petition of Virginia Electric and Power Company For approval of its 2020 DSM Update, PUR-2020-00274 (2020).

[61] Dan York et al., American Council for an Energy-Efficient Economy, *Expanding the Energy Efficiency Pie: Serving More Customers, Saving More Energy Through High Program Participation* 5 (2015), https://www.aceee.org/sites/default/files/publications/researchreports/u1501.pdf.

updated as frequently as permitted by the Company's data collection system. The Company is already reporting this information in its annual EM&V report to the Commission; the dashboard would allow for more frequent updates of the reported information.

e. Enhancing accountability to customers and stakeholders

Q66. What else can be done to enhance the usefulness of a dashboard?

A. A dashboard reporting requirement has the potential to make a wealth of data available, and we should seek to get as much value from the data as possible by making them easily accessible and understandable. Distributing the dashboard data in a more user-friendly manner will help stakeholders and the Commission make effective, timely use of any EM&V data that is provided.

One option is to make the data reported by utilities easily accessible through a dedicated website, like those used in Connecticut, Massachusetts, and New York. In all three of those states, program-level data are available online through interactive charts and tables. Users can easily evaluate and compare the performance of programs, sectors, or utilities. The raw data used to construct the dashboard should be exportable by the public and stakeholders in a variety of formats, (*e.g.,* Word, Excel, and CSV files). At a minimum, the quantitative data should be available in native form, which would allow data to be imported by stakeholders into other analytical tools. New York and Connecticut are examples of states that make their raw data available for download in different formats.

Q67. How can the annual summary be made more easily comprehensible for the average consumer?

A. The annual summary should be designed from the start for the average consumer. It should be a website that is simple in design and easy to navigate, with a focus on key numbers and a few graphics. Metrics like progress toward GTSA and VCEA targets can be displayed in a numerical format. Annual summaries should be presented in visual formats (*e.g.,* graphs), to make it easy to track progress toward shorter term goals that coincide with the three-to-five-year timeframe of program approvals.

The dashboard should be easy to locate, whether it be on the Company's website or, preferably, on the Commission's website. I understand that the Commission has an existing budget for marketing of energy efficiency opportunities. A portion of that budget might be directed to developing the annual summary/dashboard website.

A glossary of key terms should also be provided to assist customers and stakeholders in maximizing the utility of the dashboard. A good example comes from the State of New York's Clean Energy Dashboard, which has a glossary that defines key terms and expands on abbreviations used in the dashboard.[62] Finally, support should be available for members of the public and stakeholders with questions about using the dashboard.

Q68. Why should the annual summary be designed to be flexible and adaptable?

A. Although this docket is focused on EM&V for Dominion Energy Virginia, it is important to consider how dashboards and DSM summaries from multiple utilities might work together. It would make sense to have a single location for all the utilities' data on the Commission website. A single website would reduce barriers to stakeholder and public engagement by creating a complete and comprehensive overview of utility programs, with an eye on the GTSA and VCEA targets. Flexibility can and should be built into the design and presentation of data contained in the dashboard, as statewide goals are modified or expanded by the General Assembly in the coming years.

Q69. Does that complete your direct testimony?

A. Yes.

[62] *See* New York State Energy Research and Development Authority, *Glossary* (last accessed March 5, 2021), https://www.nyserda.ny.gov/Researchers-and-Policymakers/Clean-Energy-Dashboard/Glossary.

Attachment MJ-1:

C.V. of Mark James

MARK JAMES

1531 Heather Hollow Circle #11, Silver Spring, MD, 20904

802.356.6275 ♦ markjames@vermontlaw.edu

EXPERIENCE

Vermont Law School, South Royalton, VT, July 2019 – Present
Adjunct Professor and Senior Research Fellow, Institute for Energy and the Environment

- Teach online learning courses:
  - Energy Policy in a Carbon Constrained World
  - Energy Regulation & The Environment
  - Energy Efficiency Policy
- Develop curriculum and instruction for new online Alternative Transportation course.
- Serve as subject matter expert for online energy law courses.
- Lead researcher on regional transmission organization stakeholder governance project as part of a multi-school effort funded by the Sloan Foundation.
- Led Phase 2 Protect Our Power-funded student research team to enhance state-level efforts to increase distribution utility cybersecurity investments.

Northeastern University School of Law, Boston, MA, February 2021 – May 2021
Part-Time Lecturer

- Teach Energy Law and Policy in online, live lecture format.

Vermont Law School, South Royalton, VT, 2016 – 2019
Assistant Professor and Senior Research Fellow, Institute for Energy and the Environment

- Taught residential courses
  - Energy Policy in a Carbon Constrained World
  - End-Use Energy Efficiency
- Taught online learning courses:
  - Energy Policy in a Carbon Constrained World
  - Energy Regulation & The Environment
  - Alternative Fuels and Renewable Energy
  - Communications, Advocacy, and Leadership
- Led Protect Our Power-funded project to enhance state-level efforts to increase distribution utility cybersecurity investment.
- Managed student research team for Department of Energy (DOE)-funded Northeast Energy Efficiency Partnership – Home Energy Labelling Information Exchange (NEEP-

HELIX) data privacy project to develop data access protocols for a multi-state home energy efficiency score.
- Directed research on DOE-funded Powering Energy Efficiency Impacts Framework grant to facilitate access to and operation of low-income energy efficiency programming in five-county test pilot region in North Carolina.
- Led research on Maryland Climate Coalition project to compare proposed bills to increase Maryland's Renewable Portfolio Standard.
- Served as faculty supervisor to the National Energy and Sustainability Law Moot Court Team.
- Developed the grant proposal for the U.S. Department of Agriculture (USDA)-funded Farm and Energy Initiative.

Vermont Law School, South Royalton, VT, 2014 – 2016
Global Energy Fellow, Institute for Energy and the Environment
- Led research on DOE-funded Lawrence Berkeley National Laboratory (LBNL) PV AutoPop data privacy project seeking to integrate rooftop solar data into real estate multiple listing services.
- Analysed building codes and standards, utility tariffs, and government legislation.
- Drafted model code amendments for SunShot Plug and Play Solar PV for American Homes Project.
- Supervised Energy Clinic team in developing the *Guide to Community Solar* report.
- Facilitated executive training program, *Legal Essentials for Utility Executives.*

CONSULTING

Utility Hearing Expert Witness, January 2020 – May 2020
- Serve as an expert witness in Dominion Energy's Demand Side Management Program Application, Case No. PUR 2019-00201, before the Virginia State Corporation Commission.
- Work with University of Virginia School of Law's Environmental and Regulatory Law Clinic, on behalf of the Virginia Energy Efficiency Council, to submit written expert witness testimony and prepare oral testimony.

PUBLICATIONS

Articles

Kevin B. Jones, Mark James, and Heather Huebner, *Do You Know Who Owns Your Solar Energy? The Growing Practice of Separating Renewable Attributes from Renewable Energy*

Development and its Impact on Meeting Our Climate Goals, 28 FORDHAM ENVTL. L. REV.197 (2017).

Mark James, Kelsey R. Bain & David E. Sloan, *Undamming the Federal Production Tax Credit: Creating Financial Incentives for Dam Trading and Dam Removal*, 53 IDAHO L. REV. 53 (2017).

Mark James, Ashleigh H. Krick & Kelsey R. Bain, *Planning for the Sun to Come Up: Examining the Root Causes and Future Impacts of California and Nevada's Divergent Approaches to Net Metering*, 8 SAN DIEGO J. OF ENERGY L. 1 (2016-17).

Kevin B. Jones, Mark James & Roxana-Andreea Mastor, *Securing our Energy Future: Three International Perspectives on Microgrids and Distributed Renewables as a Path Toward Resilient Communities*, 16 J. OF ENVTL. HAZARDS 99 (2016).

Reports

Mark James, Claire Valentine-Fossum, Adam McGovern, Austin Scarborough, Justin Somelofske & Kristin Zweifel, *Improving the Cybersecurity of the Electric Distribution Grid: Phase 2 Report – Pathways to Enhancing Grid Security* (Institute for Energy and the Environment, Vermont Law School, November 2019).

Mark James, Adam McGovern, Justin Somelofske, Claire Valentine-Fossum & Kristin Zweifel, *Improving the Cybersecurity of the Electric Distribution Grid: Phase 1 Report – Identifying Obstacles and Presenting Best Practices for Enhanced Grid Security* (Institute for Energy and the Environment, Vermont Law School, April 2019).

Anne Tazewell, Ron Townley, Tirence Horne, Laura Langham, Daniel Pate, Mark James, Joshua Randall, William S. Slocumb, Mark Griffin, Scott Ferguson, Daniel Kauffman, Alfred Ripley, and Ookie Ma, *Powering Energy Efficiency and Impacts: A Data-Driven Project Supporting Low-Income Households in Northeastern North Carolina* (North Carolina Clean Energy Technology Center and the Upper Coastal Plains Council of Governments, March 2019).

Mark James, Kevin B. Jones, Ashleigh H. Krick & Rikaela R. Greane, *How the RTO stakeholder process affects market efficiency* (R Street Institute, Oct. 2017).

Capturing the Sun: A Roadmap for Navigating Data-Access Challenges and Auto-Populating Solar Home Sales Listings, Lawrence Berkeley National Laboratory (2016), contributing author.

Book Chapters

Kevin B. Jones & Mark James, "Distributed renewables in the new economy: lessons from community solar in Vermont," *Law and Policy for a New Economy: Sustainable, Just, and Democratic* 189 (2017).

Online Articles and Blog Posts

Mark James and Richard Mroz, *Cyber-securing the grid: Best practices for state utility commissions*, UTILITY DIVE, (April 25, 2019), https://www.utilitydive.com/news/cyber securing-the-grid-best-practices-for-state-utility-commissions/553389/.

Scott Rowland and Mark James, *Vermont Law School Watch List 2018 – Solar Trade Tariffs*, VERMONT J. OF ENVTL. LAW, (Jan. 2018), http://vjel.vermontlaw.edu/topten/solar-trade-tariffs/.

Mark James and Kevin B. Jones, *Finding efficiencies: Updating RTO stakeholder governance to meet emerging challenges*, UTILITY DIVE, (Dec. 15, 2017) https://www.utilitydive.com/news/finding-efficiencies-updating-rto-stakeholder-governance-to-meet-emerging/513085/.

Documenting COP21 – Articles 13-15, July 1, 2016 (project documenting changes to Paris Agreement during course of negotiation sessions and identifying items left to future meetings to resolve), http://vlscop.vermontlaw.edu/4564-2/.

Vermont Law School Substantial & Sustained COP21 Observer Blog, http://vlscop.vermontlaw.edu/ (written as part of VLS COP21 Observer Delegation).

- *Paris Agreement and the Clean Air Act – New Tools for the EPA?* January 19, 2016
- *UNFCCC Negotiations – Coordinating the Dance*, December 4, 2015
- *Building Transparency and Accountability in a New Climate Agreement*, December 3, 2015
- *Understanding the Complex Organized Chaos of UNFCCC* Negotiations, December 2, 2015
- *Carbon Capture and Sequestration – A Cautionary Tale*, December 1, 2015
- *The Ying and the Yang of the Low Carbon Economy*, November 30, 2015
- *Carbon Tax – More of the Same or Energy Miracle*, October 22, 2015
- *New Government in Canada, New Direction on Climate Change*, October 20, 2015

- *Past as Prologue? Joint Implementation and the Future for Flexibility Mechanisms*, October 3, 2015

End of Coal Fired Generation in Ontario, Columbia Center for Climate Change Law Blog, January 22, 2014, http://blogs.law.columbia.edu/climatechange/2014/01/22/end-of-coal-fired-generation-in-ontario/.

PRESENTATIONS

Energy Assurance and Resilience: A Cross-Functional View, National Association of State Energy Officials and National Association of Regulatory Utility Commissioners Energy Security and Data Analysis Workshop, December 2, 2019.

Pathways to Improving Distribution Utility Cybersecurity, National Association of Regulatory Utility Commissioners – Electricity Committee, November 17, 2019.

Pathways to Improving Distribution Utility Cybersecurity, National Association of Regulatory Utility Commissioners – Critical Infrastructure Committee, November 16, 2019.

Cyber-Securing the Electric Grid: Barriers and Best Practices, Department of Homeland Security Region 1 and Federal Emergency Management Agency – NLE Cyber 2020 Workshop, May 30, 2019.

Research on the survey of state commission works on regulatory issues on ensuring resilience and cybersecurity investments, National Association of Regulatory Utility Commissioners – Electricity Committee, February 12, 2019.

Research on the survey of state commission works on regulatory issues on ensuring resilience and cybersecurity investments, National Association of Regulatory Utility Commissioners – Critical Infrastructure Committee, February 10, 2019.

Comparison and Analysis of Proposed Bills to Increase Maryland's RPS Commitments, Maryland Climate Coalition, September 20, 2018.

NEEP HELIX: Privacy Considerations When Sharing Home Energy Information, 2018 NEEP HELIX Regional Residential Labeling Meeting, June 26, 2018.

PEEIF: Facilitating Access to Confidential Information from Federally Funded Low-Income Energy Efficiency Programs, Webinar, June 19 and June 21, 2018.

PEEIF: Using Technology to Address Low-Income Energy Burdens: A North Carolina Pilot Project, 2018 National Environmental Justice Conference, April 27, 2018.

Creating Additionality in City-Driven Renewable Energy Pledges, 2018 AALS Natural Resources and Energy Law Panel, January 3, 2018.

NEEP HELIX: Database Access Protocols, NEEP HELIX Year 2 Virtual Summit, November 15, 2017.

Me and My Utility Data: Data Privacy in an Interconnected World, 2017 Vermont Journal of Environmental Law Symposium, October 20, 2017.

Privacy and Governance Issues in Energy Efficiency Databases, NEEP-HELIX Year One Summit¸ November 10, 2016.

Planning for the Sun to Come Up: Examining the Root Causes and Future Impacts of California and Nevada's Divergent Approaches to Net Metering, 8th Annual University of San Diego Climate & Energy Law Symposium, November 4, 2016.

Emerging Litigation in Water Law - Des Moines Water Works, 2015 Vermont Journal of Environmental Law Conference "TMDLs 2.0," October 23, 2015.

Public Utility Commissions and Public Interest Litigation: How Citizen Action Can Advance and Protect the Renewable Energy Economy, Public Interest Environmental Law Conference, Eugene OR, March 6, 2015.

OTHER MEDIA APPEARANCES

Grid Geeks: RTO Governance – Is It Broken and Can It Be Fixed? GOOD GRID (Oct. 17, 2017), http://www.goodgrid.net/blog/2017/10/17/grid-geeks-podcast-s2e4.

James Rundle, Wall Street Journal, *Utility Companies Prepare for AI-Powered Cyber Threats*, November 22, 2019, https://www.wsj.com/articles/utility-companies-prepare-for-ai-powered-cyber-threats-11574418600.

ACADEMIC GRANTS

Northeast Energy Efficiency Partnership - Home Energy Labelling Information Exchange, May 2016 – June 2019

- Created statement of work and negotiated final sub-contract on DOE funded project to integrate home energy efficiency scores into Multiple Listing Services.
- Consulted on the development of database housing and sharing home energy data from multiple states.

Upper Coastal Plains Council of Governments - City Leap, August 2017 – December 2018

- Drafted grant proposal with project partners to secure $477,000 in DOE-funding for two-year project using energy consumption data to target home energy efficiency programs in low-income neighborhoods in eastern North Carolina.

SunShot Plug & Play for American Homes, August 2014 – May 2016

- Managed multi-year contract as sub-grantee to Fraunhofer Center for Sustainable Energy DOE-funded SunShot grant. Developed statements of work, negotiated annual contract renewal, and drafted annual compliance reports.

Lawrence Berkeley National Laboratory PV AutoPop Project, April 2016 – November 2016

- Developed statement of work and sub-contracting documents on DOE-funded project evaluating data privacy issues arising from auto-population of rooftop solar system data into Multiple Listing Services.

CONTRACTED WORK

Maryland Climate Coalition RPS Bill Analysis, May 2018 – September 2018

- Negotiated and developed project framework to prepare an internal report for Maryland Climate Coalition on two proposed bills to increase Maryland's RPS obligations.
- Completed secondary negotiation to add an in-person presentation.

Protect Our Power – Distribution Utility Cybersecurity and Grid Resilience, June 2018 – December 2019

- Developed statement of work, objectives, and deliverables schedule for a project assessing how to increase utility investment in grid resilience.
- Executed multi-phase research program on distribution utility cybersecurity.

SERVICE

Vermont Law School Institute of Energy and the Environment Hiring Committee, member, 2015 – 2019

American Association of Law Schools (AALS) Faculty Representative, 2018 – 2019

AALS Natural Resources, Environment and Energy Section, board member, 2017 – 2019

EDUCATION

Vermont Law School, LL.M in Energy Law, 2016 *summa cum laude*

- *Global Energy LL.M Fellow*, Institute for Energy and the Environment
- *Team Leader*, SunShot Plug and Play Solar PV for American Homes Project Delegate, Vermont Law School 2015 Paris Conference of Parties Delegation
- *Member*, Vermont Law School COP 21 Working Group

University of Ottawa Faculty of Law, English Common Law J.D., 2014 *cum laude*

- *Co-founder,* Canadian Association of Environmental Law Societies (CAELS)
    - Chair, CAELS Conference – "Making Waves," 2014
    - Co-chair, CAELS Conference – "Thinking Big and Small," 2013
- *Research Associate,* Professors N. Chalifour, L. Collins, and H. MacLeod-Kilmurray, 2012 – 2014
    - Prepared memorandums on carbon pricing programs, environmental justice, and the Canadian Charter of Rights and Freedoms, and sustainable agricultural policies and legislation.
    - Updated *The Canadian Brownfields Manual*.
    - Wrote case studies for *The Canadian Law of Toxic Torts.*
- *Legal Intern,* Columbia Center for Climate Change, Columbia Law School, New York City, NY, January 2014
    - Wrote report on using securities laws to encourage public corporations to disclose climate change liabilities to potential investors.

University of Toronto, B.Sc. Ecology, 1999 *with distinction*

BAR ADMISSION: Vermont

Attachment MJ-2:

Interrogatory Responses of

Virginia Electric and Power Company

Virginia Electric and Power Company
Case No. PUR-2020-00156
Virginia Energy Efficiency Council
First Set

The following response to Question No. 5 of the First Set of Interrogatories and Requests for Production of Documents propounded by Virginia Energy Efficiency Council and received on December 10, 2020, was prepared by or under the supervision of:

Dan Feng
Senior Consultant
DNV GL

Question No. 5

Reference Appendix B. The flowchart describes a process for updating the STEP Manual wherein the Mid-Atlantic TRM is referenced directly for measures it includes. Other TRMs are used where a measure cannot be found in the Mid-Atlantic TRM. Please state what proportion of measures use the Mid-Atlantic TRM versus another TRM.

Response:

Roughly 70% of the measures in the STEP Manual version 10 uses the 2019 Mid-Atlantic TRM version as its primary reference. The remaining approximately 30% of the measures use an alternative TRM because they were not included in the 2019 Mid-Atlantic TRM version.

Virginia Electric and Power Company
Case No. PUR-2020-00156
Virginia Energy Efficiency Council
Second Set

The following response to Question No. 8 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia Energy Efficiency Council and received on February 25, 2021, was prepared by or under the supervision of:

Dan Feng
Senior Consultant
DNV

As it pertains to the calculation of cost/benefit scores, the following response to Question No. 8 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia Energy Efficiency Council and received on February 25, 2021, was prepared by or under the supervision of:

Edmund J. Hall
Energy Market Strategic Advisor
Dominion Energy Services, Inc.

Question No. 8

Please refer to the Commission's August 28, 2020 Order Initiating Proceeding, pages 4-5, providing a list of programs and measures to be considered in this proceeding. For each program and/or measure, identify whether the Company is using "deemed values" or "partially deemed values" in EM&V calculations of savings and/or establishing cost benefit test scores.

Response:

DNV GL, the Company's third party consultant for EM&V matters, uses partially deemed values for all measures and programs in its EM&V calculations of savings, for the programs and measures listed on pages 4-5 of the Commission's August 28, 2020 Order Initiating Proceeding; with the exception of smart strip measure in the Non-residential Prescriptive Program. No smart strips have been installed by any program participants thus far, and no deemed savings have been applied.

DNV GL defined "deemed values" and "partially deemed values" as follows (see page 7 of DNV GL's "EM&V Background and Information" report, filed in response to the Commission's August 28, 2020 Order Initiating Proceeding).

"Deemed savings" values may be either:

- Fully deemed savings values—values that are fixed regardless of any site- or project-specific conditions, variables, or factors, or
- Partially deemed savings values—values determined with algorithms, which have as inputs some combination of (1) deemed variables or factors and (2) site- or project-specific conditions, variables, and factors. Option A of the International Performance Measurement and Verification Protocol ("IPMVP") results in partially deemed savings values.

The Company uses partially deemed values supplied from DNV GL as an input in calculating going-forward cost/benefit test scores.

Virginia Electric and Power Company
Case No. PUR-2020-00156
Virginia Energy Efficiency Council
Second Set

The following response to Question No. 9 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia Energy Efficiency Council and received on February 25, 2021, was prepared by or under the supervision of:

Dan Feng
Senior Consultant
DNV

The following response to Question No. 9 of the Second Set of Interrogatories and Requests for Production of Documents propounded by Virginia Energy Efficiency Council and received on February 25, 2021, was prepared by or under the supervision of:

Edmund J. Hall
Energy Market Strategic Advisor
Dominion Energy Services, Inc.

Question No. 9

Please provide the Company's rationales for when it is appropriate to use "deemed values" versus when it is appropriate to use "partially deemed values."

For the purposes of Question 8 and 9:

- "Deemed values" means pre-determined, validated estimates of energy and/or peak demand savings attributable to energy efficiency measures or programs.
- "Partially deemed values" means pre-determined, validated estimates of one or more (but not all) of the variables necessary for the calculation of energy and/or peak demand savings.

Response:

DNV GL defers to partially deemed values as much as reasonable, which is consistent with the source technical reference manual's methodology for savings calculations.

The Company does not determine when it is appropriate to use deemed or partially deemed values. The Company relies on the EM&V provider, DNV GL, to make that determination and uses those values as appropriate in the cost/benefit calculations.

Virginia Electric and Power Company
Case No. PUR-2020-00156
Virginia State Corporation Commission Staff
Staff Set 1

The following response to Question No. 4 of the First Set of Interrogatories and Requests for Production of Documents Propounded by the Virginia State Corporation Commission Staff received on December 2, 2020, was prepared by or under the supervision of:

Dan Feng
Senior Consultant
DNV GL

Question No. 4

Refer to Section 2.2.2 of the Report, page 20, specifically, "For measures with particularly uncertain deemed savings estimates, we may conduct impact evaluations…after the first year and annually, assuming the program budget is sufficient to warrant that level of evaluation." Please provide the following:

(a). Identify the specific level of uncertainty that would qualify a deemed savings estimate as "particularly uncertain." Absent a hard value or values, please provide a detailed narrative explanation of what would qualify a deemed savings estimate as "particularly uncertain."

(b). Identify the specific budget amount or amounts, including ratio or ratios of evaluation costs to total budget, savings, or other metric, that would be "sufficient to warrant that level of evaluation." Absent a specific dollar amount, provide a detailed narrative explanation of budget amount or amounts that would be "sufficient to warrant that level of evaluation."

Response:

(a) There is not a specific statistical value of uncertainty used to specify the level of uncertainty that would designate a deemed savings estimate to be "particularly uncertain." However, there are industry accepted guidelines using qualitative uncertainty indicators to inform decision making.

Deemed savings estimates or program estimates that are generated from deemed equations may warrant an increase in certainty gained from a higher level of EM&V activity if it meets one or more of the following criteria, which are considered in conjunction with the budgetary criteria described in the response to Staff Set 1-4(b).

- If a program and/or program measure is relatively new with no evaluation history on which to build deemed equations. For example, electric vehicles

charger rebate programs are new, evaluations are limited in the United States, and deemed equations have not yet been published in TRMs, Mid-Atlantic or otherwise. Lighting replacements or HVAC upgrades on the other hand, are mature measures that have produced reliable savings for decades.

- If the evaluation history is limited to a geographical region, customer segment, or application that is different than local conditions or implementation approach.

- If an individual measure has a high contribution to program savings (e.g., greater than 10%). In this case the same proportional uncertainty for the measure means a greater contribution to program-level savings uncertainty.

- If the program savings has a high contribution to overall portfolio savings (e.g., greater than 10%). In this case the same proportional uncertainty for the program means a greater contribution to portfolio-level savings uncertainty.

- For some direct and indirect measures, savings persistence is a potential issue. Programs in this category may undergo more frequent evaluations and do not rely on deemed savings after the first year. Home energy reports or behavior programs undergo annual evaluations in most jurisdictions for this reason. To the extent that savings result from reversible behaviors such as set-point changes rather than installation of physical measures, the savings may not persist beyond the time frame of the reports or other behavioral influence.

- Regulatory requirements such as all programs shall be evaluated once every three years.

(b) The decision to evaluate a program is typically not based on program budget alone, but made in conjunction with one or more of the factors listed above. A program budget that is sufficient to warrant conducting an impact evaluation follows one or more of the following criteria:

- As a rule of thumb, the scope of an evaluation is informed by the program budget. EM&V budgets typically ranges from 2 to 7% of the total program or portfolio budget. In some cases, economies of scale can be gained by including multiple programs to keep EM&V budgets within range.[3]

- The future expectations for a technology or program. A small active program that has the potential to grow substantially in the future might merit a higher than average budget relative to its current size. Conversely, a large active program that is being discontinued might not be worth investing a lot of EM&V resources.

- The evaluation costs should not change the program cost-effectiveness results to render the program not cost-effective.

[3] See DNV GL Report, Section 2.2.5 Balancing evaluation risk and value with costs, p.38.

- Evaluations have been identified as high priority by Dominion Energy Virginia, DNV GL and/or by the Commission and its Staff.

Virginia Electric and Power Company
Case No. PUR-2020-00156
Virginia State Corporation Commission Staff
Second Set

The following response to Question No. 13 of the Second Set of Interrogatories and Requests for Production of Documents propounded by the Staff of the State Corporation Commission and received on December 15, 2020, was prepared by or under the supervision of:

Dan Feng
Senior Consultant
DNV GL

Question No. 13

When using deemed values from technical reference manuals ("TRMs") or other sources (*e.g.* studies, surveys, etc.), does the Company or its evaluation, measurement, and verification ("EM&V") vendor fully review the original source documentation or study from which the TRM or other source data is sourced, or does the Company or EM&V vendor simply review the information as presented in the TRM?

Response:

DNV GL will attempt to review any sources that are referenced by the source TRM; however, in some cases, original sources may not be available for DNV GL to review because the documents are based on impact evaluations or materials that are not publicly available.

Virginia Electric and Power Company
Case No. PUR-2020-00156
Virginia State Corporation Commission Staff
Fourth Set

The following response to Question No. 28 of the Fourth Set of Interrogatories and Requests for Production of Documents propounded by the Staff of the State Corporation Commission and received on February 1, 2021, was prepared by or under the supervision of:

Dan Feng
Senior Consultant
DNV GL

Question No. 28

Please refer to the Commission's August 28, 2020 Order Initiating Proceeding, specifically pages 4-5. For each program and/or measure, identify whether the Company is using the "Deemed Savings Approach" or the "Evaluated Savings Approach" referenced in Appendices D and E of the EM&V Background and Information Report to evaluate, measure, and verify the savings estimates reported.

Response:

Please see the last two columns in the table that follows for a list of the programs that will be using the "Deemed Savings Approach" or the "Evaluated Savings Approach" described in Appendices D and E of the EM&V Background Information Report. This table adds to Table 2-3. "Primary impact evaluation methods to measure net energy and demand savings," from the same report on pages 22–23.

For the DSM Phase VII programs that did not have participation in 2019, the evaluated savings approach was not applicable, as there was insufficient program data to conduct impact evaluations for those programs. The following is a list of those specific programs:

- Residential Home Energy Assessment,
- Non-residential Lighting Systems & Controls,
- Non-residential Heating and Cooling Efficiency,
- Non-residential Window Film,
- Non-residential Office, and
- Non-residential Small Manufacturing.

Likewise, the DSM Phase VIII programs are in the process of being launched at the beginning of 2021. The evaluated savings approach is not applicable to those programs as there is insufficient program data to conduct impact evaluations for those programs.

DSM Phase	Program	Impact Evaluation Method	Net-to-Gross Surveys Required?	Preference Order for Collection of EM&V Data (1, 2, 3)	Deemed Savings Approach Applied or In-progress	Evaluated Savings Approach Applied or In-progress
I	Residential AC Cycling Program (AC, DSM 1)	Whole-premise, hourly load analysis	No	1 – customer specific		x
II	Non-residential Distributed Generation (DG, DSM 2)	Whole-premise, hourly load analysis	No	1 – customer specific		x
IV	Residential Income & Age Qualifying Home Improvement Program (EAL3, DSM 4)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	
V	Non-residential Small Business Improvement Program (SBIP, DSM 5)	Measurement and verification (metering)	Yes	1 – customer specific	x	
VI	Non-residential Prescriptive Program (CNRP, DSM 6)	Measurement and verification (metering)	Yes	1 – customer specific	x	x[1]
VII	Non-residential Heating and Cooling Efficiency Program (CHV3, DSM 7)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[2]
	Non-residential Lighting Systems & Controls Program (CLT3, DSM 7)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[2]
	Non-residential Office Program (CTSO, DSM 7)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[2]
	Non-residential Small Manufacturing	Measurement and	Yes	1 – customer specific	x	N/A[2]

[1] Impact evaluation in progress.
[2] No 2019 program participation.

DSM Phase	Program	Impact Evaluation Method	Net-to-Gross Surveys Required?	Preference Order for Collection of EM&V Data (1, 2, 3)	Deemed Savings Approach Applied or In-progress	Evaluated Savings Approach Applied or In-progress
	Program (CTSM, DSM 7)	verification (metering)				
	Non-residential Window Film Program Measures (CSW2, DSM 7)	Measure verification with deemed calculation	Yes	1 – customer specific	x	N/A[2]
	Residential Appliance Recycling Program (RAR2, DSM 7)	Measurement and verification (metering)	Yes	1 – customer specific	x	
	Residential Efficient Products Marketplace Program (REEC, DSM 7)	Measure verification with deemed calculation	Yes	1 – customer specific	x	x[1]
	Residential Home Energy Assessment Program (RTHO, DSM 7)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	N/A[2]
VIII	Non-residential Heating & Cooling HB 2789 Program (CHVLI, DSM 8)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	N/A[3]
	Non-residential Midstream Energy Efficient Products (CEEP, DSM 8)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[3]
	Non-residential Multifamily Program (CMFP/RMFP, DSM 8)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	N/A[3]
	Non-residential New Construction Program (CNCR, DSM 8)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[3]

[3] Program launching in early 2021

DSM Phase	Program	Impact Evaluation Method	Net-to-Gross Surveys Required?	Preference Order for Collection of EM&V Data (1, 2, 3)	Deemed Savings Approach Applied or In-progress	Evaluated Savings Approach Applied or In-progress
	Non-residential Small Business Improvement Enhanced Program (SBI2, DSM 8)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[3]
	Residential Customer Engagement Program (RCEB, DSM 8)	Whole-premise, monthly consumption data analysis	No	1 – customer specific	x	N/A[3]
	Residential Electric Vehicle Demand Response/Residential Electric Vehicle Peak Shaving Program (REVDR/REVPS, DSM 8)	Whole-premise, hourly consumption data analysis	No	1 – customer specific	x	N/A[3]
	Residential Electric Vehicle Energy Efficiency Program (REVEE, DSM 8)	Electric vehicle charging data	Yes	1 – customer specific	x	N/A[3]
	Residential Energy Efficiency Kits Program (RKTS, DSM 8)	Measure verification with deemed calculation	Yes	1 – customer specific	x	N/A[3]
	Residential HB 2789 HVAC Component Program (RHVC, DSM 8)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	N/A[3]
	Residential Home Retrofit Program (RHRF, DSM 8)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	N/A[3]
	Residential Manufactured Housing Program (RMHP, DSM 8)	Whole-premise, monthly	Yes	1 – customer specific	x	N/A[3]

DSM Phase	Program	Impact Evaluation Method	Net-to-Gross Surveys Required?	Preference Order for Collection of EM&V Data (1, 2, 3)	Deemed Savings Approach Applied or In-progress	Evaluated Savings Approach Applied or In-progress
		consumption data analysis				
	Residential Multifamily Program (RMFP, DSM 8)	Whole-premise, monthly consumption data analysis	Yes	1 – customer specific	x	N/A[3]
	Residential New Construction Program (RNCR, DSM 8)	Measurement and verification (metering)	Yes	1 – customer specific	x	N/A[3]
	Residential Smart Thermostat Behavioral Energy Efficiency Program (RTEB, DSM 8)	Whole-premise, hourly and monthly consumption data analysis	Yes	1 – customer specific		N/A[3]
	Residential Smart Thermostat Demand Reduction Program (RTDR, DSM 8)	Whole-premise, hourly consumption data analysis	No	1 – customer specific	x	N/A[3]
	Residential Smart Thermostat Energy Efficiency Program (RTEE, DSM 8)	Whole-premise, monthly consumption analysis	Yes	1 – customer specific	x	N/A[3]

Attachment MJ-3:

EM&V Data Collection from

DNV GL Reports

DNV·GL

Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy)

Case No. PUR-2018-00168 (Virginia)
Docket No. E-22 Sub 577 (North Carolina)
VOLUME 1 OF 4
PUBLIC VERSION

Date: May 15, 2020
Prepared by DNV GL Energy Insights USA, Inc. (DNV GL)

Table 1-2. Annualized Program Progress for Energy Efficiency Programs (Cumulative from Program Start through December 31, 2019) in Virginia (Active Programs)

Program	Expenditures	Gross Participants	Total Annual Net Annualized Energy Savings (kWh/year)	Cumulative Net Energy Savings (kWh)	Lifetime Net Energy Savings (kWh)
Residential Programs					
Income and Age Qualifying Home Improvement - DSM Phase IV					
Actual	$18,948,312	22,934	7,114,432	18,869,047	101,123,306
Planned	$20,125,502	15,756	4,478,008		
Percentage Toward Planned	94%	146%	159%		
Appliance Recycling - DSM Phase VII[2]					
Actual	$384,884	1,579	753,308	62,776	5,931,373
Planned	$1,094,670	5,225	644,850		
Percentage Toward Planned	35%	30%	117%		
Efficient Products Marketplace - DSM Phase VII[3]					
Actual	$4,636,049	2,507,265	51,105,293	4,258,774	836,612,694
Planned	$6,860,889	2,972,475	16,098,286		
Percentage Toward Planned	68%	84%	317%		
Home Energy Assessment					
Actual	$715,145	0	0	0	0
Planned	$2,326,635	11,030	1,073,361		
Percentage Toward Planned	31%	0%	0%		
Non-residential Programs					
Lighting Systems and Controls - DSM Phase III					
Actual	$34,942,609	4,501	195,738,057	537,950,026	1,761,642,509
Planned	$25,410,941	7,083	137,480,402		
Percentage Toward Planned	138%	64%	142%		
Lighting Systems and Controls - DSM Phase VII					
Actual	$592,373	0	0	0	0
Planned	$1,633,867	333	1,445,890		
Percentage Toward Planned	36%	0%	0%		
Heating and Cooling Efficiency - DSM Phase III					
Actual	$7,308,041	406	32,835,550	98,940,223	492,533,254
Planned	$9,134,139	3,393	106,207,832		
Percentage Toward Planned	80%	12%	31%		

[2] Participation is measured by units recycled.

[3] Participation is measured by incentivized unit, i.e. lamp, fixture, or appliance.

Program	Expenditures	Gross Participants	Total Annual Net Annualized Energy Savings (kWh/year)	Cumulative Net Energy Savings (kWh)	Lifetime Net Energy Savings (kWh)
Heating and Cooling Efficiency - DSM Phase VII					
Actual	$342,194	0	0	0	0
Planned	$1,130,793	350	1,014,615		
Percentage Toward Planned	30%	0%	0%		
Window Film - DSM Phase III					
Actual	$2,236,675	476,378	5,287,728	21,399,185	52,877,279
Planned	$7,878,071	4,788,181	43,944,759		
Percentage Toward Planned	28%	10%	12%		
Window Film - DSM Phase VII					
Actual	$192,146	0	0	0	0
Planned	$317,588	68,400	170,812		
Percentage Toward Planned	61%	0%	0%		
Small Business Improvement - DSM Phase V					
Actual	$11,354,171	2,017	39,993,147	65,609,192	559,904,063
Planned	$21,962,738	2,559	21,114,692		
Percentage Toward Planned	52%	79%	189%		
Prescriptive - DSM Phase VI					
Actual	$13,370,846	1,535	9,713,643	11,815,917	61,519,741
Planned	$16,335,545	1,120	34,471,800		
Percentage Toward Planned	82%	137%	28%[4]		
Small Manufacturing - DSM Phase VII					
Actual	$367,297	0	0	0	0
Planned	$862,936	35	351,539		
Percentage Toward Planned	43%	0%	0%		
Office - DSM Phase VII					
Actual	$405,507	0	0	0	0
Planned	$832,726	42	594,427		
Percentage Toward Planned	49%	0%	0%		
Portfolio Total[5]					
Actual	$95,796,251	31,393	342,541,158	758,905,140	3,872,144,219

[4] The Company is reviewing several aspects of the deemed energy savings used in the EM&V results and going-forward cost-benefit analysis as they relate to the filed program design for specific measures, including the AC Tune-up and Duct Testing & Sealing. The Company is also considering conducting additional EM&V studies.

[5] Gross participants total excludes Appliance Recycling, Efficient Products Marketplace, Window Film (DSM Phase III and VII) because they are measured by units recycled, units incentivized, and square feet installed, respectively, rather than customers enrolled.

Program	Expenditures	Gross Participants	Total Annual Net Annualized Energy Savings (kWh/year)	Cumulative Net Energy Savings (kWh)	Lifetime Net Energy Savings (kWh)
Planned	$115,907,040	41,701	369,091,272		
Percentage Toward Planned	83%	75%	93%		

Table 4-12. Residential Appliance Recycling Indicators (2019)

Category	Item	2019
Operations and Management Costs ($)	Direct Rebate	[redacted]
	Direct Implementation	[redacted]
	Direct EM&V	[redacted]
	Indirect Other (Administrative)	$13,009
Total Costs ($)	Total[36]	$384,884
	Planned	$1,094,670
	Variance	-$709,785
	Annual % of Planned	35%
Participants	Total (Gross)	1,579
	Planned (Gross)	5,225
	Variance	-3,646
	Annual % of Planned (Gross)	30%
Installed Energy Savings (kWh/year)	Total Gross Deemed Savings	1,255,513
	Realization Rate Adjustment (100%)	0
	Adjusted Gross Savings	1,255,513
	Net-to-Gross Adjustment (60%)	-502,205
	Net Adjusted Savings	753,308
	Planned Savings (Net)	644,850
	Annual % Toward Planned Savings (Net)	117%
	Avg. Savings per Participant (Gross)	795
	Avg. Savings per Participant (Net)	477
Installed Demand Reduction (kW)	Total Gross Deemed Demand	188
	Realization Rate Adjustment (100%)	0.0
	Adjusted Gross Demand	188
	Net-to-Gross Adjustment (60%)	-75
	Net Adjusted Demand	113
	Planned Demand (Net)	0.0
	Annual % Toward Planned Demand (Net)	N/A
	Avg. Peak Demand per Participant (Gross)	0.12
	Avg. Demand per Participant (Net)	0.07
Program Performance	Annual $Admin. per Participant (Gross)	$8
	Annual $Admin. per kWh/year (Gross)	$0

[36] Program expenditures include operations and maintenance, capital spending, and common costs. Operations and maintenance spending are separated by direct rebate, direct implementation, direct EM&V, other indirect or administrative spending. The expenditures reported in this document do not include the Company's margins.

Category	Item	2019
	Annual $Admin. per kW (Gross)	$69
	Annual $EM&V per Total Costs ($)	7%
	Annual $Rebate per Participant (Gross)	$20

The following table (Table 4-13) provides gross and net annualized energy savings and demand reduction for program year 2019, in Virginia, by measure type.

Table 4-13. Virginia Residential Appliance Recycling Program Measure-Level Performance Indicators (2019)

Program	Realization Rate		Net to Gross	
Residential Appliance Recycling Program – Virginia (DSM VII)	kWh/year	kW	kWh/year	kW
	100%	100%	60%	60%
Measure	**kWh/year**		**kW/year**	
	Gross	Net	Gross	Net
Refrigerator	947,137	568,282	142	85
Freezer	308,376	185,025	46	28
Total	1,255,513	753,308	188	113

4.3.3.2 Additional Virginia Program Data

Figure 4-26 through Figure 4-28 show the Virginia program's participation, gross annualized energy savings, and average gross annualized energy savings per participant (for participants who installed the measure in the respective years) by measure type. Note that the definition of participants for Residential Appliance Recycling Program is the number of refrigerators and freezers recycled.

Note participation in these "by measure" charts are the count of new unique customers in each year. This differs from participation count presented in the Key Virginia Program Data and Key North Carolina Program Data sections above, where a participant is only counted once, the first time they receive a rebate. After the first time the participant enrolls in a program, future applications are not counted as a new participant, though their savings are counted.

DNV·GL

Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy)

Case No. PUR-2018-00168 (Virginia)
Docket No. E-22 Sub 577 (North Carolina)
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Prepared by DNV GL Energy Insights USA, Inc. (DNV GL)

Appendix C. Program to Date Gross Energy Savings Tables for Virginia and North Carolina Programs 2010-2019

Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

PROGRAM: Residential Appliance Recycling Program
DSM Phase VII Program
Type: Energy Efficiency
Program Measure Life: 8 years (8 years, 0 months)
Current Year: 2019

Table 1		Participation										
		Program Participants										
		VA					NC					System
Month	Year	VA Monthly New [A]	VA Monthly Retired [-A retired]	VA Cum. for IRP (New + Retired) [E] = Σ[A] + Σ[-A retired]	VA Rate Reset Adj. [B]	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [F] =Σ[A] + Σ[-A retired] + B	NC Monthly New [C]	NC Monthly Retired [-C retired]	NC Cum. for IRP (New + Retired) [G] = Σ[C] + Σ[-C retired]	NC Rate Reset Adj. [D]	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [H] = Σ[C] + Σ[-C retired] + D	System Cum for IRP E+G
Jan	2019	0		0		0	0		0		0	0
Feb	2019	0		0		0	0		0		0	0
Mar	2019	0		0		0	0		0		0	0
Apr	2019	0		0		0	0		0		0	0
May	2019	0		0		0	0		0		0	0
June	2019	0		0		0	0		0		0	0
Jul	2019	0		0		0	0		0	0	0	0
Aug	2019	0		0		0	0		0	0	0	0
Sept	2019	252		252		252	0		0	0	0	252
Oct	2019	656		908		908	0		0	0	0	908
Nov	2019	424		1,332		1,332	0		0	0	0	1,332
Dec	2019	247		1,579		1,579	0		0		0	1,579
Jan	2020	0		1,579		1,579	0		0		0	1,579
Feb	2020	0		1,579		1,579	0		0		0	1,579
Mar	2020	0		1,579		1,579	0		0		0	1,579
Apr	2020	0		1,579		1,579	0		0		0	1,579
May	2020	0		1,579		1,579	0		0		0	1,579
June	2020	0		1,579		1,579	0		0		0	1,579
Jul	2020	0		1,579		1,579	0		0		0	1,579
Aug	2020	0		1,579		1,579	0		0		0	1,579
Sept	2020	0		1,579		1,579	0		0		0	1,579
Oct	2020	0		1,579		1,579	0		0		0	1,579
Nov	2020	0		1,579		1,579	0		0		0	1,579
Dec	2020	0		1,579		1,579	0		0		0	1,579
Jan	2021	0		1,579		1,579	0		0		0	1,579
Feb	2021	0		1,579		1,579	0		0		0	1,579
Mar	2021	0		1,579		1,579	0		0		0	1,579
Apr	2021	0		1,579		1,579	0		0		0	1,579
May	2021	0		1,579		1,579	0		0		0	1,579
June	2021	0		1,579		1,579	0		0		0	1,579
Jul	2021	0		1,579		1,579	0		0		0	1,579
Aug	2021	0		1,579		1,579	0		0		0	1,579
Sept	2021	0		1,579		1,579	0		0		0	1,579
Oct	2021	0		1,579		1,579	0		0		0	1,579
Nov	2021	0		1,579		1,579	0		0		0	1,579
Dec	2021	0		1,579		1,579	0		0		0	1,579
Jan	2022	0		1,579		1,579	0		0		0	1,579
Feb	2022	0		1,579		1,579	0		0		0	1,579
Mar	2022	0		1,579		1,579	0		0		0	1,579
Apr	2022	0		1,579		1,579	0		0		0	1,579
May	2022	0		1,579		1,579	0		0		0	1,579
June	2022	0		1,579		1,579	0		0		0	1,579
Jul	2022	0		1,579		1,579	0		0		0	1,579
Aug	2022	0		1,579		1,579	0		0		0	1,579
Sept	2022	0		1,579		1,579	0		0		0	1,579
Oct	2022	0		1,579		1,579	0		0		0	1,579
Nov	2022	0		1,579		1,579	0		0		0	1,579
Dec	2022	0		1,579		1,579	0		0		0	1,579
Jan	2023	0		1,579		1,579	0		0		0	1,579
Feb	2023	0		1,579		1,579	0		0		0	1,579
Mar	2023	0		1,579		1,579	0		0		0	1,579
Apr	2023	0		1,579		1,579	0		0		0	1,579
May	2023	0		1,579		1,579	0		0		0	1,579
June	2023	0		1,579		1,579	0		0		0	1,579
Jul	2023	0		1,579		1,579	0		0		0	1,579
Aug	2023	0		1,579		1,579	0		0		0	1,579
Sept	2023	0		1,579		1,579	0		0		0	1,579
Oct	2023	0		1,579		1,579	0		0		0	1,579
Nov	2023	0		1,579		1,579	0		0		0	1,579
Dec	2023	0		1,579		1,579	0		0		0	1,579

Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Energy Savings											
		Gross kWh											
		VA					NC					System	
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP
Jan	2019	0		0		0	0		0		0	0
Feb	2019	0		0		0	0		0		0	0
Mar	2019	0		0		0	0		0		0	0
Apr	2019	0		0		0	0		0		0	0
May	2019	0		0		0	0		0		0	0
June	2019	0		0		0	0		0		0	0
Jul	2019	0		0		0	0		0	0	0	0
Aug	2019	0		0		0	0		0	0	0	0
Sept	2019	15,457		15,457		15,457	0		0	0	0	15,457
Oct	2019	40,393		55,850		55,850	0		0	0	0	55,850
Nov	2019	31,325		87,175		87,175	0		0	0	0	87,175
Dec	2019	17,451		104,626		104,626	0		0		0	104,626
Jan	2020	0		104,626		104,626	0		0		0	104,626
Feb	2020	0		104,626		104,626	0		0		0	104,626
Mar	2020	0		104,626		104,626	0		0		0	104,626
Apr	2020	0		104,626		104,626	0		0		0	104,626
May	2020	0		104,626		104,626	0		0		0	104,626
June	2020	0		104,626		104,626	0		0		0	104,626
Jul	2020	0		104,626		104,626	0		0		0	104,626
Aug	2020	0		104,626		104,626	0		0		0	104,626
Sept	2020	0		104,626		104,626	0		0		0	104,626
Oct	2020	0		104,626		104,626	0		0		0	104,626
Nov	2020	0		104,626		104,626	0		0		0	104,626
Dec	2020	0		104,626		104,626	0		0		0	104,626
Jan	2021	0		104,626		104,626	0		0		0	104,626
Feb	2021	0		104,626		104,626	0		0		0	104,626
Mar	2021	0		104,626		104,626	0		0		0	104,626
Apr	2021	0		104,626		104,626	0		0		0	104,626
May	2021	0		104,626		104,626	0		0		0	104,626
June	2021	0		104,626		104,626	0		0		0	104,626
Jul	2021	0		104,626		104,626	0		0		0	104,626
Aug	2021	0		104,626		104,626	0		0		0	104,626
Sept	2021	0		104,626		104,626	0		0		0	104,626
Oct	2021	0		104,626		104,626	0		0		0	104,626
Nov	2021	0		104,626		104,626	0		0		0	104,626
Dec	2021	0		104,626		104,626	0		0		0	104,626
Jan	2022	0		104,626		104,626	0		0		0	104,626
Feb	2022	0		104,626		104,626	0		0		0	104,626
Mar	2022	0		104,626		104,626	0		0		0	104,626
Apr	2022	0		104,626		104,626	0		0		0	104,626
May	2022	0		104,626		104,626	0		0		0	104,626
June	2022	0		104,626		104,626	0		0		0	104,626
Jul	2022	0		104,626		104,626	0		0		0	104,626
Aug	2022	0		104,626		104,626	0		0		0	104,626
Sept	2022	0		104,626		104,626	0		0		0	104,626
Oct	2022	0		104,626		104,626	0		0		0	104,626
Nov	2022	0		104,626		104,626	0		0		0	104,626
Dec	2022	0		104,626		104,626	0		0		0	104,626
Jan	2023	0		104,626		104,626	0		0		0	104,626
Feb	2023	0		104,626		104,626	0		0		0	104,626
Mar	2023	0		104,626		104,626	0		0		0	104,626
Apr	2023	0		104,626		104,626	0		0		0	104,626
May	2023	0		104,626		104,626	0		0		0	104,626
June	2023	0		104,626		104,626	0		0		0	104,626
Jul	2023	0		104,626		104,626	0		0		0	104,626
Aug	2023	0		104,626		104,626	0		0		0	104,626
Sept	2023	0		104,626		104,626	0		0		0	104,626
Oct	2023	0		104,626		104,626	0		0		0	104,626
Nov	2023	0		104,626		104,626	0		0		0	104,626
Dec	2023	0		104,626		104,626	0		0		0	104,626

Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Capacity Savings											Energy Savings / Participant			Capacity Savings / Participant		
		Gross kW											Gross kWh/Participant for IRP			Gross kW/Participant for IRP		
		VA					NC					System						
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New+Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	VA	NC	System	VA	NC	System
Jan	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Feb	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Mar	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Apr	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
May	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
June	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Jul	2019	0		0		0	0		0	0	0	0	-	-	-	-	-	-
Aug	2019	0		0		0	0		0	0	0	0	-	-	-	-	-	-
Sept	2019	28		28		28	0		0	0	0	28	61	-	61	0.11	-	0.11
Oct	2019	73		100		100	0		0	0	0	100	62	-	62	0.11	-	0.11
Nov	2019	56		157		157	0		0	0	0	157	65	-	65	0.12	-	0.12
Dec	2019	31		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jan	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Feb	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Mar	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Apr	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
May	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
June	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jul	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Aug	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Sept	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Oct	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Nov	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Dec	2020	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jan	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Feb	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Mar	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Apr	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
May	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
June	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jul	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Aug	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Sept	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Oct	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Nov	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Dec	2021	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jan	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Feb	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Mar	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Apr	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
May	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
June	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jul	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Aug	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Sept	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Oct	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Nov	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Dec	2022	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jan	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Feb	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Mar	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Apr	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
May	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
June	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jul	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Aug	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Sept	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Oct	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Nov	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Dec	2023	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Participation										
		Program Participants										
		VA					NC					System
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj. [B]	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [F] =Σ[A] + Σ[-A retired] + B	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP
Jan	2024	0		1,579		1,579	0		0		0	1,579
Feb	2024	0		1,579		1,579	0		0		0	1,579
Mar	2024	0		1,579		1,579	0		0		0	1,579
Apr	2024	0		1,579		1,579	0		0		0	1,579
May	2024	0		1,579		1,579	0		0		0	1,579
June	2024	0		1,579		1,579	0		0		0	1,579
Jul	2024	0		1,579		1,579	0		0		0	1,579
Aug	2024	0		1,579		1,579	0		0		0	1,579
Sept	2024	0		1,579		1,579	0		0		0	1,579
Oct	2024	0		1,579		1,579	0		0		0	1,579
Nov	2024	0		1,579		1,579	0		0		0	1,579
Dec	2024	0		1,579		1,579	0		0		0	1,579
Jan	2025			1,579		1,579			0		0	1,579
Feb	2025			1,579		1,579			0		0	1,579
Mar	2025			1,579		1,579			0		0	1,579
Apr	2025			1,579		1,579			0		0	1,579
May	2025			1,579		1,579			0		0	1,579
June	2025			1,579		1,579			0		0	1,579
Jul	2025			1,579		1,579			0		0	1,579
Aug	2025			1,579		1,579			0		0	1,579
Sept	2025			1,579		1,579			0		0	1,579
Oct	2025			1,579		1,579			0		0	1,579
Nov	2025			1,579		1,579			0		0	1,579
Dec	2025			1,579		1,579			0		0	1,579
Jan	2026			1,579		1,579			0		0	1,579
Feb	2026			1,579		1,579			0		0	1,579
Mar	2026			1,579		1,579			0		0	1,579
Apr	2026			1,579		1,579			0		0	1,579
May	2026			1,579		1,579			0		0	1,579
June	2026			1,579		1,579			0		0	1,579
Jul	2026			1,579		1,579			0		0	1,579
Aug	2026			1,579		1,579			0		0	1,579
Sept	2026			1,579		1,579			0		0	1,579
Oct	2026			1,579		1,579			0		0	1,579
Nov	2026			1,579		1,579			0		0	1,579
Dec	2026			1,579		1,579			0		0	1,579
Jan	2027			1,579		1,579			0		0	1,579
Feb	2027			1,579		1,579			0		0	1,579
Mar	2027			1,579		1,579			0		0	1,579
Apr	2027			1,579		1,579			0		0	1,579
May	2027			1,579		1,579			0		0	1,579
June	2027			1,579		1,579			0		0	1,579
Jul	2027		0	1,579		1,579			0		0	1,579
Aug	2027		0	1,579		1,579			0		0	1,579
Sept	2027		-252	1,327		1,327			0		0	1,327
Oct	2027		-656	671		671			0		0	671
Nov	2027		-424	247		247			0		0	247
Dec	2027		-247	0		0			0		0	0
Jan	2028		0	0		0		0	0		0	0
Feb	2028		0	0		0		0	0		0	0
Mar	2028		0	0		0		0	0		0	0
Apr	2028		0	0		0		0	0		0	0
May	2028		0	0		0		0	0		0	0
June	2028		0	0		0		0	0		0	0
Jul	2028		0	0		0		0	0		0	0
Aug	2028		0	0		0		0	0		0	0
Sept	2028		0	0		0		0	0		0	0
Oct	2028		0	0		0		0	0		0	0
Nov	2028		0	0		0		0	0		0	0
Dec	2028		0	0		0		0	0		0	0

Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Energy Savings											
		Gross kWh											
		VA					NC					System	
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	
Jan	2024	0		104,626		104,626	0		0		0	104,626	
Feb	2024	0		104,626		104,626	0		0		0	104,626	
Mar	2024	0		104,626		104,626	0		0		0	104,626	
Apr	2024	0		104,626		104,626	0		0		0	104,626	
May	2024	0		104,626		104,626	0		0		0	104,626	
June	2024	0		104,626		104,626	0		0		0	104,626	
Jul	2024	0		104,626		104,626	0		0		0	104,626	
Aug	2024	0		104,626		104,626	0		0		0	104,626	
Sept	2024	0		104,626		104,626	0		0		0	104,626	
Oct	2024	0		104,626		104,626	0		0		0	104,626	
Nov	2024	0		104,626		104,626	0		0		0	104,626	
Dec	2024	0		104,626		104,626	0		0		0	104,626	
Jan	2025			104,626		104,626			0		0	104,626	
Feb	2025			104,626		104,626			0		0	104,626	
Mar	2025			104,626		104,626			0		0	104,626	
Apr	2025			104,626		104,626			0		0	104,626	
May	2025			104,626		104,626			0		0	104,626	
June	2025			104,626		104,626			0		0	104,626	
Jul	2025			104,626		104,626			0		0	104,626	
Aug	2025			104,626		104,626			0		0	104,626	
Sept	2025			104,626		104,626			0		0	104,626	
Oct	2025			104,626		104,626			0		0	104,626	
Nov	2025			104,626		104,626			0		0	104,626	
Dec	2025			104,626		104,626			0		0	104,626	
Jan	2026			104,626		104,626			0		0	104,626	
Feb	2026			104,626		104,626			0		0	104,626	
Mar	2026			104,626		104,626			0		0	104,626	
Apr	2026			104,626		104,626			0		0	104,626	
May	2026			104,626		104,626			0		0	104,626	
June	2026			104,626		104,626			0		0	104,626	
Jul	2026			104,626		104,626			0		0	104,626	
Aug	2026			104,626		104,626			0		0	104,626	
Sept	2026			104,626		104,626			0		0	104,626	
Oct	2026			104,626		104,626			0		0	104,626	
Nov	2026			104,626		104,626			0		0	104,626	
Dec	2026			104,626		104,626			0		0	104,626	
Jan	2027			104,626		104,626			0		0	104,626	
Feb	2027			104,626		104,626			0		0	104,626	
Mar	2027			104,626		104,626			0		0	104,626	
Apr	2027			104,626		104,626			0		0	104,626	
May	2027			104,626		104,626			0		0	104,626	
June	2027			104,626		104,626			0		0	104,626	
Jul	2027		0	104,626		104,626			0		0	104,626	
Aug	2027		0	104,626		104,626			0		0	104,626	
Sept	2027		-15,457	89,169		89,169			0		0	89,169	
Oct	2027		-40,393	48,776		48,776			0		0	48,776	
Nov	2027		-31,325	17,451		17,451			0		0	17,451	
Dec	2027		-17,451	0		0			0		0	0	
Jan	2028		0	0		0		0	0		0	0	
Feb	2028		0	0		0		0	0		0	0	
Mar	2028		0	0		0		0	0		0	0	
Apr	2028		0	0		0		0	0		0	0	
May	2028		0	0		0		0	0		0	0	
June	2028		0	0		0		0	0		0	0	
Jul	2028		0	0		0		0	0		0	0	
Aug	2028		0	0		0		0	0		0	0	
Sept	2028		0	0		0		0	0		0	0	
Oct	2028		0	0		0		0	0		0	0	
Nov	2028		0	0		0		0	0		0	0	
Dec	2028		0	0		0		0	0		0	0	

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Capacity Savings											Energy Savings / Participant			Capacity Savings / Participant		
		Gross kW											Gross kWh/Participant for IRP			Gross kW/Participant for IRP		
		VA					NC					System						
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New+Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	VA	NC	System	VA	NC	System
Jan	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Feb	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Mar	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Apr	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
May	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
June	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jul	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Aug	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Sept	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Oct	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Nov	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Dec	2024	0		188		188	0		0		0	188	66	-	66	0.12	-	0.12
Jan	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Feb	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Mar	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Apr	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
May	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
June	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Jul	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Aug	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Sept	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Oct	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Nov	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Dec	2025			188		188			0		0	188	66	-	66	0.12	-	0.12
Jan	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Feb	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Mar	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Apr	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
May	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
June	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Jul	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Aug	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Sept	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Oct	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Nov	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Dec	2026			188		188			0		0	188	66	-	66	0.12	-	0.12
Jan	2027			188		188			0		0	188	66	-	66	0.12	-	0.12
Feb	2027			188		188			0		0	188	66	-	66	0.12	-	0.12
Mar	2027			188		188			0		0	188	66	-	66	0.12	-	0.12
Apr	2027			188		188			0		0	188	66	-	66	0.12	-	0.12
May	2027			188		188			0		0	188	66	-	66	0.12	-	0.12
June	2027			188		188			0		0	188	66	-	66	0.12	-	0.12
Jul	2027	0		188		188			0		0	188	66	-	66	0.12	-	0.12
Aug	2027	0		188		188			0		0	188	66	-	66	0.12	-	0.12
Sept	2027	-28		160		160			0		0	160	67	-	67	0.12	-	0.12
Oct	2027	-73		88		88			0		0	88	73	-	73	0.13	-	0.13
Nov	2027	-56		31		31			0		0	31	71	-	71	0.13	-	0.13
Dec	2027	-31		0		0			0		0	0	-	-	-	-	-	-
Jan	2028	0		0		0			0		0	0	-	-	-	-	-	-
Feb	2028	0		0		0			0		0	0	-	-	-	-	-	-
Mar	2028	0		0		0			0		0	0	-	-	-	-	-	-
Apr	2028	0		0		0			0		0	0	-	-	-	-	-	-
May	2028	0		0		0			0		0	0	-	-	-	-	-	-
June	2028	0		0		0			0		0	0	-	-	-	-	-	-
Jul	2028	0		0		0			0		0	0	-	-	-	-	-	-
Aug	2028	0		0		0			0		0	0	-	-	-	-	-	-
Sept	2028	0		0		0			0		0	0	-	-	-	-	-	-
Oct	2028	0		0		0			0		0	0	-	-	-	-	-	-
Nov	2028	0		0		0			0		0	0	-	-	-	-	-	-
Dec	2028	0		0		0			0		0	0	-	-	-	-	-	-

Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Participation											
		Program Participants											
		VA					NC					System	
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj. [B]	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) (F) =Σ[A] + Σ[-A retired] + B	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	
Jan	2029		0	0		0		0	0		0	0	
Feb	2029		0	0		0		0	0		0	0	
Mar	2029		0	0		0		0	0		0	0	
Apr	2029		0	0		0		0	0		0	0	
May	2029		0	0		0		0	0		0	0	
June	2029		0	0		0		0	0		0	0	
Jul	2029		0	0		0		0	0		0	0	
Aug	2029		0	0		0		0	0		0	0	
Sept	2029		0	0		0		0	0		0	0	
Oct	2029		0	0		0		0	0		0	0	
Nov	2029		0	0		0		0	0		0	0	
Dec	2029		0	0		0		0	0		0	0	
Jan	2030		0	0		0		0	0		0	0	
Feb	2030		0	0		0		0	0		0	0	
Mar	2030		0	0		0		0	0		0	0	
Apr	2030		0	0		0		0	0		0	0	
May	2030		0	0		0		0	0		0	0	
June	2030		0	0		0		0	0		0	0	
Jul	2030		0	0		0		0	0		0	0	
Aug	2030		0	0		0		0	0		0	0	
Sept	2030		0	0		0		0	0		0	0	
Oct	2030		0	0		0		0	0		0	0	
Nov	2030		0	0		0		0	0		0	0	
Dec	2030		0	0		0		0	0		0	0	
Jan	2031		0	0		0		0	0		0	0	
Feb	2031		0	0		0		0	0		0	0	
Mar	2031		0	0		0		0	0		0	0	
Apr	2031		0	0		0		0	0		0	0	
May	2031		0	0		0		0	0		0	0	
June	2031		0	0		0		0	0		0	0	
Jul	2031		0	0		0		0	0		0	0	
Aug	2031		0	0		0		0	0		0	0	
Sept	2031		0	0		0		0	0		0	0	
Oct	2031		0	0		0		0	0		0	0	
Nov	2031		0	0		0		0	0		0	0	
Dec	2031		0	0		0		0	0		0	0	
Jan	2032		0	0		0		0	0		0	0	
Feb	2032		0	0		0		0	0		0	0	
Mar	2032		0	0		0		0	0		0	0	
Apr	2032		0	0		0		0	0		0	0	
May	2032		0	0		0		0	0		0	0	
June	2032		0	0		0		0	0		0	0	
Jul	2032			0		0		0	0		0	0	
Aug	2032			0		0		0	0		0	0	
Sept	2032			0		0		0	0		0	0	
Oct	2032			0		0		0	0		0	0	
Nov	2032			0		0		0	0		0	0	
Dec	2032			0		0		0	0		0	0	

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Energy Savings										
		Gross kWh										
		VA					NC					System
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP
Jan	2029		0	0		0		0	0		0	0
Feb	2029		0	0		0		0	0		0	0
Mar	2029		0	0		0		0	0		0	0
Apr	2029		0	0		0		0	0		0	0
May	2029		0	0		0		0	0		0	0
June	2029		0	0		0		0	0		0	0
Jul	2029		0	0		0		0	0		0	0
Aug	2029		0	0		0		0	0		0	0
Sept	2029		0	0		0		0	0		0	0
Oct	2029		0	0		0		0	0		0	0
Nov	2029		0	0		0		0	0		0	0
Dec	2029		0	0		0		0	0		0	0
Jan	2030		0	0		0		0	0		0	0
Feb	2030		0	0		0		0	0		0	0
Mar	2030		0	0		0		0	0		0	0
Apr	2030		0	0		0		0	0		0	0
May	2030		0	0		0		0	0		0	0
June	2030		0	0		0		0	0		0	0
Jul	2030		0	0		0		0	0		0	0
Aug	2030		0	0		0		0	0		0	0
Sept	2030		0	0		0		0	0		0	0
Oct	2030		0	0		0		0	0		0	0
Nov	2030		0	0		0		0	0		0	0
Dec	2030		0	0		0		0	0		0	0
Jan	2031		0	0		0		0	0		0	0
Feb	2031		0	0		0		0	0		0	0
Mar	2031		0	0		0		0	0		0	0
Apr	2031		0	0		0		0	0		0	0
May	2031		0	0		0		0	0		0	0
June	2031		0	0		0		0	0		0	0
Jul	2031		0	0		0		0	0		0	0
Aug	2031		0	0		0		0	0		0	0
Sept	2031		0	0		0		0	0		0	0
Oct	2031		0	0		0		0	0		0	0
Nov	2031		0	0		0		0	0		0	0
Dec	2031		0	0		0		0	0		0	0
Jan	2032		0	0		0		0	0		0	
Feb	2032		0	0		0		0	0		0	
Mar	2032		0	0		0		0	0		0	
Apr	2032		0	0		0		0	0		0	
May	2032		0	0		0		0	0		0	
June	2032		0	0		0		0	0		0	
Jul	2032			0		0		0	0		0	
Aug	2032			0		0		0	0		0	
Sept	2032			0		0		0	0		0	
Oct	2032			0		0		0	0		0	
Nov	2032			0		0		0	0		0	
Dec	2032			0		0		0	0		0	

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Capacity Savings											Energy Savings / Participant			Capacity Savings / Participant		
		Gross kW											Gross kWh/Participant for IRP			Gross kW/Participant for IRP		
		VA					NC					System						
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New+Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	VA	NC	System	VA	NC	System
Jan	2029		0	0		0			0		0	0	-	-	-	-	-	-
Feb	2029		0	0		0			0		0	0	-	-	-	-	-	-
Mar	2029		0	0		0			0		0	0	-	-	-	-	-	-
Apr	2029		0	0		0			0		0	0	-	-	-	-	-	-
May	2029		0	0		0			0		0	0	-	-	-	-	-	-
June	2029		0	0		0			0		0	0	-	-	-	-	-	-
Jul	2029		0	0		0			0		0	0	-	-	-	-	-	-
Aug	2029		0	0		0			0		0	0	-	-	-	-	-	-
Sept	2029		0	0		0			0		0	0	-	-	-	-	-	-
Oct	2029		0	0		0			0		0	0	-	-	-	-	-	-
Nov	2029		0	0		0			0		0	0	-	-	-	-	-	-
Dec	2029		0	0		0			0		0	0	-	-	-	-	-	-
Jan	2030		0	0		0			0		0	0	-	-	-	-	-	-
Feb	2030		0	0		0			0		0	0	-	-	-	-	-	-
Mar	2030		0	0		0			0		0	0	-	-	-	-	-	-
Apr	2030		0	0		0			0		0	0	-	-	-	-	-	-
May	2030		0	0		0			0		0	0	-	-	-	-	-	-
June	2030		0	0		0			0		0	0	-	-	-	-	-	-
Jul	2030		0	0		0			0		0	0	-	-	-	-	-	-
Aug	2030		0	0		0			0		0	0	-	-	-	-	-	-
Sept	2030		0	0		0			0		0	0	-	-	-	-	-	-
Oct	2030		0	0		0			0		0	0	-	-	-	-	-	-
Nov	2030		0	0		0			0		0	0	-	-	-	-	-	-
Dec	2030		0	0		0			0		0	0	-	-	-	-	-	-
Jan	2031		0	0		0			0		0	0	-	-	-	-	-	-
Feb	2031		0	0		0			0		0	0	-	-	-	-	-	-
Mar	2031		0	0		0			0		0	0	-	-	-	-	-	-
Apr	2031		0	0		0			0		0	0	-	-	-	-	-	-
May	2031		0	0		0			0		0	0	-	-	-	-	-	-
June	2031		0	0		0			0		0	0	-	-	-	-	-	-
Jul	2031		0	0		0			0		0	0	-	-	-	-	-	-
Aug	2031		0	0		0			0		0	0	-	-	-	-	-	-
Sept	2031		0	0		0			0		0	0	-	-	-	-	-	-
Oct	2031		0	0		0			0		0	0	-	-	-	-	-	-
Nov	2031		0	0		0			0		0	0	-	-	-	-	-	-
Dec	2031		0	0		0			0		0	0	-	-	-	-	-	-
Jan	2032		0	0		0			0		0	0	-	-	-	-	-	-
Feb	2032		0	0		0			0		0	0	-	-	-	-	-	-
Mar	2032		0	0		0			0		0	0	-	-	-	-	-	-
Apr	2032		0	0		0			0		0	0	-	-	-	-	-	-
May	2032		0	0		0			0		0	0	-	-	-	-	-	-
June	2032		0	0		0			0		0	0	-	-	-	-	-	-
Jul	2032			0		0			0		0	0	-	-	-	-	-	-
Aug	2032			0		0			0		0	0	-	-	-	-	-	-
Sept	2032			0		0			0		0	0	-	-	-	-	-	-
Oct	2032			0		0			0		0	0	-	-	-	-	-	-
Nov	2032			0		0			0		0	0	-	-	-	-	-	-
Dec	2032			0		0			0		0	0	-	-	-	-	-	-

Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 2. EM&V Data Incremental by Vintage Year

	Program Participants										
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019			1,579		1,579			-		-	1,579

Table 3. EM&V Data Annualized by Vintage Year

	Program Participants										
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019			1,579		1,579			-		-	1,579

Table 4. EM&V Data Accumulated through Vintage Year (for PPI)

	Program Participants										
	VA							NC PPI			System
2019								-			
2020								-			
2021								-			
2022								-			
2023								-			
2024								-			
2025								-			

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 2. EM&V Data Incremental by Vintage Year

	Gross Incremental Energy (kWh)										
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019			263,109		263,109			-		-	263,109

Table 3. EM&V Data Annualized by Vintage Year

	Gross Annualized Energy (kWh)										
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019			1,255,513		1,255,513			-		-	1,255,513

Table 4. EM&V Data Accumulated through Vintage Year (for PPI)

	Gross Energy (kWh) for PPI										
	VA							NC PPI			System
2019								-			-
2020								-			-
2021								-			-
2022								-			-
2023								-			-
2024								-			-
2025								-			-

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 2. EM&V Data Incremental by Vintage Year												Incremental Energy Savings/Participant			Incremental Capacity Savings/Participant		
	Gross Peak Demand (kW)											Gross kWh/Participant for IRP			Gross kW/Participant for IRP		
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP	VA	NC	System	VA	NC	System
2019	-	-	188	-	188	-	-	-	-	-	188	167	-	167	0.12	-	0.12

Table 3. EM&V Data Annualized by Vintage Year												Annualized Energy Savings/Participant			Annualized Capacity Savings/Participant		
	Gross Peak Demand (kW)											Gross kWh/Participant for IRP			Gross kW/Participant for IRP		
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP	VA	NC	System	VA	NC	System
2019	-	-	188	-	188	-	-	-	-	-	188	795	-	795	0.12	-	0.12

Table 4. EM&V Data Accumulated through Vintage Year (for PPI)											PPI Energy Savings/Participant			PPI Capacity Savings/Participant		
	Gross Peak Demand (kW)										Gross kWh/Participant			Gross kW/Participant		
	VA						NC PPI			System	VA	NC	System	VA	NC	System
2019							-					-			-	
2020							-					-			-	
2021							-					-			-	
2022							-					-			-	
2023							-					-			-	
2024							-					-			-	
2025							-					-			-	

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 5. EM&V Data Accumulated through Vintage Year (for IRP and NLR)

	Program Participants	VA IRP	VA NLR	NC IRP	NC NLR	System IRP
2019		1,579	1,579	-	-	1,579
2020		1,579	1,579	-	-	1,579
2021		1,579	1,579	-	-	1,579
2022		1,579	1,579	-	-	1,579
2023		1,579	1,579	-	-	1,579
2024		1,579	1,579	-	-	1,579
2025		1,579	1,579	-	-	1,579
2026		1,579	1,579	-	-	1,579
2027		-	-	-	-	-
2028		-	-	-	-	-
2029		-	-	-	-	-
2030		-	-	-	-	-
2031		-	-	-	-	-
2032		-	-	-	-	-

Table 6. Cumulative EM&V Data Accumulated through Vintage Year (Lifetime)

	Program Participants	VA Lifetime		NC Lifetime		System Lifetime
2019		1,579		-		1,579
2020		1,579		-		1,579
2021		1,579		-		1,579
2022		1,579		-		1,579
2023		1,579		-		1,579
2024		1,579		-		1,579
2025		1,579		-		1,579
2026		1,579		-		1,579
2027		1,579		-		1,579
2028		1,579		-		1,579
2029		1,579		-		1,579
2030		1,579		-		1,579
2031		1,579		-		1,579
2032		1,579		-		1,579

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 5. EM&V Data Accumulated through Vintage Year (for IRP and NLR)									
	Gross Energy (kWh)								
	VA IRP	VA NLR	NC IRP	NC NLR	System IRP
2019	104,626	104,626	-	-	104,626
2020	1,255,513	1,255,513	-	-	1,255,513
2021	1,255,513	1,255,513	-	-	1,255,513
2022	1,255,513	1,255,513	-	-	1,255,513
2023	1,255,513	1,255,513	-	-	1,255,513
2024	1,255,513	1,255,513	-	-	1,255,513
2025	1,255,513	1,255,513	-	-	1,255,513
2026	1,255,513	1,255,513	-	-	1,255,513
2027	992,404	992,404	-	-	992,404
2028	-	-	-	-	-
2029	-	-	-	-	-
2030	-	-	-	-	-
2031	-	-	-	-	-
2032	-	-	-	-	-

Table 6. Cumulative EM&V Data Accumulated through Vintage Year (Lifetime)					
	Gross Energy (kWh)				
	VA Lifetime	NC Lifetime	System Lifetime
2019	104,626	-	104,626
2020	1,360,139	-	1,360,139
2021	2,615,652	-	2,615,652
2022	3,871,165	-	3,871,165
2023	5,126,678	-	5,126,678
2024	6,382,191	-	6,382,191
2025	7,637,704	-	7,637,704
2026	8,893,217	-	8,893,217
2027	9,885,621	-	9,885,621
2028	9,885,621	-	9,885,621
2029	9,885,621	-	9,885,621
2030	9,885,621	-	9,885,621
2031	9,885,621	-	9,885,621
2032	9,885,621	-	9,885,621

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Appendix C.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 5. EM&V Data Accumulated through Vintage Year (for IRP and NLR)											IRP Energy Savings/Participant			IRP Capacity Savings/Participant		
	Gross Peak Demand (kW)										Gross kWh/Participant			Gross kW/Participant		
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP	VA	NC	System	VA	NC	System
2019			188		188			-		-	188	66	-	66	0.12	-	0.12
2020			188		188			-		-	188	795	-	795	0.12	-	0.12
2021			188		188			-		-	188	795	-	795	0.12	-	0.12
2022			188		188			-		-	188	795	-	795	0.12	-	0.12
2023			188		188			-		-	188	795	-	795	0.12	-	0.12
2024			188		188			-		-	188	795	-	795	0.12	-	0.12
2025			188		188			-		-	188	795	-	795	0.12	-	0.12
2026			188		188			-		-	188	795	-	795	0.12	-	0.12
2027			-		-			-		-	-	-	-	-	-	-	-
2028			-		-			-		-	-	-	-	-	-	-	-
2029			-		-			-		-	-	-	-	-	-	-	-
2030			-		-			-		-	-	-	-	-	-	-	-
2031			-		-			-		-	-	-	-	-	-	-	-
2032			-		-			-		-	-	-	-	-	-	-	-

Table 6. Cumulative EM&V Data Accumulated through Vintage Year (Lifetime)											Lifetime Energy Savings/Participant			Lifetime Capacity Savings/Participant		
	Gross Peak Demand (kW)										Gross kWh/Participant			Gross kW/Participant		
			VA Lifetime					NC Lifetime			System Lifetime	VA	NC	System	VA	NC	System
2019			188					-			188	66	-	66	0.12	-	0.12
2020			188					-			188	861	-	861	0.12	-	0.12
2021			188					-			188	1,657	-	1,657	0.12	-	0.12
2022			188					-			188	2,452	-	2,452	0.12	-	0.12
2023			188					-			188	3,247	-	3,247	0.12	-	0.12
2024			188					-			188	4,042	-	4,042	0.12	-	0.12
2025			188					-			188	4,837	-	4,837	0.12	-	0.12
2026			188					-			188	5,632	-	5,632	0.12	-	0.12
2027			188					-			188	6,261	-	6,261	0.12	-	0.12
2028			188					-			188	6,261	-	6,261	0.12	-	0.12
2029			188					-			188	6,261	-	6,261	0.12	-	0.12
2030			188					-			188	6,261	-	6,261	0.12	-	0.12
2031			188					-			188	6,261	-	6,261	0.12	-	0.12
2032			188					-			188	6,261	-	6,261	0.12	-	0.12

DNV·GL

Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy)

Case No. PUR-2018-00168 (Virginia)
Docket No. E-22 Sub 577 (North Carolina)
VOLUME 3 OF 4
PUBLIC VERSION

Date: May 15, 2020
Prepared by DNV GL Energy Insights USA, Inc. (DNV GL)

Appendix D. Program to Date Net Energy Savings Tables for Virginia and North Carolina Programs 2010-2019

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

PROGRAM: Residential Appliance Recycling Program
DSM Phase VII Program
Type: Energy Efficiency
Program Measure Life: 8 years (8 years, 0 months) 8.0 years
Current Year: 2019

Table 1		Participation										
		Program Participants										
		VA					NC					System
Month	Year	VA Monthly New [A]	VA Monthly Retired [-A retired]	VA Cum. for IRP (New + Retired) [E] = Σ[A] + Σ[-A retired]	VA Rate Reset Adj. [B]	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [F] =Σ[A] + Σ[-A retired] + B	NC Monthly New [C]	NC Monthly Retired [-C retired]	NC Cum. for IRP (New + Retired) [G] = Σ[C] + Σ[-C retired]	NC Rate Reset Adj. [D]	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [H] = Σ[C] + Σ[-C retired] + D	System Cum for IRP E+G
Jan	2019	0		0		0	0		0		0	0
Feb	2019	0		0		0	0		0		0	0
Mar	2019	0		0		0	0		0		0	0
Apr	2019	0		0		0	0		0		0	0
May	2019	0		0		0	0		0		0	0
June	2019	0		0		0	0		0		0	0
Jul	2019	0		0		0	0		0	0	0	0
Aug	2019	0		0		0	0		0	0	0	0
Sept	2019	252		252		252	0		0	0	0	252
Oct	2019	656		908		908	0		0	0	0	908
Nov	2019	424		1,332		1,332	0		0	0	0	1,332
Dec	2019	247		1,579		1,579	0		0		0	1,579
Jan	2020	0		1,579		1,579	0		0		0	1,579
Feb	2020	0		1,579		1,579	0		0		0	1,579
Mar	2020	0		1,579		1,579	0		0		0	1,579
Apr	2020	0		1,579		1,579	0		0		0	1,579
May	2020	0		1,579		1,579	0		0		0	1,579
June	2020	0		1,579		1,579	0		0		0	1,579
Jul	2020	0		1,579		1,579	0		0		0	1,579
Aug	2020	0		1,579		1,579	0		0		0	1,579
Sept	2020	0		1,579		1,579	0		0		0	1,579
Oct	2020	0		1,579		1,579	0		0		0	1,579
Nov	2020	0		1,579		1,579	0		0		0	1,579
Dec	2020	0		1,579		1,579	0		0		0	1,579
Jan	2021	0		1,579		1,579	0		0		0	1,579
Feb	2021	0		1,579		1,579	0		0		0	1,579
Mar	2021	0		1,579		1,579	0		0		0	1,579
Apr	2021	0		1,579		1,579	0		0		0	1,579
May	2021	0		1,579		1,579	0		0		0	1,579
June	2021	0		1,579		1,579	0		0		0	1,579
Jul	2021	0		1,579		1,579	0		0		0	1,579
Aug	2021	0		1,579		1,579	0		0		0	1,579
Sept	2021	0		1,579		1,579	0		0		0	1,579
Oct	2021	0		1,579		1,579	0		0		0	1,579
Nov	2021	0		1,579		1,579	0		0		0	1,579
Dec	2021	0		1,579		1,579	0		0		0	1,579
Jan	2022	0		1,579		1,579	0		0		0	1,579
Feb	2022	0		1,579		1,579	0		0		0	1,579
Mar	2022	0		1,579		1,579	0		0		0	1,579
Apr	2022	0		1,579		1,579	0		0		0	1,579
May	2022	0		1,579		1,579	0		0		0	1,579
June	2022	0		1,579		1,579	0		0		0	1,579
Jul	2022	0		1,579		1,579	0		0		0	1,579
Aug	2022	0		1,579		1,579	0		0		0	1,579
Sept	2022	0		1,579		1,579	0		0		0	1,579
Oct	2022	0		1,579		1,579	0		0		0	1,579
Nov	2022	0		1,579		1,579	0		0		0	1,579
Dec	2022	0		1,579		1,579	0		0		0	1,579
Jan	2023	0		1,579		1,579	0		0		0	1,579
Feb	2023	0		1,579		1,579	0		0		0	1,579
Mar	2023	0		1,579		1,579	0		0		0	1,579
Apr	2023	0		1,579		1,579	0		0		0	1,579
May	2023	0		1,579		1,579	0		0		0	1,579
June	2023	0		1,579		1,579	0		0		0	1,579
Jul	2023	0		1,579		1,579	0		0		0	1,579
Aug	2023	0		1,579		1,579	0		0		0	1,579
Sept	2023	0		1,579		1,579	0		0		0	1,579
Oct	2023	0		1,579		1,579	0		0		0	1,579
Nov	2023	0		1,579		1,579	0		0		0	1,579
Dec	2023	0		1,579		1,579	0		0		0	1,579

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Energy Savings										
		Net kWh										
		VA					NC					System
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP
Jan	2019	0		0		0	0		0		0	0
Feb	2019	0		0		0	0		0		0	0
Mar	2019	0		0		0	0		0		0	0
Apr	2019	0		0		0	0		0		0	0
May	2019	0		0		0	0		0		0	0
June	2019	0		0		0	0		0		0	0
Jul	2019	0		0		0	0		0	0	0	0
Aug	2019	0		0		0	0		0	0	0	0
Sept	2019	9,274		9,274		9,274	0		0	0	0	9,274
Oct	2019	24,236		33,510		33,510	0		0	0	0	33,510
Nov	2019	18,795		52,305		52,305	0		0	0	0	52,305
Dec	2019	10,470		62,776		62,776	0		0		0	62,776
Jan	2020	0		62,776		62,776	0		0		0	62,776
Feb	2020	0		62,776		62,776	0		0		0	62,776
Mar	2020	0		62,776		62,776	0		0		0	62,776
Apr	2020	0		62,776		62,776	0		0		0	62,776
May	2020	0		62,776		62,776	0		0		0	62,776
June	2020	0		62,776		62,776	0		0		0	62,776
Jul	2020	0		62,776		62,776	0		0		0	62,776
Aug	2020	0		62,776		62,776	0		0		0	62,776
Sept	2020	0		62,776		62,776	0		0		0	62,776
Oct	2020	0		62,776		62,776	0		0		0	62,776
Nov	2020	0		62,776		62,776	0		0		0	62,776
Dec	2020	0		62,776		62,776	0		0		0	62,776
Jan	2021	0		62,776		62,776	0		0		0	62,776
Feb	2021	0		62,776		62,776	0		0		0	62,776
Mar	2021	0		62,776		62,776	0		0		0	62,776
Apr	2021	0		62,776		62,776	0		0		0	62,776
May	2021	0		62,776		62,776	0		0		0	62,776
June	2021	0		62,776		62,776	0		0		0	62,776
Jul	2021	0		62,776		62,776	0		0		0	62,776
Aug	2021	0		62,776		62,776	0		0		0	62,776
Sept	2021	0		62,776		62,776	0		0		0	62,776
Oct	2021	0		62,776		62,776	0		0		0	62,776
Nov	2021	0		62,776		62,776	0		0		0	62,776
Dec	2021	0		62,776		62,776	0		0		0	62,776
Jan	2022	0		62,776		62,776	0		0		0	62,776
Feb	2022	0		62,776		62,776	0		0		0	62,776
Mar	2022	0		62,776		62,776	0		0		0	62,776
Apr	2022	0		62,776		62,776	0		0		0	62,776
May	2022	0		62,776		62,776	0		0		0	62,776
June	2022	0		62,776		62,776	0		0		0	62,776
Jul	2022	0		62,776		62,776	0		0		0	62,776
Aug	2022	0		62,776		62,776	0		0		0	62,776
Sept	2022	0		62,776		62,776	0		0		0	62,776
Oct	2022	0		62,776		62,776	0		0		0	62,776
Nov	2022	0		62,776		62,776	0		0		0	62,776
Dec	2022	0		62,776		62,776	0		0		0	62,776
Jan	2023	0		62,776		62,776	0		0		0	62,776
Feb	2023	0		62,776		62,776	0		0		0	62,776
Mar	2023	0		62,776		62,776	0		0		0	62,776
Apr	2023	0		62,776		62,776	0		0		0	62,776
May	2023	0		62,776		62,776	0		0		0	62,776
June	2023	0		62,776		62,776	0		0		0	62,776
Jul	2023	0		62,776		62,776	0		0		0	62,776
Aug	2023	0		62,776		62,776	0		0		0	62,776
Sept	2023	0		62,776		62,776	0		0		0	62,776
Oct	2023	0		62,776		62,776	0		0		0	62,776
Nov	2023	0		62,776		62,776	0		0		0	62,776
Dec	2023	0		62,776		62,776	0		0		0	62,776

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Capacity Savings											Energy Savings / Participant			Capacity Savings / Participant		
		Net kW											Net kWh/Participant for IRP			Net kW/Participant for IRP		
		VA					NC					System						
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New+Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	VA	NC	System	VA	NC	System
Jan	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Feb	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Mar	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Apr	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
May	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
June	2019	0		0		0	0		0		0	0	-	-	-	-	-	-
Jul	2019	0		0		0	0		0	0	0	0	-	-	-	-	-	-
Aug	2019	0		0		0	0		0	0	0	0	-	-	-	-	-	-
Sept	2019	17		17		17	0		0	0	0	17	37	-	37	0.07	-	0.07
Oct	2019	44		60		60	0		0	0	0	60	37	-	37	0.07	-	0.07
Nov	2019	34		94		94	0		0	0	0	94	39	-	39	0.07	-	0.07
Dec	2019	19		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jan	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Feb	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Mar	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Apr	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
May	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
June	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jul	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Aug	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Sept	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Oct	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Nov	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Dec	2020	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jan	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Feb	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Mar	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Apr	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
May	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
June	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jul	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Aug	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Sept	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Oct	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Nov	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Dec	2021	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jan	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Feb	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Mar	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Apr	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
May	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
June	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jul	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Aug	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Sept	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Oct	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Nov	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Dec	2022	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jan	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Feb	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Mar	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Apr	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
May	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
June	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jul	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Aug	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Sept	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Oct	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Nov	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Dec	2023	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Participation										
		Program Participants										
		VA					NC					System
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj. [B]	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [F] =Σ[A] + Σ[-A retired) + B	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP
Jan	2024	0		1,579		1,579	0		0		0	1,579
Feb	2024	0		1,579		1,579	0		0		0	1,579
Mar	2024	0		1,579		1,579	0		0		0	1,579
Apr	2024	0		1,579		1,579	0		0		0	1,579
May	2024	0		1,579		1,579	0		0		0	1,579
June	2024	0		1,579		1,579	0		0		0	1,579
Jul	2024	0		1,579		1,579	0		0		0	1,579
Aug	2024	0		1,579		1,579	0		0		0	1,579
Sept	2024	0		1,579		1,579	0		0		0	1,579
Oct	2024	0		1,579		1,579	0		0		0	1,579
Nov	2024	0		1,579		1,579	0		0		0	1,579
Dec	2024	0		1,579		1,579	0		0		0	1,579
Jan	2025			1,579		1,579			0		0	1,579
Feb	2025			1,579		1,579			0		0	1,579
Mar	2025			1,579		1,579			0		0	1,579
Apr	2025			1,579		1,579			0		0	1,579
May	2025			1,579		1,579			0		0	1,579
June	2025			1,579		1,579			0		0	1,579
Jul	2025			1,579		1,579			0		0	1,579
Aug	2025			1,579		1,579			0		0	1,579
Sept	2025			1,579		1,579			0		0	1,579
Oct	2025			1,579		1,579			0		0	1,579
Nov	2025			1,579		1,579			0		0	1,579
Dec	2025			1,579		1,579			0		0	1,579
Jan	2026			1,579		1,579			0		0	1,579
Feb	2026			1,579		1,579			0		0	1,579
Mar	2026			1,579		1,579			0		0	1,579
Apr	2026			1,579		1,579			0		0	1,579
May	2026			1,579		1,579			0		0	1,579
June	2026			1,579		1,579			0		0	1,579
Jul	2026			1,579		1,579			0		0	1,579
Aug	2026			1,579		1,579			0		0	1,579
Sept	2026			1,579		1,579			0		0	1,579
Oct	2026			1,579		1,579			0		0	1,579
Nov	2026			1,579		1,579			0		0	1,579
Dec	2026			1,579		1,579			0		0	1,579
Jan	2027			1,579		1,579			0		0	1,579
Feb	2027			1,579		1,579			0		0	1,579
Mar	2027			1,579		1,579			0		0	1,579
Apr	2027			1,579		1,579			0		0	1,579
May	2027			1,579		1,579			0		0	1,579
June	2027			1,579		1,579			0		0	1,579
Jul	2027		0	1,579		1,579			0		0	1,579
Aug	2027		0	1,579		1,579			0		0	1,579
Sept	2027		-252	1,327		1,327			0		0	1,327
Oct	2027		-656	671		671			0		0	671
Nov	2027		-424	247		247			0		0	247
Dec	2027		-247	0		0			0		0	0
Jan	2028		0	0		0		0	0		0	0
Feb	2028		0	0		0		0	0		0	0
Mar	2028		0	0		0		0	0		0	0
Apr	2028		0	0		0		0	0		0	0
May	2028		0	0		0		0	0		0	0
June	2028		0	0		0		0	0		0	0
Jul	2028		0	0		0		0	0		0	0
Aug	2028		0	0		0		0	0		0	0
Sept	2028		0	0		0		0	0		0	0
Oct	2028		0	0		0		0	0		0	0
Nov	2028		0	0		0		0	0		0	0
Dec	2028		0	0		0		0	0		0	0

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Energy Savings										
		Net kWh										
		VA					NC					System
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP
Jan	2024	0		62,776		62,776	0		0		0	62,776
Feb	2024	0		62,776		62,776	0		0		0	62,776
Mar	2024	0		62,776		62,776	0		0		0	62,776
Apr	2024	0		62,776		62,776	0		0		0	62,776
May	2024	0		62,776		62,776	0		0		0	62,776
June	2024	0		62,776		62,776	0		0		0	62,776
Jul	2024	0		62,776		62,776	0		0		0	62,776
Aug	2024	0		62,776		62,776	0		0		0	62,776
Sept	2024	0		62,776		62,776	0		0		0	62,776
Oct	2024	0		62,776		62,776	0		0		0	62,776
Nov	2024	0		62,776		62,776	0		0		0	62,776
Dec	2024	0		62,776		62,776	0		0		0	62,776
Jan	2025			62,776		62,776			0		0	62,776
Feb	2025			62,776		62,776			0		0	62,776
Mar	2025			62,776		62,776			0		0	62,776
Apr	2025			62,776		62,776			0		0	62,776
May	2025			62,776		62,776			0		0	62,776
June	2025			62,776		62,776			0		0	62,776
Jul	2025			62,776		62,776			0		0	62,776
Aug	2025			62,776		62,776			0		0	62,776
Sept	2025			62,776		62,776			0		0	62,776
Oct	2025			62,776		62,776			0		0	62,776
Nov	2025			62,776		62,776			0		0	62,776
Dec	2025			62,776		62,776			0		0	62,776
Jan	2026			62,776		62,776			0		0	62,776
Feb	2026			62,776		62,776			0		0	62,776
Mar	2026			62,776		62,776			0		0	62,776
Apr	2026			62,776		62,776			0		0	62,776
May	2026			62,776		62,776			0		0	62,776
June	2026			62,776		62,776			0		0	62,776
Jul	2026			62,776		62,776			0		0	62,776
Aug	2026			62,776		62,776			0		0	62,776
Sept	2026			62,776		62,776			0		0	62,776
Oct	2026			62,776		62,776			0		0	62,776
Nov	2026			62,776		62,776			0		0	62,776
Dec	2026			62,776		62,776			0		0	62,776
Jan	2027			62,776		62,776			0		0	62,776
Feb	2027			62,776		62,776			0		0	62,776
Mar	2027			62,776		62,776			0		0	62,776
Apr	2027			62,776		62,776			0		0	62,776
May	2027			62,776		62,776			0		0	62,776
June	2027			62,776		62,776			0		0	62,776
Jul	2027		0	62,776		62,776			0		0	62,776
Aug	2027		0	62,776		62,776			0		0	62,776
Sept	2027		-9,274	53,502		53,502			0		0	53,502
Oct	2027		-24,236	29,265		29,265			0		0	29,265
Nov	2027		-18,795	10,470		10,470			0		0	10,470
Dec	2027		-10,470	0		0			0		0	0
Jan	2028		0	0		0		0	0		0	0
Feb	2028		0	0		0		0	0		0	0
Mar	2028		0	0		0		0	0		0	0
Apr	2028		0	0		0		0	0		0	0
May	2028		0	0		0		0	0		0	0
June	2028		0	0		0		0	0		0	0
Jul	2028		0	0		0		0	0		0	0
Aug	2028		0	0		0		0	0		0	0
Sept	2028		0	0		0		0	0		0	0
Oct	2028		0	0		0		0	0		0	0
Nov	2028		0	0		0		0	0		0	0
Dec	2028		0	0		0		0	0		0	0

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Capacity Savings											Energy Savings / Participant			Capacity Savings / Participant		
		Net kW											Net kWh/Participant for IRP			Net kW/Participant for IRP		
		VA					NC					System						
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New+Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	VA	NC	System	VA	NC	System
Jan	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Feb	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Mar	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Apr	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
May	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
June	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jul	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Aug	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Sept	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Oct	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Nov	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Dec	2024	0		113		113	0		0		0	113	40	-	40	0.07	-	0.07
Jan	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Feb	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Mar	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Apr	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
May	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
June	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Jul	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Aug	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Sept	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Oct	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Nov	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Dec	2025			113		113			0		0	113	40	-	40	0.07	-	0.07
Jan	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Feb	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Mar	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Apr	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
May	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
June	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Jul	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Aug	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Sept	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Oct	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Nov	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Dec	2026			113		113			0		0	113	40	-	40	0.07	-	0.07
Jan	2027			113		113			0		0	113	40	-	40	0.07	-	0.07
Feb	2027			113		113			0		0	113	40	-	40	0.07	-	0.07
Mar	2027			113		113			0		0	113	40	-	40	0.07	-	0.07
Apr	2027			113		113			0		0	113	40	-	40	0.07	-	0.07
May	2027			113		113			0		0	113	40	-	40	0.07	-	0.07
June	2027			113		113			0		0	113	40	-	40	0.07	-	0.07
Jul	2027		0	113		113			0		0	113	40	-	40	0.07	-	0.07
Aug	2027		0	113		113			0		0	113	40	-	40	0.07	-	0.07
Sept	2027		-17	96		96			0		0	96	40	-	40	0.07	-	0.07
Oct	2027		-44	53		53			0		0	53	44	-	44	0.08	-	0.08
Nov	2027		-34	19		19			0		0	19	42	-	42	0.08	-	0.08
Dec	2027		-19	0		0			0		0	0	-	-	-	-	-	-
Jan	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Feb	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Mar	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Apr	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
May	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
June	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Jul	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Aug	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Sept	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Oct	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Nov	2028		0	0		0		0	0		0	0	-	-	-	-	-	-
Dec	2028		0	0		0		0	0		0	0	-	-	-	-	-	-

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Participation											
		Program Participants											
		VA					NC					System	
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj. [B]	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.) [F] =Σ[A] + Σ[-A retired] + B	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	
Jan	2029		0	0		0		0	0		0	0	
Feb	2029		0	0		0		0	0		0	0	
Mar	2029		0	0		0		0	0		0	0	
Apr	2029		0	0		0		0	0		0	0	
May	2029		0	0		0		0	0		0	0	
June	2029		0	0		0		0	0		0	0	
Jul	2029		0	0		0		0	0		0	0	
Aug	2029		0	0		0		0	0		0	0	
Sept	2029		0	0		0		0	0		0	0	
Oct	2029		0	0		0		0	0		0	0	
Nov	2029		0	0		0		0	0		0	0	
Dec	2029		0	0		0		0	0		0	0	
Jan	2030		0	0		0		0	0		0	0	
Feb	2030		0	0		0		0	0		0	0	
Mar	2030		0	0		0		0	0		0	0	
Apr	2030		0	0		0		0	0		0	0	
May	2030		0	0		0		0	0		0	0	
June	2030		0	0		0		0	0		0	0	
Jul	2030		0	0		0		0	0		0	0	
Aug	2030		0	0		0		0	0		0	0	
Sept	2030		0	0		0		0	0		0	0	
Oct	2030		0	0		0		0	0		0	0	
Nov	2030		0	0		0		0	0		0	0	
Dec	2030		0	0		0		0	0		0	0	
Jan	2031		0	0		0		0	0		0	0	
Feb	2031		0	0		0		0	0		0	0	
Mar	2031		0	0		0		0	0		0	0	
Apr	2031		0	0		0		0	0		0	0	
May	2031		0	0		0		0	0		0	0	
June	2031		0	0		0		0	0		0	0	
Jul	2031		0	0		0		0	0		0	0	
Aug	2031		0	0		0		0	0		0	0	
Sept	2031		0	0		0		0	0		0	0	
Oct	2031		0	0		0		0	0		0	0	
Nov	2031		0	0		0		0	0		0	0	
Dec	2031		0	0		0		0	0		0	0	
Jan	2032		0	0		0		0	0		0	0	
Feb	2032		0	0		0		0	0		0	0	
Mar	2032		0	0		0		0	0		0	0	
Apr	2032		0	0		0		0	0		0	0	
May	2032		0	0		0		0	0		0	0	
June	2032		0	0		0		0	0		0	0	
Jul	2032			0		0		0	0		0	0	
Aug	2032			0		0		0	0		0	0	
Sept	2032			0		0		0	0		0	0	
Oct	2032			0		0		0	0		0	0	
Nov	2032			0		0		0	0		0	0	
Dec	2032			0		0		0	0		0	0	

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Energy Savings											
		Net kWh											
		VA					NC					System	
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New + Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	
Jan	2029		0	0		0		0	0		0	0	
Feb	2029		0	0		0		0	0		0	0	
Mar	2029		0	0		0		0	0		0	0	
Apr	2029		0	0		0		0	0		0	0	
May	2029		0	0		0		0	0		0	0	
June	2029		0	0		0		0	0		0	0	
Jul	2029		0	0		0		0	0		0	0	
Aug	2029		0	0		0		0	0		0	0	
Sept	2029		0	0		0		0	0		0	0	
Oct	2029		0	0		0		0	0		0	0	
Nov	2029		0	0		0		0	0		0	0	
Dec	2029		0	0		0		0	0		0	0	
Jan	2030		0	0		0		0	0		0	0	
Feb	2030		0	0		0		0	0		0	0	
Mar	2030		0	0		0		0	0		0	0	
Apr	2030		0	0		0		0	0		0	0	
May	2030		0	0		0		0	0		0	0	
June	2030		0	0		0		0	0		0	0	
Jul	2030		0	0		0		0	0		0	0	
Aug	2030		0	0		0		0	0		0	0	
Sept	2030		0	0		0		0	0		0	0	
Oct	2030		0	0		0		0	0		0	0	
Nov	2030		0	0		0		0	0		0	0	
Dec	2030		0	0		0		0	0		0	0	
Jan	2031		0	0		0		0	0		0	0	
Feb	2031		0	0		0		0	0		0	0	
Mar	2031		0	0		0		0	0		0	0	
Apr	2031		0	0		0		0	0		0	0	
May	2031		0	0		0		0	0		0	0	
June	2031		0	0		0		0	0		0	0	
Jul	2031		0	0		0		0	0		0	0	
Aug	2031		0	0		0		0	0		0	0	
Sept	2031		0	0		0		0	0		0	0	
Oct	2031		0	0		0		0	0		0	0	
Nov	2031		0	0		0		0	0		0	0	
Dec	2031		0	0		0		0	0		0	0	
Jan	2032		0	0		0		0	0		0	0	
Feb	2032		0	0		0		0	0		0	0	
Mar	2032		0	0		0		0	0		0	0	
Apr	2032		0	0		0		0	0		0	0	
May	2032		0	0		0		0	0		0	0	
June	2032		0	0		0		0	0		0	0	
Jul	2032			0		0		0	0		0	0	
Aug	2032			0		0		0	0		0	0	
Sept	2032			0		0		0	0		0	0	
Oct	2032			0		0		0	0		0	0	
Nov	2032			0		0		0	0		0	0	
Dec	2032			0		0		0	0		0	0	

Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 1		Capacity Savings											Energy Savings / Participant			Capacity Savings / Participant		
		Net kW											Net kWh/Participant for IRP			Net kW/Participant for IRP		
		VA					NC					System						
Month	Year	VA Monthly New	VA Monthly Retired	VA Cum. for IRP (New+Retired)	VA Rate Reset Adj.	VA Cum. for Net Lost Revenue (NLR)	NC Monthly New	NC Monthly Retired	NC Cum. for IRP (New + Retired)	NC Rate Reset Adj.	NC Cum. for Net Lost Revenue (NLR) (New + Retired + Rate Reset Adj.)	System Cum for IRP	VA	NC	System	VA	NC	System
Jan	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Feb	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Mar	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Apr	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
May	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
June	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Jul	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Aug	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Sept	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Oct	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Nov	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Dec	2029		0	0		0		0	0		0	0	-	-	-	-	-	-
Jan	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Feb	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Mar	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Apr	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
May	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
June	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Jul	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Aug	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Sept	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Oct	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Nov	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Dec	2030		0	0		0		0	0		0	0	-	-	-	-	-	-
Jan	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Feb	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Mar	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Apr	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
May	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
June	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Jul	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Aug	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Sept	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Oct	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Nov	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Dec	2031		0	0		0		0	0		0	0	-	-	-	-	-	-
Jan	2032		0	0		0		0	0		0	0	-	-	-	-	-	-
Feb	2032		0	0		0		0	0		0	0	-	-	-	-	-	-
Mar	2032		0	0		0		0	0		0	0	-	-	-	-	-	-
Apr	2032		0	0		0		0	0		0	0	-	-	-	-	-	-
May	2032		0	0		0		0	0		0	0	-	-	-	-	-	-
June	2032		0	0		0		0	0		0	0	-	-	-	-	-	-
Jul	2032			0		0		0	0		0	0	-	-	-	-	-	-
Aug	2032			0		0		0	0		0	0	-	-	-	-	-	-
Sept	2032			0		0		0	0		0	0	-	-	-	-	-	-
Oct	2032			0		0		0	0		0	0	-	-	-	-	-	-
Nov	2032			0		0		0	0		0	0	-	-	-	-	-	-
Dec	2032			0		0		0	0		0	0	-	-	-	-	-	-

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Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 2. EM&V Data Incremental by Vintage Year

	Program Participants										
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019	-	-	1,579		1,579			-		-	1,579

Table 3. EM&V Data Annualized by Vintage Year

	Program Participants										
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019	-	-	1,579		1,579			-		-	1,579

Table 4. EM&V Data Accumulated through Vintage Year (for PPI)

	Program Participants										
	VA							NC PPI			System
2019								-			
2020								-			
2021								-			
2022								-			
2023								-			
2024								-			
2025								-			

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Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 2. EM&V Data Incremental by Vintage Year										
	Net Incremental Energy (kWh)									
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019			157,865		157,865			-		-	157,865

Table 3. EM&V Data Annualized by Vintage Year										
	Net Annualized Energy (kWh)									
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP
2019			753,308		753,308			-		-	753,308

Table 4. EM&V Data Accumulated through Vintage Year (for PPI)										
	Net Energy (kWh) for PPI									
	VA							NC PPI			System
2019								-			
2020								-			
2021								-			
2022								-			
2023								-			
2024								-			
2025								-			

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Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 2. EM&V Data Incremental by Vintage Year											Incremental Energy Savings/Participant			Incremental Capacity Savings/Participant		
	Net Peak Demand (kW)										Net kWh/Participant for IRP			Net kW/Participant for IRP		
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP	VA	NC	System	VA	NC	System
2019			113		113			-		-	113	100	-	100	0.07	-	0.07

Table 3. EM&V Data Annualized by Vintage Year											Annualized Energy Savings/Participant			Annualized Capacity Savings/Participant		
	Net Peak Demand (kW)										Net kWh/Participant for IRP			Net kW/Participant for IRP		
			VA IRP		VA NLR			NC IRP		NC NLR	System IRP	VA	NC	System	VA	NC	System
2019			113		113			-		-	113	477	-	477	0.07	-	0.07

Table 4. EM&V Data Accumulated through Vintage Year (for PPI)											PPI Energy Savings/Participant			PPI Capacity Savings/Participant		
	Net Peak Demand (kW)										Net kWh/Participant			Net kW/Participant		
	VA							NC PPI			System	VA	NC	System	VA	NC	System
2019								-			-		-	-		-	-
2020								-			-		-	-		-	-
2021								-			-		-	-		-	-
2022								-			-		-	-		-	-
2023								-			-		-	-		-	-
2024								-			-		-	-		-	-
2025								-			-		-	-		-	-

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Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 5. EM&V Data Accumulated through Vintage Year (for IRP and NLR)

	Program Participants	VA IRP	VA NLR	NC IRP	NC NLR	System IRP
2019		1,579	1,579	-	-	1,579
2020		1,579	1,579	-	-	1,579
2021		1,579	1,579	-	-	1,579
2022		1,579	1,579	-	-	1,579
2023		1,579	1,579	-	-	1,579
2024		1,579	1,579	-	-	1,579
2025		1,579	1,579	-	-	1,579
2026		1,579	1,579	-	-	1,579
2027		-	-	-	-	-
2028		-	-	-	-	-
2029		-	-	-	-	-
2030		-	-	-	-	-
2031		-	-	-	-	-
2032		-	-	-	-	-

Table 6. Cumulative EM&V Data Accumulated through Vintage Year (Lifetime)

	Program Participants	VA Lifetime	NC Lifetime	System Lifetime
2019		1,579	-	1,579
2020		1,579	-	1,579
2021		1,579	-	1,579
2022		1,579	-	1,579
2023		1,579	-	1,579
2024		1,579	-	1,579
2025		1,579	-	1,579
2026		1,579	-	1,579
2027		1,579	-	1,579
2028		1,579	-	1,579
2029		1,579	-	1,579
2030		1,579	-	1,579
2031		1,579	-	1,579
2032		1,579	-	1,579

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Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 5. EM&V Data Accumulated through Vintage Year (for IRP and NLR)

	Net Energy (kWh)								
	VA IRP		VA NLR		NC IRP		NC NLR	System IRP
2019	62,776		62,776		-		-	62,776
2020	753,308		753,308		-		-	753,308
2021	753,308		753,308		-		-	753,308
2022	753,308		753,308		-		-	753,308
2023	753,308		753,308		-		-	753,308
2024	753,308		753,308		-		-	753,308
2025	753,308		753,308		-		-	753,308
2026	753,308		753,308		-		-	753,308
2027	595,443		595,443		-		-	595,443
2028	-		-		-		-	-
2029	-		-		-		-	-
2030	-		-		-		-	-
2031	-		-		-		-	-
2032	-		-		-		-	-

Table 6. Cumulative EM&V Data Accumulated through Vintage Year (Lifetime)

	Net Energy (kWh)								
	VA Lifetime				NC Lifetime			System Lifetime
2019	62,776				-			62,776
2020	816,083				-			816,083
2021	1,569,391				-			1,569,391
2022	2,322,699				-			2,322,699
2023	3,076,007				-			3,076,007
2024	3,829,315				-			3,829,315
2025	4,582,622				-			4,582,622
2026	5,335,930				-			5,335,930
2027	5,931,373				-			5,931,373
2028	5,931,373				-			5,931,373
2029	5,931,373				-			5,931,373
2030	5,931,373				-			5,931,373
2031	5,931,373				-			5,931,373
2032	5,931,373				-			5,931,373

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Appendix D.3 Residential Appliance Recycling Program (DSM Phase VII) 2019

Table 5. EM&V Data Accumulated through Vintage Year (for IRP and NLR)										IRP Energy Savings/Participant			IRP Capacity Savings/Participant		
	Net Peak Demand (kW)									Net kWh/Participant			Net kW/Participant		
			VA IRP		VA NLR		NC IRP		NC NLR	System IRP	VA	NC	System	VA	NC	System
2019			113		113		-		-	113	40	-	40	0.07	-	0.07
2020			113		113		-		-	113	477	-	477	0.07	-	0.07
2021			113		113		-		-	113	477	-	477	0.07	-	0.07
2022			113		113		-		-	113	477	-	477	0.07	-	0.07
2023			113		113		-		-	113	477	-	477	0.07	-	0.07
2024			113		113		-		-	113	477	-	477	0.07	-	0.07
2025			113		113		-		-	113	477	-	477	0.07	-	0.07
2026			113		113		-		-	113	477	-	477	0.07	-	0.07
2027			-		-		-		-	-	-	-	-	-	-	-
2028			-		-		-		-	-	-	-	-	-	-	-
2029			-		-		-		-	-	-	-	-	-	-	-
2030			-		-		-		-	-	-	-	-	-	-	-
2031			-		-		-		-	-	-	-	-	-	-	-
2032			-		-		-		-	-	-	-	-	-	-	-

Table 6. Cumulative EM&V Data Accumulated through Vintage Year (Lifetime)										Lifetime Energy Savings/Participant			Lifetime Capacity Savings/Participant		
	Net Peak Demand (kW)									Net kWh/Participant			Net kW/Participant		
			VA Lifetime				NC Lifetime			System Lifetime	VA	NC	System	VA	NC	System
2019			113				-			113	40	-	40	0.07	-	0.07
2020			113				-			113	517	-	517	0.07	-	0.07
2021			113				-			113	994	-	994	0.07	-	0.07
2022			113				-			113	1,471	-	1,471	0.07	-	0.07
2023			113				-			113	1,948	-	1,948	0.07	-	0.07
2024			113				-			113	2,425	-	2,425	0.07	-	0.07
2025			113				-			113	2,902	-	2,902	0.07	-	0.07
2026			113				-			113	3,379	-	3,379	0.07	-	0.07
2027			113				-			113	3,756	-	3,756	0.07	-	0.07
2028			113				-			113	3,756	-	3,756	0.07	-	0.07
2029			113				-			113	3,756	-	3,756	0.07	-	0.07
2030			113				-			113	3,756	-	3,756	0.07	-	0.07
2031			113				-			113	3,756	-	3,756	0.07	-	0.07
2032			113				-			113	3,756	-	3,756	0.07	-	0.07

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