Harrison T. Godfrey
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Virginia Advanced Energy Economy
2224 Rosewood Ave.
Richmond, Va. 23220

Tuesday, October 20, 2020

Joel H. Peck, Clerk
c/o Document Control Center
State Corporation Commission
1300 E. Main Street
Richmond, Va. 23219

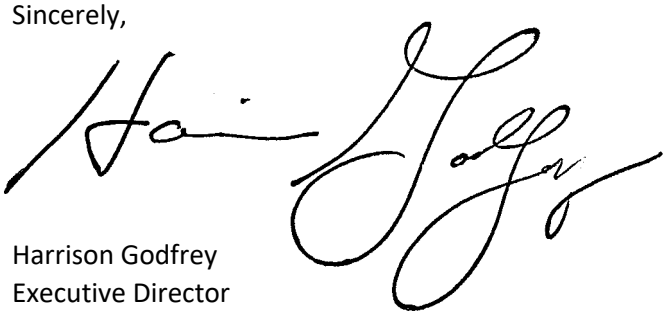
Re: In the matter regarding Virginia Electric and Power Company's Integrated Resource Plan Filing Pursuant To Va. Code Sections 56-597 Et Seq. / Case No. PUR-2020-00035

Dear Mr. Peck,

Please accept the attached letter as the Comments of Virginia Advanced Energy Economy regarding Virginia Electric and Power (Dominion Virginia) Company's 2020 Integrated Resource Plan filing pursuant to Va. Code Sections 56-597 ET Seq. Virginia Advanced Energy Economy (Va. AEE) is a coalition of businesses that seek to make the Commonwealth's energy more secure, clean, and affordable, bolstering Virginia's economy. The comments expressed herein represent the position of Va. AEE as a coalition but may not represent the view of any particular member.

On behalf of Virginia's advanced energy industry, I appreciate the opportunity to share our perspective and stand ready to address any questions the Commission or its staff may have.

Sincerely,



Harrison Godfrey
Executive Director

Attn:
Earnest White, Utilities Analyst
K.B. Clowers, Associate General Counsel
Ashley Macko, Senior Counsel
Matt Roussy, Hearing Examiner

COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

Re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code sections 56-596 et seq.

CASE NO. PUR-2020-00035

October 20, 2020

Executive Summary

The integrated resource planning (IRP) process allows the State Corporation Commission (SCC) to evaluate whether the plans of Virginia's investor-owned utilities (IOUs) will meet their load obligations, provide reliable service, and implement the Commonwealth's policies in a cost-effective manner. To inform the Commission's evaluation, Virginia Advanced Energy Economy (Va. AEE) retained a third-party analyst to review the utilization of energy efficiency (EE) in Dominion's 2020 IRP.

The cost-effectiveness of EE and demand response are well documented.[1] Moreover the Commonwealth recently enacted the Virginia Clean Economy Act (VCEA), which includes a binding Energy Efficiency Resource Standard (EERS), requiring the IOUs to meet specific energy savings targets through 2025 and empowering the Commission to extend and increase such targets. We therefore expected that the utility, in its least-cost plan, would include significant levels of EE, both to meet current and anticipated policy obligations, and to maximize ratepayer savings.

Unfortunately, after carefully evaluating the utility's plan, it is our determination that Dominion Virginia has included in their 2020 IRP only those measures essential to achieving a cumulative savings targets through 2025, as required by the VCEA, and continuation of program spending as required under the Grid Transformation and Security Act (GTSA) through 2028. So far as we are able to surmise, they have not considered EE as a cost-effective resource in the development of a true least-cost compliance pathway. Nor do they seem to have taken into account the possibility that the SCC, as empowered by the VCEA, could continue, let alone increase, their efficiency targets post-2025.

Drawing upon data from the Energy Information Agency (EIA), our analysis shows that the majority of investor-owned utilities are able to achieve residential and commercial EE savings orders of magnitude greater than Dominion achieved in 2019 at costs that are less than the locational marginal price (LMP) of power projected by the utility in their 2020 IRP. We therefore posit that the utility can significantly ramp up the utilization of EE, with programming analogous to what is already being conducted by comparable utilities and produce cost savings upwards of approximately $1.052 billion per year by 2035.

Our analysis furthermore considers the impact upon residential electricity bills should the utility implement such EE programming. When we take into account both the cumulative avoided costs to the grid that result from additional EE, and reduced household consumption, our analysis indicates such EE

[1] See, for example, Goldman et al. 2020. The Cost of Saving Electricity: A Multi-program Cost Curve for Programs Funded by U.S. Utility Customers, available from https://emp.lbl.gov/publications/cost-saving-electricity-multi-program.

programming will reduce the average monthly residential bill in 2030 by an estimated $16.76 below what it would otherwise be. This amount largely offsets almost 90% of the costs that Dominion Virginia attributes to the 2020 legislation. Based upon this analysis, we urge the Commission to direct the utility to develop a least-cost plan that implements Virginia's energy transition in a manner that is both compliant with applicable law and at the least cost to ratepayers, taking full advantage of the cost-effectiveness of energy efficiency.

Introduction

We comment on Dominion Virginia's 2020 IRP to highlight that it fails to adequately consider energy efficiency as a resource and in consequence presents a plan that is unnecessarily costly and attributes too high a cost to the Virginia Clean Economy Act ("VCEA"). We further show that robust energy efficiency programs will virtually eliminate the incremental costs of electricity bills that Dominion Virginia attributes to the VCEA. We urge the Commission to find that because Dominion Virginia has not presented a least-cost plan for compliance with the VCEA, Dominion Virginia's calculation of the cost of compliance with the Virginia Clean Economy Act ("VCEA") is not valid.

Dominion's approach to considering energy efficiency in their 2020 IRP is well summarized in the following section drawn from their filing:

> *Alternative Plans B through D factor in the implementation of energy efficiency programs and measures to achieve both 5% annual energy savings by 2025, as targeted by the VCEA, and $870 million in proposed spending by 2028, as required by the Grid Transformation and Security Act of 2018 (the "GTSA"). The Company has modeled these objectives by supplementing the Company's approved and pending DSM programs with a generic level of energy efficiency at a fixed price. This approach is a theoretical assumption used for planning purposes only. In reality, the level of energy efficiency savings included in this 2020 Plan may not materialize in the same manner as modeled due to many outside factors. These factors include the ability of future vendors to deliver program savings at the assumed fixed price, the desire of customers to participate in the program at that price, and the effectiveness of the program to be administered at that price. The modeled costs and level of savings attributable to generic energy efficiency are thus placeholders as future phases of energy efficiency programs are developed and implemented.*[2]

In short, Dominion has only included the energy efficiency programs that are approved or required. Dominion has not explored the potential of additional energy efficiency programming as a resource to be selected in this plan. We are therefore hard-pressed to consider their submission a true integrated resource plan (IRP). More accurately it is an integrated generation plan, with what appears to be little more than a nod to efficiency.

Further, Dominion Virginia's use of $200/MWH as the cost of energy efficiency programs is misleading, since they do not present life-cycle costs divided by first-year energy supply as a relevant metric for any other resource. Their use of this poorly defined statistic obscures their weak analysis of energy efficiency as a resource in this IRP.

[2] Case No. PUR-2020-00035 Docket No. E-100, Sub 165 Virginia Electric and Power Company's Report of Its Integrated Resource Plan, Filed May 1, 2020. Pages 5-6.

Since the cost-effectiveness of energy efficiency and demand response are well documented[3], a true least-cost IRP would include substantial energy efficiency programming, well beyond the program levels that Dominion is required to pursue. We show below that if Dominion Virginia performs energy efficiency programs at costs comparable to all other investor-owned utilities, energy efficiency is a less costly resource than any new generation option. We also show that Dominion Virginia has executed and proposes to execute energy efficiency programs that have achieved, and will achieve, energy savings below those of most investor-owned utilities in the United States. Thus, we strongly urge the Commission to direct Dominion to develop a least-cost plan that implements Virginia's energy transition in a manner that is both compliant with applicable law and at the least cost to ratepayers, including the full measure of energy efficiency programs.

Dominion's Recent Energy Efficiency Programs

The US Energy Information Administration ("EIA") requires each investor-owned electric utility and most other electric utilities to annually file considerable information about the utility's operations in each state in which they operate using Form 861. This reporting has included Energy Efficiency data since 2013. EIA compiles those data and publishes these annual compilations via the EIA website.[4] For purposes of this comment, we examined the data submitted to EIA by Dominion Virginia (listed as Virginia Electric & Power Company in Form 861 data) and by other utilities to summarize and compare Dominion Virginia's energy efficiency programs to those of other, comparable utilities.

The EIA provides instructions to utilities completing the energy efficiency portion of Form 861.[5] In these Form 861 data, EIA requires that a utility submit Reporting Year Energy Savings and Peak Demand Reduction on an annualized Reporting Year basis and Life Cycle Energy Savings and Peak Demand Reduction. In the industry, Reporting Year savings are often referred to as first-year savings and means the annualized savings in the first year that an energy efficiency measure is installed. Life Cycle savings are the sum of annual savings throughout the life of the measure. It is common to discuss energy efficiency program levels as first-year savings as a percentage of sales. Peak Demand Reduction is the reduction in electricity demand at the time of the utility's peak demand and generally is the same in both the Reporting Year and Life Cycle reports. EIA further requires that energy efficiency program costs be provided as Reporting Year and Life Cycle costs; when a utility expenses all energy efficiency program expenditures, these will generally be the same. For our analyses, we focus on first-year savings as a percentage of sales as the primary gauge of program accomplishment and on life-cycle costs as the measure of costs. We characterize Life-Cycle Energy Savings and Peak Demand Reduction as functions of Reporting Year Energy Savings as a percentage of sales.

All Form 861 reporting is Incremental Savings, meaning that the report for 2019 includes the savings attributable to program activities in 2019 and not savings in 2019 from accumulated effects of programs prior to 2019.

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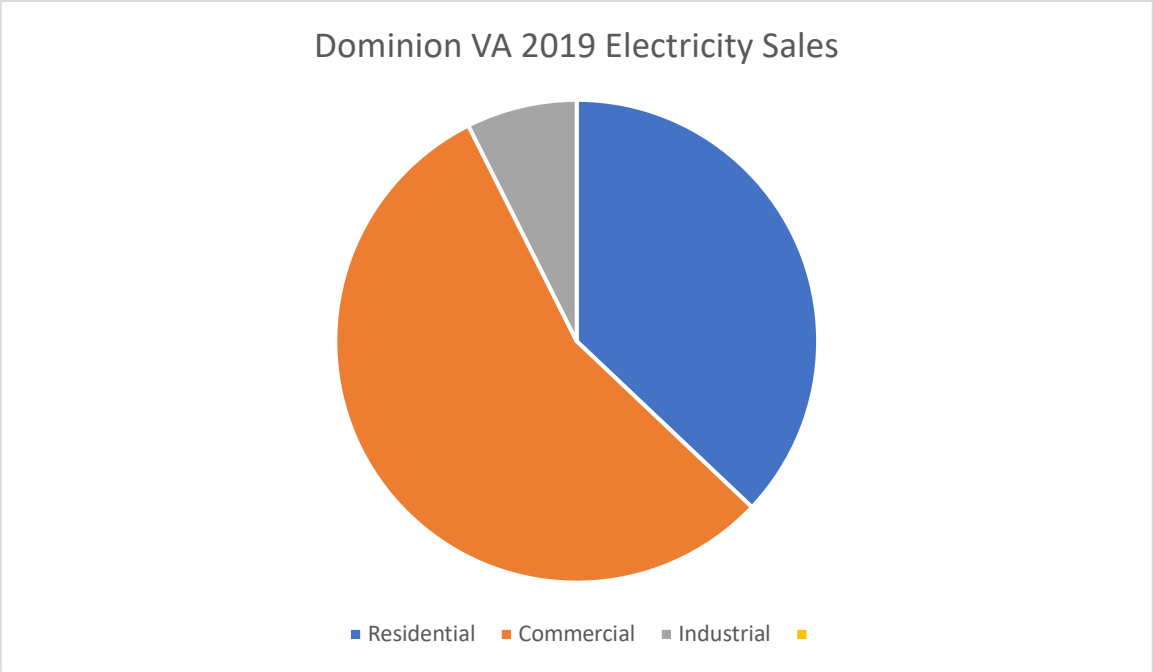
[3] See, for example, Goldman et al. 2020. The Cost of Saving Electricity: A Multi-program Cost Curve for Programs Funded by U.S. Utility Customers, available from https://emp.lbl.gov/publications/cost-saving-electricity-multi-program.

[4] See https://www.eia.gov/electricity/data/eia861/

[5] See https://elecidc12c.eia.doe.gov/2017%20EIA-861%20Instructions.pdf

For context, Dominion Virginia's 2019 sales were 29,829,089 MWH to residential customers, 44,681,860 MWH to commercial customers, and 5,962,659 MWH to industrial customers, further illustrated below.

Exhibit 1. Class Composition of Dominion Virginia Electricity Sales



Dominion Virginia reported residential energy efficiency programs from 2013 through 2019 as follows:

Exhibit 2. Dominion Virginia Residential Energy Efficiency Programs as Summarized in EIA Form 861

	Incremental Reporting Year Energy Savings (MWH)	Incremental Life Cycle Energy Savings (MWH)	Incremental Peak Demand Savings (MW)	Incremental Life Cycle Costs - All Costs ($1000)	Incremental Reporting Year Energy Savings (% Sales)	Incremental Life Cycle Costs - All Costs ($/kWh Sales)	Incremental Life Cycle Costs($/kWh Reporting Year Savings)	Incremental Life Cycle Costs($/kWh Life Cycle Savings)
2019	75,717	1,227,205	7	9,787	0.254%	$ 0.00012	$ 0.129	$ 0.008
2018	448	6,269	0	1,432	0.001%	$ 0.00002	$ 3.196	$ 0.228
2017	7,717	81,106	1	8,503	0.028%	$ 0.00013	$ 1.102	$ 0.105
2016	40,143	418,036	9	21,021	0.140%	$ 0.00031	$ 0.524	$ 0.050
2015	19,834	189,411	8	14,882	0.068%	$ 0.00026	$ 0.750	$ 0.079
2014	24,516	250,525	7	16,376	0.083%	$ 0.00024	$ 0.668	$ 0.065
2013	14,218	159,451	6	9,875	0.049%	$ 0.00019	$ 0.695	$ 0.062

Dominion Virginia reported commercial energy efficiency programs from 2013 through 2019 as follows:

Exhibit 3. Dominion Virginia Commercial Energy Efficiency Programs as Summarized in EIA Form 861

	Incremental Reporting Year Energy Savings (MWH)	Incremental Life Cycle Energy Savings (MWH)	Incremental Peak Demand Savings (MW)	Incremental Life Cycle Costs - All Costs ($1000)	Incremental Reporting Year Energy Savings (% Sales)	Incremental Life Cycle Costs - All Costs ($/kWh Sales)	Incremental Life Cycle Costs($/kWh Reporting Year Savings)	Incremental Life Cycle Costs($/kWh Life Cycle Savings)
2019	61,376	609,706	12	16,016	0.137%	$ 0.00011	$ 0.261	$ 0.026
2018	77,896	821,920	14	18,469	0.181%	$ 0.00013	$ 0.237	$ 0.022
2017	98,872	1,069,038	18	17,828	0.238%	$ 0.00012	$ 0.180	$ 0.017
2016	159,803	2,429,679	21	17,650	0.396%	$ 0.00009	$ 0.110	$ 0.007
2015	88,916	1,229,306	17	16,092			$ 0.181	$ 0.013
2014	57,210	938,567	5	16,724			$ 0.292	$ 0.018
2013	6,048	74,118	1	3,982			$ 0.658	$ 0.054

In these exhibits, Incremental Reporting Year Energy Savings (% Sales) is the appropriate metric to compare Dominion Virginia's level of program effort to that of other utilities. In 2019, Dominion Virginia's residential energy efficiency program achieved 0.254% reporting year savings as a percentage of residential sales. This was 69th out of 88 reporting investor-owned utilities (23rd percentile). In 2019, Dominion Virginia's commercial program achieved 0.136% reporting year savings as a percentage of commercial sales. This was 79th out of 89 reporting investor-owned utilities (12th percentile).

In these exhibits, Incremental Life Cycle Costs – All Costs ($/kWh Sales) characterizes the level of sales surcharge needed to fund the program. Comparisons between utilities on costs should be related to levels of savings, which we examine later in these comments.

In these exhibits, Incremental Life Cycle Costs ($/kWh Life Cycle Savings) is the appropriate metric to roughly compare the costs of energy efficiency to the costs of power supply, though in an IRP time discounting and the distinct avoided costs of capacity and energy should be used, as we discuss later in these comments. We note here, and will discuss in greater detail below (See Dominion Virginia's Figure 5.5.2.1, reproduced below), that the costs of energy saved on a life cycle basis through energy efficiency are well below the retail costs of power supply and below the locational marginal prices of power shown in Dominion's 2020 IRP.

We note, as a matter of clarification, that Dominion Virginia has used $200/MWH, or $0.20 per kWh, as the cost of generic energy efficiency resources. Virginia Dominion has not been careful in defining that metric, but we understand it to be the equivalent of EIA's Incremental Life Cycle Costs – All Costs per MWh Reporting Year Savings and not Incremental Life Cycle Costs – All Costs per MWH Life Cycle Savings. As can be seen in these exhibits, our interpretation is generally consistent with the reported data. Dominion Virginia's use of $200/MWH as the cost of energy efficiency programs is misleading, since they do not present life-cycle costs divided by first-year energy supply as a relevant metric for any other resource.

Comparison of Dominion's Energy Efficiency Programs to High Performance Utilities

To establish context for considering Dominion Virginia's existing and proposed energy efficiency programs, we present below an exhibit of the investor-owned utilities that had the highest levels of Reporting Year Savings as a percentage of Sales for residential and commercial customers, respectively, developed from EIA's Form 861 data.

The most robust residential energy efficiency programs by investor-owned utilities are:

Exhibit 4. Investor-owned Electric Utilities with Highest Reporting Year Incremental Annual Residential Energy Savings in 2019 as % of Residential Electricity Sales

Rank	Utility	State	Reporting Year Incremental Annual Savings (% of Sales)	Incremental Life Cycle Costs ($/kWh Life Cycle Savings)
1	Massachusetts Electric Co	MA	6.65%	$ 0.068
2	The Narragansett Electric Co	RI	6.17%	$ 0.056
3	NSTAR Electric Company	MA	4.75%	$ 0.090
4	Otter Tail Power Co	MN	3.91%	$ 0.011
5	Commonwealth Edison Co	IL	3.77%	$ 0.016
6	Public Service Co of Colorado	CO	2.55%	$ 0.016
7	Pacific Gas & Electric Co.	CA	2.52%	$ 0.028
8	The Potomac Edison Company	MD	2.40%	$ 0.027
9	Baltimore Gas & Electric Co	MD	2.32%	$ 0.032
10	Pennsylvania Electric Co	PA	2.22%	$ 0.021
11	Tucson Electric Power Co	AZ	2.16%	$ 0.007
12	Southwestern Public Service Co	NM	2.15%	$ 0.019
13	DTE Electric Company	MI	2.07%	$ 0.023
14	MidAmerican Energy Co	IL	1.98%	$ 0.025
15	Southern Indiana Gas & Elec Co	IN	1.92%	$ 0.016
16	Metropolitan Edison Co	PA	1.87%	$ 0.024
17	El Paso Electric Co	NM	1.86%	$ 0.019
18	Pennsylvania Power Co	PA	1.84%	$ 0.019
19	Northern Indiana Pub Serv Co	IN	1.78%	$ 0.017
20	UNS Electric, Inc	AZ	1.75%	$ 0.006
21	Potomac Electric Power Co	MD	1.71%	$ 0.060
22	San Diego Gas & Electric Co	CA	1.65%	$ 0.020
23	Indianapolis Power & Light Co	IN	1.65%	$ 0.024
24	Cleveland Electric Illum Co	OH	1.61%	$ 0.014
25	Niagara Mohawk Power Corp.	NY	1.59%	$ 0.029
…	…			
69	Dominion	VA	0.25%	$ 0.008

The most robust commercial energy efficiency programs by investor-owned utilities are:

Exhibit 5. Investor-owned Electric Utilities with Highest Reporting Year Incremental Annual Commercial Energy Savings in 2019 as % of Commercial Electricity Sales

Rank	Utility	State	Reporting Year Incremental Annual Savings (% of Sales)	Incremental Life Cycle Costs ($/kWh Life Cycle Savings)
1	Indianapolis Power & Light Co	IN	5.96%	$ 0.009
2	ALLETE, Inc.	MN	3.74%	$ 0.009
3	Commonwealth Edison Co	IL	3.44%	$ 0.015
4	Massachusetts Electric Co	MA	2.69%	$ 0.021
5	NSTAR Electric Company	MA	2.36%	$ 0.034
6	Indiana Michigan Power Co	MI	2.33%	$ 0.010
7	Public Service Co of Colorado	CO	2.32%	$ 0.009
8	Public Service Co of NH	NH	2.29%	$ 0.019
9	Unitil Energy Systems	NH	2.28%	$ 0.046
10	Oklahoma Gas & Electric Co	AR	2.12%	$ 0.015
11	Nevada Power Co	NV	2.08%	$ 0.008
12	DTE Electric Company	MI	2.03%	$ 0.014
13	Indiana Michigan Power Co	IN	2.00%	$ 0.006
14	Consumers Energy Co	MI	2.00%	$ 0.017
15	Potomac Electric Power Co	MD	1.97%	$ 0.022
16	Northern States Power Co	MI	1.96%	$ 0.010
17	Pennsylvania Electric Co	PA	1.96%	$ 0.004
18	The Narragansett Electric Co	RI	1.96%	$ 0.035
19	Pennsylvania Power Co	PA	1.88%	$ 0.005
20	San Diego Gas & Electric Co	CA	1.87%	$ 0.027
21	Pacific Gas & Electric Co.	CA	1.86%	$ 0.017
22	Connecticut Light & Power Co	CT	1.83%	$ 0.033
23	Northern Indiana Pub Serv Co	IN	1.82%	$ 0.009
24	Entergy Arkansas LLC	AR	1.74%	$ 0.011
25	Idaho Power Co	ID	1.72%	$ 0.000
…	…			
79	Dominion	VA	0.14%	$ 0.026

The two preceding exhibits demonstrate that many investor-owned utilities are able to achieve Reporting Year residential and commercial energy efficiency savings at a pace that is an order of magnitude larger than was achieved by Dominion in 2019 at costs that are less than the locational marginal price of power projected by Dominion Virginia in their 2020 IRP. Dominion projects planning period average nominal values for locational marginal price of energy in the range $0.0389/kWh to $0.04458/kWh on-peak and $0.03279/kWh to $0.03478/kWh off-peak.[6] Put simply, Dominion

[6] Case No. PUR-2020-00035 Docket No. E-100, Sub 165 Virginia Electric and Power Company's Report of Its Integrated Resource Plan, Filed May 1, 2020. Figure 4.4.1.1, page 63.

significantly lags its peer utilities when it comes to residential and commercial efficiency and, yet, overestimates the cost of achieving additional savings from EE.

Energy Efficiency in Dominion's 2020 IRP

In preparing their 2020 IRP, Dominion Virginia incorporated energy efficiency in three tranches: existing and approved programs, proposed programs, and generic energy efficiency. For IRP Plan B, these are presented in cumulative rather than incremental amounts by year from 2020 through 2035 in Appendix 6 of the IRP, with cumulative energy savings from existing and approved programs in Appendix 6C, cumulative energy savings from proposed programs in Appendix 6I, and generic resources in Appendix 6L. In order to support our further analysis, we converted these exhibits to show annual net incremental energy savings divided between residential and commercial customer classes in each of Dominion Virginia's tranches. It is important to note that the Incremental Reporting Year savings reported to EIA on Form 861 and discussed above differ from these annual net incremental energy savings, in that Dominion has accounted for the limited life of previously installed measures as those measures cease to provide savings at the end of their assumed useful life. The difference between Dominion's cumulative savings in a given year and in the preceding year are the result of both deprecation of old measures and new Incremental Reporting Year Savings as reported to EIA, which causes Dominion's annual incremental savings to be negative in years without significant new program activity. Nonetheless, the following exhibits provide some basis for comparing Dominion's plans to the programs pursued by some other investor-owned utilities.

Exhibit 6. Energy Efficiency Programs Presented in Dominion Virginia's 202 IRP

Annual Net Incremental Energy Savings per IRP	Existing and Approved Residential Programs	Existing and Approved Commercial Programs	Proposed Residential Programs	Proposed Commercial Programs	Generic Programs	Proposed Residential Programs (% of Sales)	Proposed Commercial Programs (% of Sales)	Generic Programs (% of Sales)
2021	16,794	(14,562)	18,974	8,654	190,920	0.06%	0.03%	0.29%
2022	71,472	(12,947)	41,314	16,198	354,018	0.13%	0.05%	0.52%
2023	113,826	14,664	47,199	18,301	354,068	0.15%	0.05%	0.50%
2024	47,505	(18,929)	46,057	20,869	367,762	0.14%	0.05%	0.51%
2025	7,499	(53,172)	43,530	22,046	340,999	0.13%	0.05%	0.46%
2026	(4,665)	(45,973)	20,668	10,168	354,234	0.06%	0.02%	0.47%
2027	(3,027)	(36,950)	2,134	848	354,232	0.01%	0.00%	0.46%
2028	(418)	(14,209)	2,052	824	193,427	0.01%	0.00%	0.24%
2029	(1,370)	1,081	1,984	804	(30,128)	0.01%	0.00%	-0.04%
2030	12,788	(3,151)	1,937	788	-	0.01%	0.00%	0.00%
2031	(1,363)	(6,755)	1,912	775	-	0.01%	0.00%	0.00%
2032	(2,329)	(7,115)	1,830	764	32,211	0.01%	0.00%	0.04%
2033	1,175	(6,136)	1,811	748	(97,824)	0.01%	0.00%	-0.11%
2034	1,349	(2,470)	1,780	742	(120,383)	0.01%	0.00%	-0.14%
2035	15,942	803	1,754	733	(119,762)	0.01%	0.00%	-0.14%

This exhibit illustrates that Dominion Virginia has included in their 2020 IRP only those measures essential to achieving a cumulative savings of 5% of sales in the year 2025 as required by the VCEA and continuation of program spending as required under the GTSA through 2028. So far as we are able to

surmise, they have not considered EE as a least-cost resource in the development of a true least-cost compliance pathway. Nor do they seem to have taken into account the possibility that the SCC, as empowered by the VCEA, could continue, let alone increase, their efficiency targets post-2025. Both of these factors, in our estimation, constitute significant shortcomings in their integrated resource planning process.

Throughout this period up to 2025, the level of annual net incremental energy savings from approved and proposed residential energy efficiency programs in Dominion's IRP is about 0.15% of residential energy sales. The level of annual net incremental energy savings from approved and proposed commercial energy efficiency programs is about 0.05% of commercial energy sales. Finally, the level of annual net incremental energy savings from generic energy efficiency programs that are not specific to customer class is about 0.5% of combined residential and commercial energy sales. Although Dominion Virginia does not specify the allocation of generic energy efficiency to residential and commercial customers, we may conclude that from 2021 through 2025, Dominion proposes to pursue annual Incremental Reporting Year savings of around 0.6%. From 2026 through 2028 Dominion Virginia proposes to achieve approximately 0.5% annual Incremental Reporting Year savings through the spending required by the GTSA. Dominion Virginia does not include any material level of energy efficiency programming after 2028. Compared to all other investor-owned electric utilities in 2019, they would maintain their low ranking through 2025 and then fade to near the bottom of the list by 2029.

Energy Efficiency as a Resource for Dominion's 2020 IRP

In order to consider energy efficiency as a resource in Dominion Virginia's 2020 IRP, it is necessary to identify the amounts and costs of this resource that could be made available for selection. Ideally, Dominion Virginia would have given the identification and characterization of energy efficiency resources the same level of attention as they gave to generation resources. If they had done so, the IRP could have selected from an expansive menu of program options with a supply curve for each that related cost to resource quantity. Since Dominion did not perform that analysis, we examined potential energy efficiency resources using EIA Form 861 data from all investor-owned utilities under the hypothesis that Dominion Virginia could produce energy efficiency for costs equivalent to the average investor-owned utility.

In order to assess what it would cost for Dominion Virginia to achieve levels of energy efficiency programming distinctly different than those they currently attain, we used Form 861 data about energy efficiency programs by customer class from all of the reporting investor-owned utilities. We found statistical relationships for each customer class between levels of energy efficiency programs as measured by Reporting Year Incremental Savings and Annual Life Cycle Incremental Cost, as well as of Peak Demand Savings and of Life Cycle Savings in relation to Reporting year Energy Savings. Those statistical relationships constitute an empirical EE supply curve appropriate for use in an IRP.

Using these relationships, we developed the results that could be achieved by Dominion Virginia through energy efficiency programs more comparable to those of other investor-owned electric utilities. In an IRP, a primary driver of the need for new resources is the ability of the utility to meet peak demand each year with reasonable reliability. Peak demand plus a reserve margin determines the aggregate generating capacity required by the utility, with energy use throughout the year determining the types

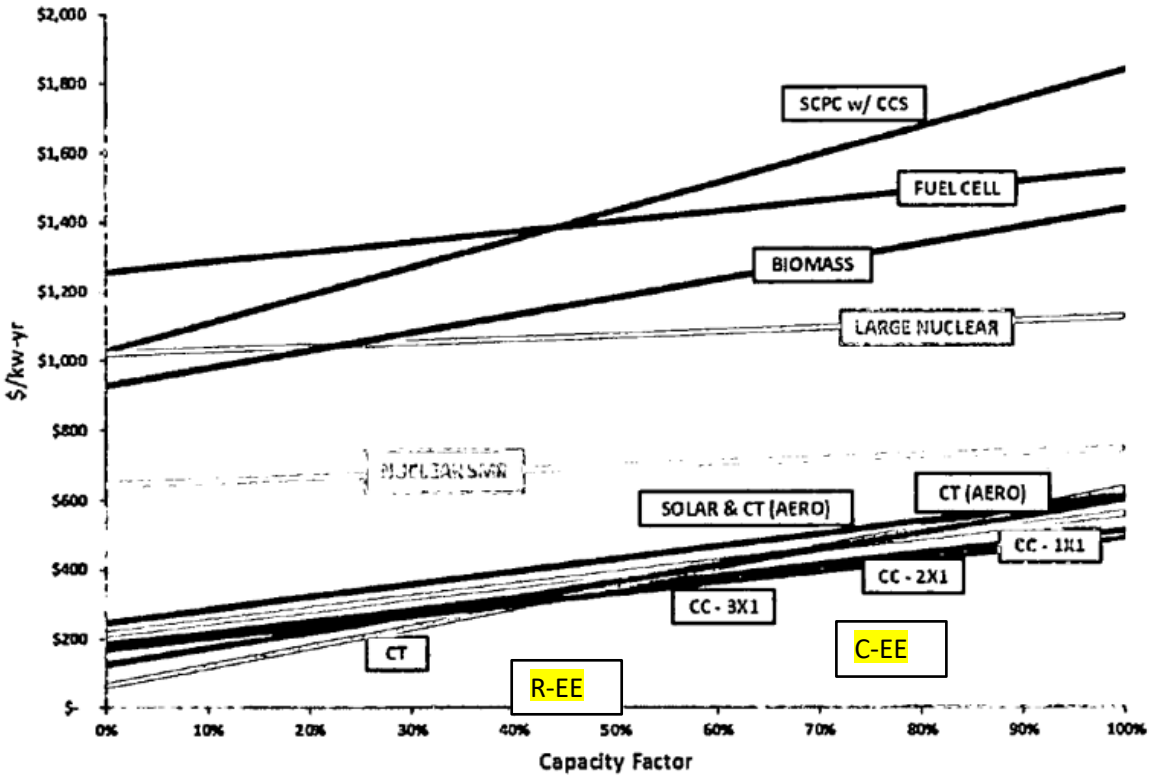
of generating capacity that are most cost-effective. Thus, peak demand reduction is an important benefit of energy efficiency in an IRP.

Energy efficiency generally reduces electricity demand throughout the year, including at the time of peak demand. Many efficiency measures provide savings proportional to demand, so have a proportionate benefit at the time of the peak. Still other measures (such as high-efficiency air conditioning) are focused on the time of peak demand and thus have a disproportionate benefit at the time of the peak. Because we have characterized peak demand reduction statistically based on the mix of energy efficiency measures commonly used across the industry, our projection of demand reduction in relationship to the level of overall energy efficiency programming is reasonable for Dominion Virginia.

Based on our regression results, saving an average of one MWH per hour over the course of a year through residential energy efficiency reduces peak demand by about 2.34 MW while commercial energy efficiency reduces peak demand by about 1.26 MW by saving an average of one MWH per hour. Viewed as capacity factors per MW peak demand reduction, residential energy efficiency operates with a capacity factor of 43% while commercial energy efficiency operates with a capacity factor of 79%. Based on our regression results, these savings can be obtained with costs equal to $17.17 per kW-yr of residential demand reduction and $67.15 per kW-yr of commercial demand reduction. These capacity factors and costs per kW-yr enable us to compare energy efficiency to generation technologies in the following exhibit. This exhibit shows Dominion Virginia's Figure 5.5.2.1 "screening curve" comparison of dispatchable generation technologies with residential EE (R-EE) and commercial EE (C-EE) resources overlaid based on our regression results. The fact that both the residential EE and commercial EE points fall below any of the generation technology cost vs. capacity factor curves shows that both are cheaper than any generation technology.

Exhibit 7

Figure 5.5.2.1 - Dispatchable LCOE (2023 COD)



As an illustration of the power of persistent energy efficiency programming at higher levels than those incorporated into the Dominion Virginia 2020 IRP, energy efficiency programming at the rate of 1.5% annual Reporting Year Savings as a percentage of residential and commercial sales from now through 2035 would produce cumulative peak demand reduction of about 3,600 MW in contrast to Dominion Virginia's projection of 164 MW of DSM capacity.[7] 1.5% annual Reporting Year Savings as a percentage of residential and commercial sales would be about three times the level achieved by Dominion in 2019 but would still leave Dominion ranked at about the 60th percentile of investor-owned utilities.

Energy efficiency programming at the rate of 2.0% annual Reporting Year Savings as a percentage of residential and commercial sales from now through 2035 would produce cumulative peak demand reduction of about 4,900 MW in contrast to Dominion Virginia's projection of 164 MW DSM capacity. 2.0% annual Reporting Year Savings as a percentage of residential and commercial sales would be about four times the level achieved by Dominion in 2019 and rank Dominion at about the 83rd percentile of investor-owned utilities.

Without access to the detailed data and modeling tools used by Dominion Virginia in preparing their 2020 IRP, we cannot fully calculate the avoided costs that would result from persistent energy efficiency programming at the rate of 1.5% Reporting Year savings per year. As an approximation, we apply the

[7] Case No. PUR-2020-00035 Docket No. E-100, Sub 165 Virginia Electric and Power Company's Report of Its Integrated Resource Plan, Filed May 1, 2020. Appendix 2A.

capacity and locational marginal prices supplied by Dominion Virginia in their 2020 IRP in Table 4.4.1.1[8] under the heading "2020 Plan Mid-Case Federal CO2 with Virginia in RGGI". The following exhibit shows the projected program costs and avoided costs of such a scenario.

Exhibit 8. Projected Net Financial Benefits to Dominion Virginia's Customers of 1.5% Annual First-Year Savings from 2020 Through 2035

Financial Benefits of 1.5% Annual Incremental EE Programs								
	2020	2021	2022	2023	2024	2025	2026	2027
Program Costs (1000s)	$119,949	$123,094	$127,307	$ 131,963	$135,378	$ 139,242	$ 141,910	$ 145,306
Avoided Costs (1000s)	$ 48,756	$ 98,837	$150,735	$ 204,649	$260,135	$ 316,934	$ 374,834	$ 434,183
Net Savings (1000s)	$ (71,193)	$ (24,257)	$ 23,428	$ 72,686	$124,758	$ 177,692	$ 232,924	$ 288,877
Program Costs (1000s)	2028	2029	2030	2031	2032	2033	2034	2035
Avoided Costs (1000s)	$148,742	$150,473	$152,724	$ 154,839	$157,350	$ 159,012	$ 160,858	$ 162,570
Net Savings (1000s)	$495,022	$556,520	$618,947	$ 682,244	$746,612	$ 811,627	$ 877,470	$ 944,071
	$346,281	$406,046	$466,222	$ 527,405	$589,262	$ 652,615	$ 716,612	$ 781,501

The following exhibit shows the similar results of persistent 2% annual Incremental Reporting Year EE programs, which would be about 4 times the level of energy efficiency programming that Dominion performed in 2019 and plans to pursue through 2025, and would place Dominion Virginia at about the 80th percentile of investor-owned utilities:

Exhibit 9. Projected Net Financial Benefits to Dominion Virginia's Customers of 2.0% Annual First-Year Savings from 2020 Through 2035

Financial Benefits of 2.0% Annual Incremental EE Programs								
	2020	2021	2022	2023	2024	2025	2026	2027
Program Costs (1000s)	$149,732	$153,925	$159,543	$ 165,751	$170,304	$ 175,456	$ 179,013	$ 183,541
Avoided Costs (1000s)	$ 65,009	$131,782	$200,980	$ 272,865	$346,847	$ 422,579	$ 499,778	$ 578,910
Net Savings (1000s)	$ (84,724)	$ (22,142)	$ 41,437	$ 107,115	$176,544	$ 247,123	$ 320,765	$ 395,369
Program Costs (1000s)	2028	2029	2030	2031	2032	2033	2034	2035
Avoided Costs (1000s)	$188,122	$190,431	$193,433	$ 196,252	$199,600	$ 201,816	$ 204,278	$ 206,560
Net Savings (1000s)	$660,030	$742,026	$825,262	$ 909,659	$995,482	$1,082,170	$1,169,960	$1,258,761
	$471,908	$551,595	$631,830	$ 713,407	$795,882	$ 880,353	$ 965,682	$1,052,201

2% annual Incremental Reporting Year EE programs would place Dominion Virginia on par with utilities such as PECO in Pennsylvania, DTE in Michigan, MidAmerican in Illinois, Southern Indiana Gas & Electric (Vectren South) in Indiana. As Exhibits 4 and 5 above demonstrate, while these utilities have more robust energy efficiency programs than Dominion, they are still far from the top performing utilities in the country.

Based on the above analysis, we conclude that if Dominion Virginia were to accelerate energy efficiency programming to a pace of 1.5% - 2.0% annual Reporting Year Incremental Savings, performing those programs at costs similar to the average investor-owned utility performing at those levels, Dominion Virginia could substantially reduce its needs for new generation resources, aside from those serving to decarbonize the grid and thereby meet the Commonwealth's clean energy goals, and save its customers substantial costs. Exhibit 9 shows that energy efficiency at a pace of 2% annual Reporting Year savings produces annual cost savings that accumulate to about $1.052 billion per year by 2035.

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Without the ability to fully model an IRP for Dominion Virginia, we cannot identify the optimum level of energy efficiency programming. Since utilities like PEPCO, DTE, and MidAmerican are performing at 2% annual Reporting Year savings based on IRP proceedings, we adopt 2% annual Reporting Year savings as the basis for a Residential Bill Analysis.

Virginia Residential Bill Analysis

Dominion Virginia presents a Residential Bill Analysis for its 2020 Integrated Resource Plan beginning on page 32 of its IRP Report. This analysis is based on a customer using an average 1,000 kWh per month in 2030. The following exhibit duplicates Dominion Virginia's Figure 2.5.1

Exhibit 10. Dominion Virginia's Average Monthly Residential Bill Analysis as Presented in Their 2020 IRP. Effects of Legislation is Based by Dominion Virginia on Their Plan B

	2030	Compound Annual Growth Rate
2019 Year End	$122.66	n/a
Plan A	$11.70	0.8%
Pre-2020 Legislation	$15.28	1.0%
2020 Legislation	$18.94	1.1%
Total 2030 Year End	$168.58	2.9%
Total Bill Increase	$45.92	n/a

We offer two revisions to this calculation. If Dominion were to carry out energy efficiency programming at the pace of 2% annual Incremental Reporting Year Savings for both residential and commercial customers, the net savings in 2030 would be approximately $632 million. Assuming Dominion Virginia's projected sales in 2030, less the cumulative 2030 energy savings from a 2% annual Incremental Reporting Year Savings, yields net savings of $9.62 per MWh sales. The posited monthly residential bill is for 1 MWh, which would therefore be reduced by $9.62 to a Total 2030 Year End amount of $158.96 with a bill increase of $36.32. This savings accrues to all customers whether or not they participate in the energy efficiency programs, because it reflects the difference in the total cost of energy efficiency programs and the total avoided cost of power supply due to the energy efficiency programs. Both the cost of energy efficiency programs and the avoided cost of power supply are allocated to all customers roughly in proportion to their energy use.

Additionally, in the presence of a robust energy efficiency program, it is not appropriate to assume that the average monthly electricity use will be unchanged. Rather it is more appropriate to assume that the usage of a representative customer is reduced by the cumulative level of energy efficiency programming, which would be approximately 18% in 2030, for a net usage of 820 kWh/month. This level of energy efficiency savings can be achieved through the replacement of consumer products such as lights and appliances with more efficient technologies, savings in air conditioning from reduced heat load inside the home from those more efficient consumer products, and improvements in the efficiency of heating and cooling. All of these are widely-available efficiency measures deployed by peer utilities across the country, producing verifiable energy savings. It is not possible to fully replicate Dominion Virginia's residential bill calculations with the information presented in their IRP, so we approximate the

effects of reduced energy consumption by assuming that the avoided costs are limited to locational marginal price. Assuming the locational marginal prices presented by Dominion Virginia in Table 4.4.1.1 under the heading "2020 Plan Mid-Case Federal CO2 with Virginia in RGGI", this would further reduce the representative residential monthly bill by $7.14 to a Total 2030 Year End amount of $151.82, for a bill increase of $29.18 over 2019 levels. This represents a bill increase that is about 35% lower than what was estimated by Dominion.

The exhibit below captures Dominion's analysis of the VCEA on customer bills, noted above, and the EE cost savings we have calculated.

Exhibit 11. Effects of 2% Annual Reporting Year Energy Savings on Dominion Virginia's Residential Bill Analysis

Factor	2030
2020 Legislation Cost according to Dominion	$18.94
Bill Savings Due to 2% annual Energy Efficiency	$16.76
Net Cost of 2020 Legislation if Implemented with Robust Energy Efficiency	$ 2.18

Because we have not evaluated other aspects of Dominion Virginia's 2020 IRP, we do not endorse the overall bill analysis presented by the utility. But, as the above exhibit demonstrates, we believe that an energy efficiency program analogous to what is already being conducted by comparable utilities will reduce the average residential bill by an estimated $16.76 below what it would otherwise be. This amount largely offsets (by nearly 90%) the costs that Dominion Virginia attributes to the 2020 legislation.

Conclusion

In their 2020 IRP, Dominion Virginia has included only the energy efficiency programs they are obligated to perform by law. The record does not indicate that they have carefully considered energy efficiency as a resource in competition with generation resources. As a result, they have not provided a least-cost plan going forward and have significantly overestimated the net cost of compliance with the VCEA.

Dominion Virginia's current (2019) energy efficiency programs are weak by comparison to peer investor-owned electric utilities, ranking in the 8th percentile of energy savings per MWh energy sales through residential customer programs and in the 20th percentile of energy savings per MWh energy sales through commercial customer programs.

By executing more robust energy efficiency programs at costs comparable to peer utilities that have such programs, Dominion Virginia could avoid generation costs far exceeding the costs of the energy efficiency programs. If Dominion Virginia produced energy efficiency at the pace of 1.5% annual incremental first-year savings, Dominion Virginia would reduce net costs to customers by about $781 million in 2035. If Dominion Virginia produced energy efficiency at the pace of 2.0% annual incremental first-year savings, Dominion Virginia would reduce net costs to customers by about $1.052 billion in 2035. Savings in ever increasing amounts would accrue to customers each year through 2035. At these levels of energy efficiency programs, residential bill analysis shows that virtually all of the costs that

Dominion Virginia attributes to compliance with the VCEA can be eliminated through robust energy efficiency.

We strongly urge the Commission to direct Dominion to develop a least-cost plan that implements Virginia's energy transition in a manner that is both compliant with applicable law and at the least cost to ratepayers, including the full measure of energy efficiency programs.

We likewise urge the Commission to find that because Dominion Virginia has not presented a least-cost plan for compliance with the VCEA, Dominion Virginia's calculation of the cost of compliance with the VCEA is not valid.