

**Virginia State Corporation Commission
eFiling CASE Document Cover Sheet**

190320063

Case Number (if already assigned)	PUR-2018-00065
Case Name (if known)	Commonwealth of Virginia ex rel. State Corporation Commission, In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.
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190320063

March 7, 2019

BY ELECTRONIC DELIVERY

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Richmond, VA 23219

*Commonwealth of Virginia ex rel. State Corporation Commission,
In re: Virginia Electric and Power Company's Integrated Resource Plan
filing pursuant to Va. Code § 56-597 et seq.
Case No. PUR-2018-00065*

Dear Mr. Peck:

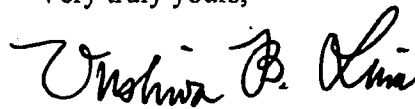
Please find enclosed for electronic filing in the above-referenced matter the *2018 Compliance Filing* of Virginia Electric and Power Company (the "Company"). In addition, enclosed is the *Identification and Summaries of Direct Witnesses of Virginia Electric and Power Company for the 2018 Compliance Filing*, which the Company is filing in lieu of prefiled testimony and exhibits as permitted by Ordering Paragraph (2) of the Order Establishing Schedule for Continuation of Proceeding issued by the State Corporation Commission (the "Commission") on February 12, 2019.

Also enclosed with this filing is a cover letter from Paul D. Koonce, President and Chief Executive Officer of the Power Generation Group, which provides an overview of the 2018 Compliance Filing.

The Company is contemporaneously filing with the Commission under separate cover a *Legal Memorandum of Virginia Electric and Power Company*.

Please do not hesitate to contact me if you have any questions in regard to this filing.

Very truly yours,



Vishwa B. Link

Enclosure

March 7, 2019
Mr. Joel H. Peck
Page 2

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190320063

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15032003

March 7, 2019

Joel H. Peck, Clerk
Virginia State Corporation Commission
C/o Document Control Center
1300 East Main Street
Richmond, VA 23219

RE: Compliance Filing, Case No. PUR-2018-00065

Dear Mr. Peck:

As directed by the Commission in its December 7, 2018 Order (the "Order") regarding the 2018 Integrated Resource Plan (the "2018 Plan" or the "Plan") filing by Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company") in Case No. PUR-2018-00065, Dominion Energy Virginia respectfully submits this compliance filing (the "Compliance Filing").

Dominion Energy Virginia has included in this Compliance Filing every directive of the Order to the best of its ability at this time. Consistent with the Order, the Company has re-run the modeling for the five alternative plans contained in the 2018 Plan submitted to the Commission on May 1, 2018. The 2018 Plan included a least-cost plan ("Alternative Plan A") modeled on the assumption of no future state, regional or federal power station carbon dioxide ("CO₂") emissions regulation, plus four alternative plans ("Alternative Plans B through E") based on varying carbon regulation scenarios.

The Compliance Filing's Alternative Plan A incorporates the directives of the Order for this least-cost plan. Additionally, the Compliance Filing fulfills the Order's directive that the Company calculate "the incremental cost impacts of the mandates contained in Senate Bill 966," otherwise known as the Grid Transformation and Security Act of 2018 ("GTSA"). Alternative Plans B through E incorporate these "incremental cost impacts" of the GTSA. Additionally, as directed by the Commission, a new alternative plan ("Alternative Plan F") modifies the least-cost plan by adding in the "incremental cost impacts" of the GTSA "mandates," as defined by the Order. While the Company believes this is an unlikely scenario, Alternative Plan F, like the least-cost plan, is modeled on the assumption of no future power station carbon regulation.

The Company recognizes the authority of the Commission to require the Compliance Filing and as noted, has sought to comply with all of the Order's directives. To that end, the Company met with the Commission Staff in advance of this filing in an attempt to narrow any areas of potential misunderstanding.

While Dominion Energy Virginia has complied with the Commission's directives, there are several areas of concern and clarification the Company would like to respectfully point out.

For example, the Order's directive to calculate the "incremental cost impacts" of the GTSA and factor them into the modeling would fail to balance these costs with the benefits to the Company's customers, and society in general, of a greener, more intelligent, and more reliable electric system, unless those benefits are also included. For example, the table on page 16 of the Compliance Filing shows that the GTSA imposes \$5.81 billion in additional costs on customers (*i.e.*, Alternative Plan F's net present value ("NPV") compliance costs are listed as \$5.81 billion greater than those for the least-cost plan, Alternative Plan A). In order to partially consider the benefits of a transformed electric system, the NPV of some of the benefits of the improvements authorized and promoted by the GTSA are also shown on the table as offsetting some of the compliance costs of Alternative Plans B through F. The Company is committed to including more in-depth details and projections of the benefits of its ongoing efforts to implement a smarter, stronger, and greener grid for its customers in future filings of its Grid Transformation Plan (the "GT Plan") as authorized by the GTSA.

In the Order, the Commission listed what it defined as GTSA-related "mandated" incremental costs and required the Company to evaluate them in the Compliance Filing. These costs, as set forth in the Order, include:

- the Coastal Virginia Offshore Wind demonstration project ("CVOW");
- the total 5,000 megawatts ("MW") of nameplate wind and solar capacity, including 25 percent of such resources from non-utility generators obtained through power purchase agreements;
- the total \$870 million in spending on energy efficiency programs;
- a battery storage pilot of 30 MW;
- the GT Plan;
- the Strategic Underground Program ("SUP"); and
- the two projects under the Transmission Line Underground Pilot.

However, the Company has concerns about the Order's interpretation of the term "mandates," and discusses these issues in the legal memorandum accompanying the Compliance Filing.

The Company respectfully disagrees with other Order directives, notably a requirement that the Company's modeling include a 23% capacity factor for future solar development. Dominion Energy Virginia believes this 23% capacity factor is too low and fails to reflect the steady improvements in solar technology, including improved cell efficiency and tracking technology to maximize the arrays' direct sunlight exposure.

Additionally, the Order's 23% capacity factor requirement forces the Company to assume this level of efficiency for all new solar installed through 2033. Limiting solar throughout this 15-year period to an assumed and unrealistic 23% capacity factor was the main reason for the decline in its competitive position and the sharp decrease in solar resources in Alternative Plan A, the least-cost plan. As an example, modeling using the 23% solar capacity factor prescribed by the Order results in only 480 MW of solar capacity being chosen for the Compliance Filing's least-cost plan. In contrast, the model would have chosen a much-larger 3,600 MW of solar capacity using the 25.4% capacity factor that the Company used in the 2018 Plan. The Company submits that the 25.4% capacity factor is a supported and

supportable assumption for solar resources. Using the Order-directed 23% capacity factor makes solar uneconomic, resulting in the cases in which the Company must force solar resources into the model (*i.e.*, Alternative Plans B through F) being about \$400 million more expensive.

As has been noted many times, any given Integrated Resource Plan is merely a "snapshot in time," reflecting pricing, market conditions, and other highly variable factors. The decrease in projected solar capacity in the least-cost scenario should not obscure the fact that solar generation is now competitive with natural gas as a least-cost energy source available to the electric utility industry. Indeed, the fact that the Compliance Filing's least-cost plan still includes some solar resources illustrates this point. As costs fluctuate slightly, from a purely least-cost standpoint, solar will be the less expensive generation source in some years, natural gas in others. But with the continued advancement of solar technology, including better efficiency and improved tracking mechanisms, it is likely that solar energy's competitiveness will be even stronger in the future.

In summary, the Company respectfully disagrees with several of the directives and assumptions contained in the Order. Dominion Energy Virginia believes that the Commonwealth's integrated resource planning process has served it well over the years by providing plausible paths forward for serving customers amid rapid changes in technology, economics, regulation, and customer demands and expectations. Dominion Energy Virginia will continue to present timely scenarios and proposals to the Commission in future filings. And we believe that these filings will underscore the larger role that renewable energy, grid transformation, and energy efficiency improvements will play in building the more reliable, more secure, and greener electric system demanded by customers in the 21st century, all while maintaining electricity as an affordable and competitive energy source.

Sincerely,



Paul D. Koonce

VIRGINIA ELECTRIC AND POWER COMPANY
2018 COMPLIANCE FILING

COMMONWEALTH OF VIRGINIA, ex rel.
STATE CORPORATION COMMISSION
In re: Virginia Electric and Power Company's
Integrated Resource Plan filing pursuant to
Va. Code § 56-597 et seq.

Case No. PUR-2018-00065

Filed: March 7, 2019

**VIRGINIA ELECTRIC AND POWER COMPANY
2018 COMPLIANCE FILING**

1. 2018 INTEGRATED RESOURCE PLAN PROCEEDING OVERVIEW

On May 1, 2018, Virginia Electric and Power Company (the "Company") filed its 2018 Integrated Resource Plan ("2018 Plan") with the Virginia State Corporation Commission ("SCC") in accordance with § 56-599 of the Code of Virginia (or "Va. Code") and the SCC's guidelines issued on December 23, 2008. Concurrent with this filing, the Company filed the 2018 Plan with the North Carolina Utilities Commission ("NCUC") in accordance with § 62-2 of the North Carolina General Statutes ("NCGS") and Rule R8-60 of NCUC's Rules and Regulations. The 2018 Plan was prepared for the Dominion Energy Load Serving Entity ("DOM LSE") and represented the Company's service territories in the Commonwealth of Virginia and the State of North Carolina, which are part of the PJM Interconnection, L.L.C. ("PJM") Regional Transmission Organization ("RTO").

On May 7, 2018, the SCC issued an Order for Notice and Hearing that, among other things, docketed the matter and established a procedural schedule ("Procedural Order"). Notices of participation were filed by Appalachian Voices ("Environmental Respondents"); the Virginia Chapter of the Sierra Club ("Sierra Club"); the Board of Supervisors of Culpeper County, Virginia ("Culpeper County"); the Mid-Atlantic Renewable Energy Coalition ("MAREC"); the Solar Energy Industries Association ("SEIA"); the Virginia Committee for Fair Utility Rates ("Committee"); Sandra L. Meyer, Trustee of the Meyer Family Trust ("Meyer Trust"); and the Virginia Office of the Attorney General, Division of Consumer Counsel ("Consumer Counsel"). The Company, Environmental Respondents, Sierra Club, MAREC, and Staff pre-filed testimony. The SCC convened an evidentiary hearing on September 24, 2018, which concluded on September 27, 2018. On December 7, 2018, the SCC issued an Order ("2018 Order") directing the submission of this 2018 Compliance Filing.¹

The proceeding before the NCUC is currently ongoing.²

2. 2018 ORDER

Pursuant to Va. Code § 56-599 C, the SCC is required to analyze and review an integrated resource plan and, after giving notice and an opportunity to be heard, to make a determination "as to whether such an integrated resource plan is reasonable and is in the public interest." In its 2018 Order, the SCC found that "the Company has failed to establish that its 2018 [Plan], as currently filed, is reasonable and in the public interest."³ Specifically, the 2018 Order found that the Company failed to comply with certain directives in the SCC's Order on the Company's 2017 Plan,⁴ namely, that the 2018 Plan include (1) a least-cost plan;⁵ and (2) detailed plans⁶ to implement the "mandates"⁷

¹ On February 12, 2019, the SCC issued its Order Establishing Schedule for Continuation of Proceedings (the "Second Procedural Order"). The Second Procedural Order set deadlines for the Company, respondents, and Staff to pre-file testimony, and set a hearing for May 8, 2019.

² See *In the Matter of 2018 Integrated Resource Plans and Related 2018 REPS Compliance Plans*, Docket No. E-100, Sub 157. On January 22, 2019, the Company filed a joint motion with the Public Staff of the NCUC to extend the deadlines in the North Carolina proceeding based on the SCC's 2018 Order. The NCUC granted the joint motion, extended the deadlines in the North Carolina proceeding based on the filing of the 2018 Compliance Filing. The Company is contemporaneously submitting this 2018 Compliance Filing in the NCUC docket.

³ 2018 Order at 2-3.

⁴ *Commonwealth of Virginia, ex rel. State Corporation Commission In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.*, Case No. PUR-2017-00051, Order (Mar. 12, 2018) ("2017 Order").

⁵ 2017 Order at 4, n. 8.

contained in Senate Bill 966.⁶ As such, the SCC directed the Company to "re-run and re-file the corrected results of its 2018 [Plan] within 90 days from the date of this Order, subject to the requirements of this Order."⁹

3. 2018 ORDER REQUIREMENTS

Pursuant to the 2018 Order, the Company submits this 2018 Compliance Filing to address the requirements identified therein, as discussed in detail below. It is the Company's intent to comply with the 2018 Order to the best of its ability and in good faith. Where the Company has made assumptions and used its judgment in order to interpret the 2018 Order's requirements, the assumptions are explained. Notwithstanding this Compliance Filing, the Company does not waive its right to contest certain of the modeling assumptions required to be included by the 2018 Order in future proceedings, including but not limited to, the solar capacity factor, the use of the PJM load forecast, and the inclusion of generic demand-side management ("DSM") programs. Therefore, this Compliance Filing does not reflect endorsement of any particular plan contained herein as a path forward for the Company's system.

a. 2018 Compliance Filing

On page 5 of the 2018 Order, the SCC made the following finding:

The Commission finds that the Company shall re-run and re-file the corrected results of its 2018 IRP within 90 days from the date of this Order, subject to the requirements of this Order.

To address this requirement, the Company herein submits its 2018 Compliance Filing, which provides narrative details regarding the assumptions utilized by the Company along with tabular and/or graphic data that represent the PLEXOS modeling results with adjusted input variables as required and utilizing 2018 ICF assumptions. This 2018 Compliance Filing does not include a Comprehensive Risk Analysis.

b. Least Cost Plan

The 2018 Order included several requirements specific to the Company's least cost plan ("Least Cost Plan" or "Alternative Plan A"), as follows.

i. Modeling of Resources – Least Cost Plan

On page 5 of the 2018 Order, the SCC provided certain requirements in regards to modeling resources in the Company's Least Cost Plan:

In its corrected 2018 IRP, for purposes of its least-cost plan, the Company shall not force the modeling to select any resource, nor exclude any reasonable resource. This requirement does not reflect any finding that the Company should pursue any specific resource included in the least-cost plan; rather, as the Commission has

⁶ 2017 Order at 3-4.

⁷ See Memorandum of Virginia Electric and Power Company filed contemporaneously with this 2018 Compliance Filing in SCC Case No. PUR-2018-00065.

⁸ 2018 Virginia Acts of Assembly, Chapter 296 (effective July 1, 2018); also referred to herein as the Grid Transformation and Security Act of 2018 or "GTSA."

⁹ 2018 Order at 5.

repeatedly recognized, the IRP is a planning document, and it is reasonable, for planning purposes, to identify the least-cost plan to provide a benchmark against which to measure the costs of other alternative plans.

To address this requirement, the Company has incorporated the following modeling assumptions for the Least Cost Plan into its 2018 Compliance Filing:

- The Coastal Virginia Offshore Wind (“CVOW”) facility was not included as a must take resource within the PLEXOS modeling, but rather was offered to the model as an optional generating unit. The Company notes, however, that since filing the original 2018 Plan on May 1, 2018, the Commission has approved the Company’s prudence petition for the CVOW facility and, going forward, it is a resource that will no longer be analyzed in future integrated resource plans.¹⁰
- Three-on-one (3x1) combined-cycle (“CC”) units were offered to the PLEXOS model as an optional generating unit.
- Consistent with the 2018 Plan, the Least Cost Plan includes an annual cap of 480 megawatt (“MW”) of solar consisting of both power purchase agreements (“PPAs”) and self-build cost-of-service (“COS”) utilizing the same 2017 Request for Proposal (“RFP”) results included in the 2018 Plan. The model had the option of selecting a PPA or COS solar with an aggregate split of 25% for PPAs and 75% for COS.

ii. Fuel Transportation Costs – Least Cost Plan

In footnote 14 on page 5 of the 2018 Order, the SCC directed the Company to incorporate certain fuel assumptions into the modeling of the Least Cost Plan, noting:

For purposes of the corrected 2018 IRP, the Company should include a reasonable estimate of fuel transportation costs, including interruptible transportation, if applicable, associated with all natural gas generation facilities in addition to the fuel commodity costs.

To address this requirement, the Company utilized Transco’s interruptible transportation (“IT”) tariff rate (public data) for modeling of future peaking gas-fired resources.

c. Senate Bill 966 Cost Impacts

On page 5 of the 2018 Order, the SCC directed the Company to model the incremental cost impacts of various mandates of Senate Bill 966, stating:

As previously ordered, the Company shall also calculate the incremental cost impacts of the mandates contained in Senate Bill 966, including a comparison to the identified least-cost plan. This includes CVOW; 5,000 MW of nameplate wind and solar, including at least 25 percent of such resources from non-utility generators; \$870 million in spending on energy efficiency programs; the 30 MW battery storage pilot; the Strategic Underground Program (“SUP”); the Grid

¹⁰ *Petition of Virginia Electric and Power Company, For a prudence determination with respect to the Coastal Virginia Offshore Wind Project pursuant to Virginia Code § 56-585.1:4 F, Case No. PUR-2018-00121, Final Order (Nov. 2, 2018).*

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Transformation Plan; and the Transmission Line Undergrounding Pilot.¹¹

To address these 2018 Order requirements, the Company re-ran Alternative Plans B through E from the 2018 Plan, and also ran a new Alternative Plan F (No CO₂ plus GTSA "Mandates"), in PLEXOS using the assumptions described below.

i. CVOW

To address this requirement on page 5 of the 2018 Order, the CVOW facility was included in Alternative Plans B through F modeling.

ii. SOLAR

To address the requirement related to wind and solar on page 5 of the 2018 Order, at least 5,000 MW (nameplate) of utility scale solar photovoltaic ("PV") (capped at 480 MW annually) was included in Alternative Plans B through F, including the following assumptions:

- 25% of the solar resources modeled were from non-utility generators ("NUGs"), with prices based on the results of the Company's 2017 Solar-Wind RFP, but with the Commission-ordered 23% capacity factor.
- 75% of the solar resources modeled were from self-build, with prices modeled the same as in the 2018 Plan, but with the Commission-ordered 23% capacity factor.
- The 480 MW annual solar PV cap used in the 2018 Plan was exceeded in year 2028 to meet the 5,000 MW total by 2028.

iii. ENERGY EFFICIENCY PROGRAMS

The 2018 Order included two requirements on energy efficiency ("EE") Plans, as discussed below.

1. Modeling of Costs and Benefits

To address the requirement on page 5 of the 2018 Order regarding energy efficiency program spending, the costs and benefits of \$870 million in spending on such programs was included in Alternative Plans B through F modeling, the costs and benefits of which was based on:

- The energy efficiency programs, both existing and proposed, that were presented in the Company's DSM filing to the SCC dated October 3, 2018,¹² and

¹¹ For purposes of this 2018 Compliance Filing, the Company has created its assumptions, as described in detail herein, consistent with the scope of the "mandates contained in Senate Bill 966" referenced in this quoted language from the 2018 Order. All references to "mandates" as discussed herein are consistent with the Commission's directive. However, see the *Memorandum of Virginia Electric and Power Company* filed contemporaneously with this 2018 Compliance Filing in SCC Case No. PUR-2018-00065.

¹² *Petition of Virginia Electric and Power Company For approval to implement demand-side management programs and for approval of two update rate adjustment clauses pursuant to § 56-585.1 A 5 of the Code of Virginia*, Case No. PUR-2018-00168 (filed Oct. 3, 2018) ("2018 Virginia DSM filing").

- A methodology to calculate a generic block of EE, using a DOM Zone load shape, to represent the difference between the proposed EE in Case No. PUR-2018-00168 and the \$870 million in the GTSA.¹³

2. Impact of Modeling on the Load Forecast

In addition to the directives on page 5 of the 2018 Order related to energy efficiency programs, the SCC further directed the following on page 8:

In order to assess more fully the impact of the requirement of Senate Bill 966 that the Company propose \$870 million in spending on new energy efficiency programs by 2028, the Company shall also model the impact of that requirement on the load forecast in all plans other than the least cost plan. Specifically, this should be modeled separately as (1) an impact on the PJM peak load and energy sales forecast, and (2) a supply-side resource as currently presented. The Company should model the impact on forecasted peak load and energy sales using reasonable assumptions based on actual Virginia-specific data.

In order to show the impact of \$870 million in spending on the load forecast, the Company provides in this 2018 Compliance Filing:

- Annual megawatt-hour ("MWh") reduction.
- Spending of \$870 million by year 2028.

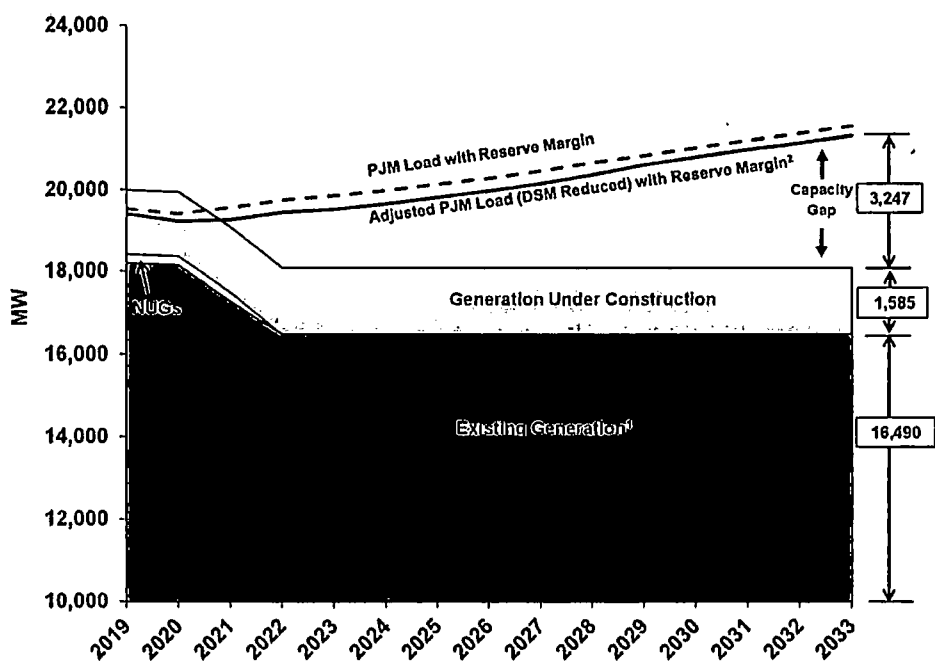
¹³ For clarity, and consistent with supply-side resource technologies and attributes, the Company believes the concept of "generic DSM" is flawed because differing technologies, target participants, timing of reductions, and rate structures provide differing cost and benefit streams for all EE programs. Prior to the 2018 Order, the Commission denied requests to model generic DSM. See, e.g., *Commonwealth of Virginia, ex rel. State Corporation Commission In re: Virginia Electric and Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.*, Case No. PUE-2011-00092, Final Order at 5 (Oct. 5, 2012). In addition, the EE that the Company will propose in filings after the 2018 Virginia DSM filing will be the result of a stakeholder process which just began in January 2019. The cycle for DSM program approvals means that the first filing that could potentially reflect proposed programs fully developed through the newly created stakeholder process outlined in the GTSA would be the fall of 2019, with a Commission Order potentially approving the request in mid-2020. Based on this assumed timeline and not separate from including any DSM programs that are part of the 2018 Virginia DSM filing, additional savings reductions were included within PLEXOS beginning in 2021, with growing contributions thru 2028, consistent with the dates listed in the GTSA. Of note, while the Company anticipates filing for program and cost recovery approvals annually in the fall of future years and will develop and review its proposed programs through the stakeholder process, those actual potential programs have not been evaluated to date and are not reflected within this model run because they are not yet available.

The savings reductions included in this 2018 Compliance Filing are illustrative only based upon a number of simplifying assumptions, and, to date, there has been no analysis conducted by the Company to confirm that:

1. There is any set of programs that would produce these same results;
2. Future EE program costs would be consistent with assumed costs in this run;
3. Future programs would be found cost-effective;
4. Future programs would be found in the public interest and approved by the Commission; or
5. Customers would choose to participate in the future programs to achieve the calculated savings.

- An explanation of how the spending is folded into the forecast.
 - In the PLEXOS modeling, DSM is modeled as a load reducer. The Company's Least Cost Plan (Alternative Plan A) includes existing DSM and the DSM that was filed (proposed) in the 2018 Virginia DSM filing. Alternative Plans B through F include the DSM that was included in Plan A in addition to generic DSM that total to \$870 million. The cost of the Company's DSM has been added to Alternative Plans B through F modeling net present value ("NPV") costs.
- Figures 1 and 2 show the Company's current capacity and energy position with and without DSM (\$870 million), with DSM modeled as a load reducer.

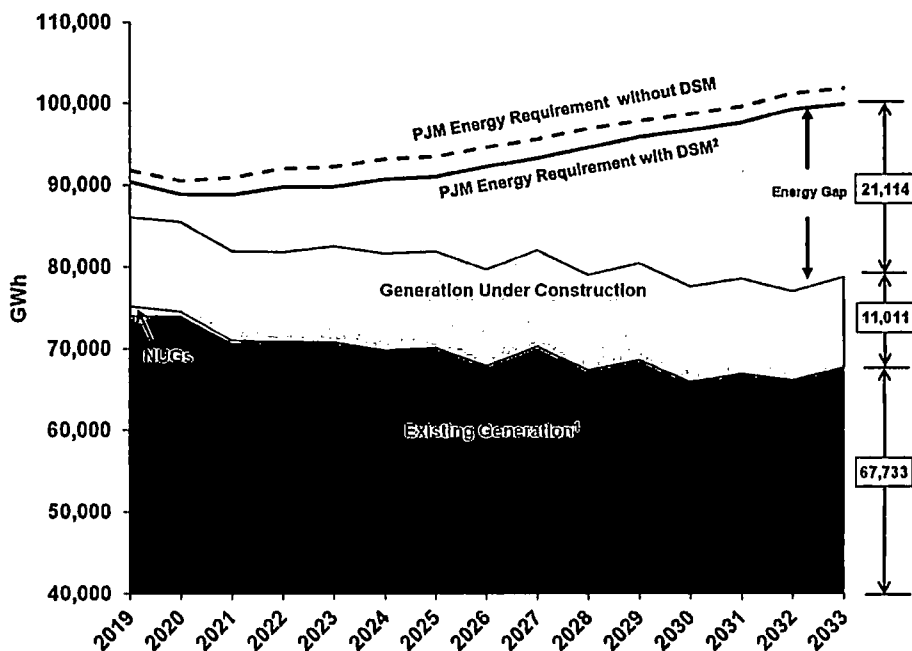
Figure 1 – Current Company Capacity Position with DSM as a Load Reducer for Plan E (2019 – 2033)



Note: The values in the boxes represent total capacity in 2033.

- 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.
- 2) Includes existing, proposed, and generic DSM totaling \$870 million.

Figure 2 – Current Company Energy Position with DSM as a Load Reducer for Plan E (2019 – 2033)

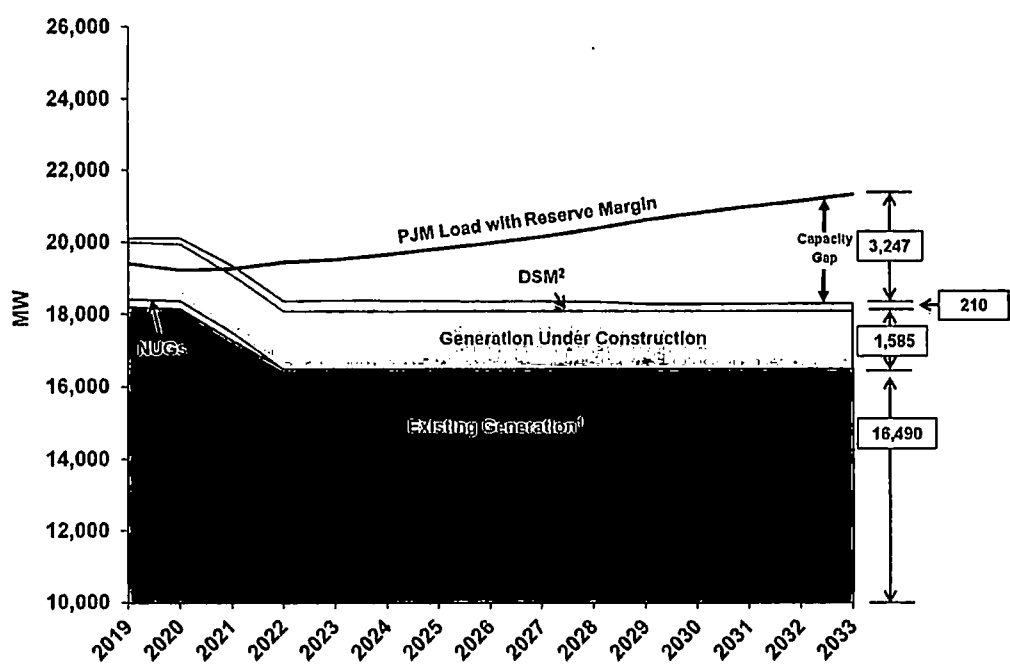


Note: The values in the boxes represent total energy in 2033.

- 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.
- 2) Includes existing, proposed, and generic DSM totaling \$870 million.

- As required on page 8 of the 2018 Order, the Company has also modeled DSM as a supply-side resource in the PLEXOS model. The Company had modeled DSM in the 2018 Plan and prior Plans as a supply-side resource with an adjusted reserve margin to account for DSM. The modeling of DSM as a load reducer and as a supply-side resource resulted in effectively identical results. Figures 3 and 4 show Company's current capacity and energy position with DSM (\$870 million) modeled as a supply-side resource.

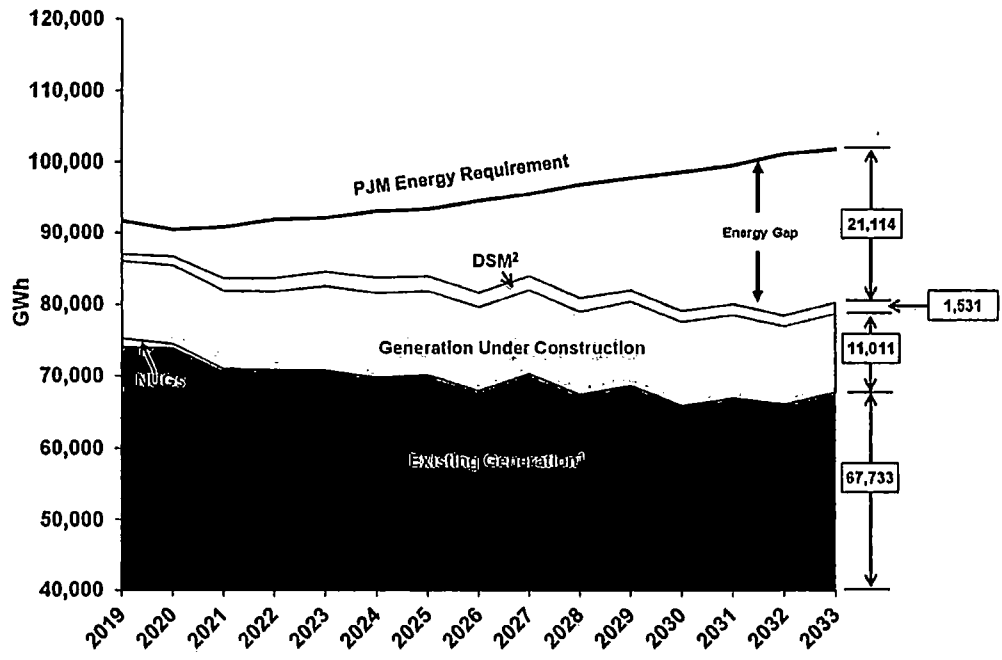
Figure 3 – Current Company Capacity Position with DSM as a Supply-Side Resource for Plan E (2019 – 2033)



Note: The values in the boxes represent total capacity in 2033.

- 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.
- 2) Includes existing, proposed, and generic DSM totaling \$870 million.

Figure 4 – Current Company Energy Position with DSM as a Supply-Side Resource for Plan E (2019 – 2033)



Note: The values in the boxes represent total energy in 2033.

- 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.
- 2) Includes existing, proposed, and generic DSM totaling \$870 million.

iv. BATTERY STORAGE PILOT

In accordance with the requirement on page 5 of the 2018 Order, the Company has modeled 30 MW battery storage pilots as a proxy generation resource in PLEXOS. The actual costs and benefits of a total of 30 MW of battery storage pilots may differ from this estimate. In future Plans, once locations have been selected, portions of the battery storage pilot will be placed on the supply side for grid relief, and on the distribution side, for grid support and non-wires alternatives.

v. STRATEGIC UNDERGROUNDING PROGRAM

With respect to the SUP, the 2018 Order clarified in footnote 15 on page 5 that "the Company shall calculate the incremental cost impacts associated with those SUP conversions after September 1, 2016, that were not approved for recovery prior to the effective date of Senate Bill 966." To address this requirement and clarification on page 5 of the 2018 Order, the cost of the Company's SUP has been added to Alternative Plans B through F modeling NPV costs. In accordance with its reading of footnote 15, the Company has included actual and projected SUP costs related to Phases IIB through XIII. The projections of the costs for phases that have yet to be presented to the Commission (i.e., Phases IV through XIII) may change based on future assumptions and filings.

vi. GRID TRANSFORMATION PLAN

To address this requirement on page 5 of the 2018 Order, the costs associated with the Company's Grid Transformation ("GT") Plan for 2019 through 2028 have been added to Alternative Plans B

through F modeling NPV costs, based on a combination of the Company's 2018 GT Plan filing, the Commission's Final Order on the GT Plan issued in that proceeding on January 17, 2019,¹⁴ and the Company's forward-looking activities as of January 31, 2019. Any future GT Plan filing will address the Commission's Final Order and will contain more defined cost and benefits estimates than those presented herein. The Final Order approved certain costs in the GT Plan related to cyber and physical security, including supporting telecommunications investments. Accordingly, the Company has incorporated the as-filed costs for these investments, with "Year 1" beginning in 2019. For the remainder of the as-filed costs, the Company has shifted these costs to begin in 2020, with the following exceptions. As of January 31, 2019, the Company had limited GT Plan-related activities pertaining to installation of smart meters planned for 2019, as well as activities needed to comply with the requirements set forth in the Final Order to support a future GT Plan proposal. The Company has included these costs in 2019, and has adjusted the remainder of the costs in the remaining years.

With the 2018 GT Plan filing, the Company supported \$2.786 billion through 2038 in selected, quantifiable benefits. The Company adjusted these selected, quantifiable benefits consistent with the adjustments to projected costs described above, then converted this number to its net present value—\$1.463 billion. The Commission's Final Order on the GT Plan noted a lack of benefits commensurate with costs. In its ongoing efforts to meet the current and futures needs of customers with a smarter, stronger, and greener grid, the Company is committed to refiling the GT Plan. Future filings will include in-depth details regarding proposed investments, and will seek to quantify the resulting customer, Company, and societal benefits.

vii. TRANSMISSION LINE UNDERGROUNDING PILOT

Enactment Clause No. 2 of the GTSA, codified at Va. Code 56-585.1:5, established a pilot program to further the understanding of underground electric transmission lines in regard to electric reliability, construction methods and related cost and timeline estimating, and the probability of meeting such projections ("Transmission Pilot Program"). The pilot program "shall consist of a total of two qualifying electrical transmission line projects, constructed in whole or in part underground."

On July 2, 2018, the Company submitted its Request to Participate in the Pilot Program Established by Enactment Clause No. 2 of the GTSA for the Haymarket Project in Case No. PUE-2015-00107. On July 26, 2018, the Commission issued its Order on Request to Participate in Pilot Program, approving the Haymarket Project as a qualifying project under the Transmission Pilot Program.¹⁵ The estimated cost of the Haymarket Project is approximately \$171.9 million.

While the Company may submit a second project for inclusion in the Transmission Pilot Program, it has not yet identified a specific project to evaluate to determine an estimated cost to include in the 2018 Compliance Filing, as required on page 5 of the 2018 Order. Many variables go into estimating the cost of specific transmission projects, including but not limited to location, line length, number of circuits, voltage, technology type, and ancillary system upgrade costs. Because the Company does not have a specific project to evaluate for a second project in the Transmission Pilot Program, the Company has included the second project with the same cost estimate approved for the Haymarket Project, \$171.9 million. To the extent the Company submits a second project to be part of the Transmission Pilot Program, the cost estimate in that case will be based on the specific information

¹⁴ *Petition of Virginia Electric and Power Company, For approval of a plan for electric distribution grid transformation projects pursuant to § 56-585.1 A 6 of the Code of Virginia, Case No. PUR-2018-00100, Final Order (Jan. 17, 2019).*

¹⁵ *Application of Virginia Electric and Power Company for approval and certification of electric transmission facilities: Haymarket 230 kV Double Circuit Transmission Line and 230-34.5 kV Haymarket Substation, Case No. PUE-2015-00107, Order on Request to Participate in Pilot Program (Jul. 26, 2018).*

associated with that project, which may vary from the assumption provided for use in this 2018 Compliance Filing.

d. Load Forecast

On page 8 of the 2018 Order, the SCC provided certain requirements in regards to the load forecast utilized for the 2018 Compliance Filing:

Based on the foregoing, rather than the Company's internal load forecast, the Commission directs that, for purposes of its corrected 2018 IRP, the Company shall utilize the Dominion Zone PJM coincident peak load forecast and energy sales forecast, scaled down to the Dominion load serving entity level, consistent with the methodology presented by Staff witness White, as further modified below.

To address this requirement in the 2018 Compliance Filing, the Company first took the PJM coincident peak load forecast and energy sales forecast, and scaled it down to the Dominion Load Serving Entity ("DOM LSE") level. PJM does not provide a DOM LSE forecast; therefore, the DOM LSE percent of the DOM Zone was determined using a regression technique that utilizes historical peak and energy data over the preceding 10-year period.

Next, because the PJM forecast only provides a 15-year forecast, PJM's 15 year compound annual growth rate ("CAGR") of 0.8% and 0.9% was used to extend the peak demand and energy forecasts, respectively, for years 2034 through 2043.

Figure 5 presents this scaled-down forecast along with the forecast extensions.

10032003

Figure 5 – PJM Coincident Peak Load Forecast

PJM 2018 - DOM Zone			PJM 2018 - LSE Equivalent		
Year	Coincident Peak	Energy	Year	Coincident Peak	Energy
2018	18,903	98,532	2018	16,513	86,016
2019	19,112	99,774	2019	16,696	87,100
2020	19,162	100,284	2020	16,739	87,545
2021	19,330	100,842	2021	16,886	88,032
2022	19,511	101,897	2022	17,044	88,953
2023	19,641	102,666	2023	17,158	89,625
2024	19,743	103,679	2024	17,247	90,509
2025	19,889	104,324	2025	17,375	91,072
2026	20,035	105,315	2026	17,502	91,937
2027	20,219	106,405	2027	17,663	92,889
2028	20,429	107,937	2028	17,846	94,226
2029	20,618	108,884	2029	18,011	95,053
2030	20,774	109,786	2030	18,148	95,840
2031	20,929	110,865	2031	18,283	96,782
2032	21,110	112,289	2032	18,441	98,025
2033	21,267	113,087	2033	18,578	98,722
2034	21,435	114,131	2034	18,725	99,633
2035	21,604	115,184	2035	18,873	100,552
2036	21,774	116,247	2036	19,021	101,480
2037	21,946	117,320	2037	19,171	102,417
2038	22,119	118,403	2038	19,323	103,362
2039	22,293	119,496	2039	19,475	104,316
2040	22,469	120,599	2040	19,629	105,279
2041	22,646	121,712	2041	19,783	106,251
2042	22,825	122,835	2042	19,939	107,232
2043	23,005	123,969	2043	20,097	108,222
CAGR 15-Yr =>	0.8%	0.9%	Average 10-Yr Reg =>	87.36%	87.30%

Next, the Company needed to determine how to incorporate this forecast into its model, PLEXOS. Planning models, including PLEXOS, require 8760 hour (*i.e.*, the total hours in a year) load shapes (“8760 load shapes”) as a necessary input. PJM does not provide forecasted 8760 load shapes. Instead of attempting to generate 8760 load shapes for PJM through original work, the Company used the following steps to come to a reasonable approximation of the scaled-down PJM coincident peak forecast:

- The Company utilized the non-coincident peak demand and energy forecast for the DOM Zone that was published by PJM in its January 2018 Load Forecast Report, scaled down to the DOM LSE level based on the Company’s load ratio share of the DOM Zone as described above.
- As a proxy to account for the magnitude difference in PJM’s coincident and non-coincident peak demand forecast, the Company adjusted the ~15.8% PJM planning reserve figure to lower the overall DOM Zone capacity needs consistent with PJM’s coincident/non-coincident peak demand differences. This was done by calculating the average of the DOM Zone coincident/non-coincident peak ratio for the years 2018 through 2021, as published in PJM’s 2018 Load Forecast Report. This calculation resulted in a diversification factor of ~96.47%.

- Using this diversification factor, the Company then adjusted the PJM's full planning reserve figure of 15.8% using the following formula:

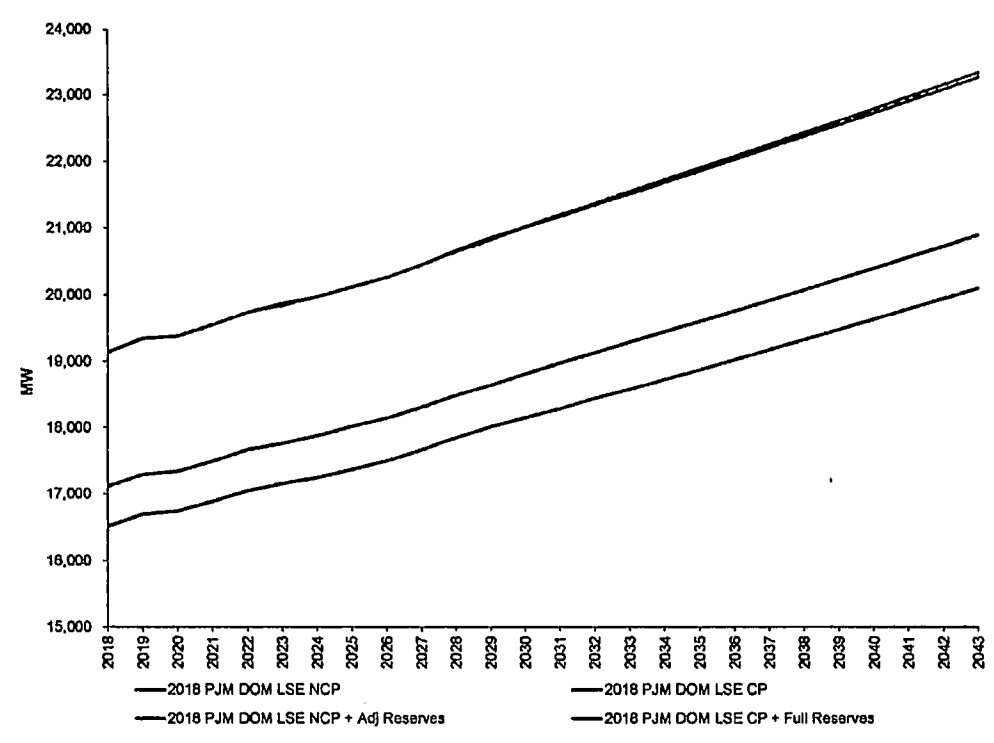
$$\text{Adjusted Planning Reserves} = [(1 + \text{Full Planning Reserves}) * \text{Diversification Factor}] - 1$$

Using numbers in the above equation results in the Adjusted Planning Reserves equal to ~11.7%.

- This Adjusted Planning Reserve figure of 11.7% was then applied to PJM's 2018 DOM Zone non-coincident peak demand forecast. This is in contrast to applying the full reserve figure of 15.8% to PJM's 2018 DOM Zone coincident peak forecast.

These adjustments result in a forecast that can be input into PLEXOS, and that reasonably approximates the PJM coincident peak plus full planning reserves of 15.8%, scaled down for the DOM LSE, as required by the 2018 Order recognizing the Company's need to input 8760 load shapes into its modeling. Figure 6 presents the results of these adjustments.

Figure 6 – PJM 2018 Peak Demand Forecast – DOM LSE



As shown in Figure 6, the green line, which reflects the adjustments described above (i.e., PJM DOM LSE non-coincident peak plus adjusted reserves), overlaps with the purple line, which reflects the PJM DOM LSE coincident peak plus full reserves. Figures 7 and 8 present the data supporting Figure 6. The Company has discussed these adjustments and results with Staff prior to filing.

Figure 7 – PJM 2018 Peak Demand Forecast – Coincident Peak (Supporting Data)

PJM 2018 - LSE Equivalent			Reserve Calculations				
Year	Coincident Peak	Energy	PJM Planning Reserves	Diversification Factor	Adjusted Reserves	Reserve Requirement	Total Resource Requirement
2018	16,513	86,016	0.159	N/A	N/A	2,626	19,139
2019	16,696	87,100	0.159	N/A	N/A	2,655	19,350
2020	16,739	87,545	0.158	N/A	N/A	2,645	19,384
2021	16,886	88,032	0.158	N/A	N/A	2,668	19,554
2022	17,044	88,953	0.158	N/A	N/A	2,693	19,737
2023	17,158	89,625	0.158	N/A	N/A	2,711	19,869
2024	17,247	90,509	0.158	N/A	N/A	2,725	19,972
2025	17,375	91,072	0.158	N/A	N/A	2,745	20,120
2026	17,502	91,937	0.158	N/A	N/A	2,765	20,267
2027	17,663	92,889	0.158	N/A	N/A	2,791	20,454
2028	17,846	94,226	0.158	N/A	N/A	2,820	20,666
2029	18,011	95,053	0.158	N/A	N/A	2,846	20,857
2030	18,148	95,840	0.158	N/A	N/A	2,867	21,015
2031	18,283	96,782	0.158	N/A	N/A	2,889	21,172
2032	18,441	98,025	0.158	N/A	N/A	2,914	21,355
2033	18,578	98,722	0.158	N/A	N/A	2,935	21,514
2034	18,725	99,633	0.158	N/A	N/A	2,959	21,683
2035	18,873	100,552	0.158	N/A	N/A	2,982	21,854
2036	19,021	101,480	0.158	N/A	N/A	3,005	22,027
2037	19,171	102,417	0.158	N/A	N/A	3,029	22,200
2038	19,323	103,362	0.158	N/A	N/A	3,053	22,376
2039	19,475	104,316	0.158	N/A	N/A	3,077	22,552
2040	19,629	105,279	0.158	N/A	N/A	3,101	22,730
2041	19,783	106,251	0.158	N/A	N/A	3,126	22,909
2042	19,939	107,232	0.158	N/A	N/A	3,150	23,090
2043	20,097	108,222	0.158	N/A	N/A	3,175	23,272

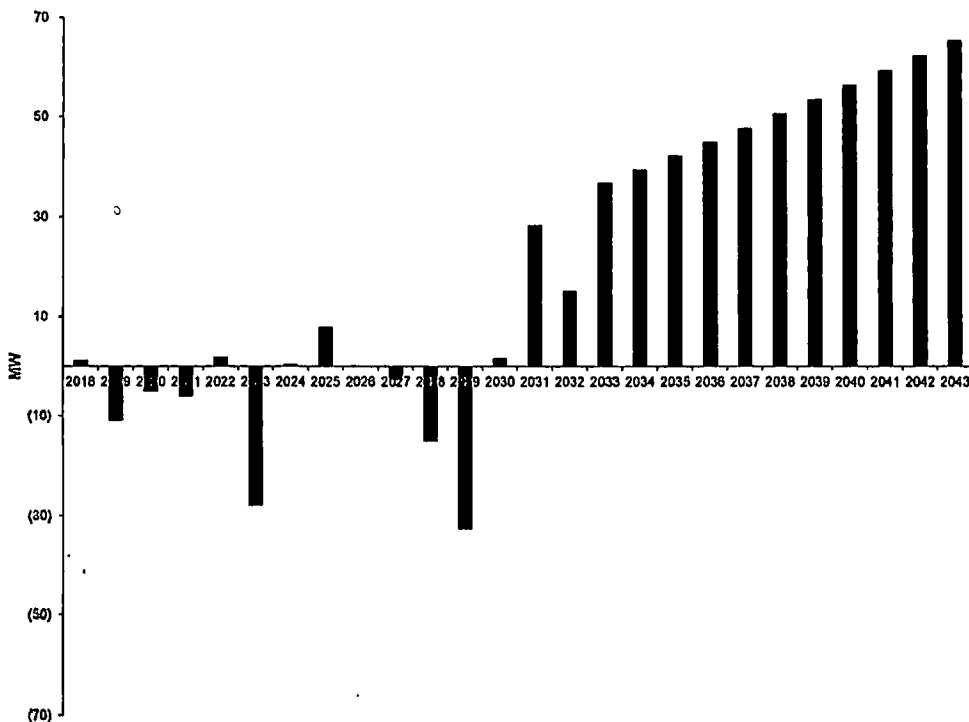
Figure 8 – PJM 2018 Peak Demand Forecast – Non-Coincident Peak (Supporting Data)

PJM 2018 - DOM Zone			PJM 2018 - LSE Equivalent			Reserve Calculations				
Year	Non-Coincident Peak	Energy	Year	Non-Coincident Peak	Energy	PJM Planning Reserves	Diversification Factor	Adjusted Reserves	Reserve Requirement	Total Resource Requirement
2018	19,599	98,632	2018	17,119	86,016	15.90%	99.47%	11.81%	2,021	19,140
2019	19,800	99,774	2019	17,287	87,100	15.90%	99.47%	11.81%	2,043	19,339
2020	19,858	100,284	2020	17,347	87,545	15.80%	99.47%	11.71%	2,032	19,379
2021	20,031	100,842	2021	17,499	88,032	15.80%	99.47%	11.71%	2,049	19,548
2022	20,227	101,897	2022	17,670	88,953	15.80%	99.47%	11.71%	2,070	19,739
2023	20,331	102,658	2023	17,761	89,625	15.80%	99.47%	11.71%	2,080	19,941
2024	20,466	103,679	2024	17,879	90,509	15.80%	99.47%	11.71%	2,094	19,973
2025	20,625	104,324	2025	18,018	91,072	15.80%	99.47%	11.71%	2,110	20,128
2026	20,768	105,315	2026	18,142	91,937	15.80%	99.47%	11.71%	2,125	20,267
2027	20,958	106,405	2027	18,307	92,889	15.80%	99.47%	11.71%	2,144	20,451
2028	21,161	107,937	2028	18,486	94,228	15.80%	99.47%	11.71%	2,165	20,651
2029	21,339	108,984	2029	18,641	95,053	15.80%	99.47%	11.71%	2,183	20,825
2030	21,536	109,788	2030	18,813	95,840	15.80%	99.47%	11.71%	2,203	21,017
2031	21,724	110,865	2031	18,978	96,782	15.80%	99.47%	11.71%	2,223	21,200
2032	21,898	112,289	2032	19,130	98,025	15.80%	99.47%	11.71%	2,241	21,370
2033	22,083	113,087	2033	19,291	98,722	15.80%	99.47%	11.71%	2,259	21,551
2034	22,260	114,131	2034	19,445	99,833	15.80%	99.47%	11.71%	2,278	21,723
2035	22,438	115,184	2035	19,601	100,552	15.80%	99.47%	11.71%	2,296	21,897
2036	22,617	116,247	2036	19,758	101,480	15.80%	99.47%	11.71%	2,314	22,072
2037	22,798	117,320	2037	19,916	102,417	15.80%	99.47%	11.71%	2,333	22,249
2038	22,980	118,403	2038	20,075	103,362	15.80%	99.47%	11.71%	2,351	22,428
2039	23,164	119,496	2039	20,238	104,316	15.80%	99.47%	11.71%	2,370	22,608
2040	23,349	120,599	2040	20,397	105,279	15.80%	99.47%	11.71%	2,389	22,788
2041	23,536	121,712	2041	20,561	106,251	15.80%	99.47%	11.71%	2,408	22,969
2042	23,724	122,835	2042	20,725	107,232	15.80%	99.47%	11.71%	2,427	23,152
2043	23,914	123,969	2043	20,891	108,222	15.80%	99.47%	11.71%	2,447	23,337

CAGR 15-Yr	0.8%	0.6%	Average 10-Yr Reg =>	87.35%	87.30%
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Figure 9 reflects the peak demand Total Resource Requirement difference between the using the PJM coincident peak plus full reserves versus the proxy methodology used by the Company in this 2018 Compliance Filing.

Figure 9 – Total Resource Requirement Difference – Coincident Peak vs. Proxy Methodology



One final item worth mentioning is that PJM reduces its load forecasts for behind-the-meter ("BTM") solar PV generation. Thus, to avoid double counting, the Company has not included any operating or expected BTM solar PV facilities in any PLEXOS modeling supply resources.

e. Solar Capacity Factor

On page 9 of the 2018 Order, the SCC found that an alternate capacity factor should be modeled for solar PV facilities, stating:

For purposes of the Company's corrected 2018 IRP, the Commission finds that the Company should model a 23 percent capacity factor for solar PV resources.

To address this requirement, the Company has modeled all future solar PV facilities assuming a capacity factor of 23% for purposes of this 2018 Compliance Filing.

f. REC Price Forecasting Methodology

On page 10 of the 2018 Order, the SCC directed the Company to present an alternative renewable energy certificate ("REC") price forecasting methodology, stating:

For purposes of the corrected 2018 IRP filing, the Company shall present an alternative methodology for forecasting REC prices that incorporates actual observable market prices for RECs.

To address this requirement, the Company has modeled an alternative REC forecasting methodology that incorporates actual observable prices for RECs, as shown in Figure 10. This methodology will benchmark fundamental forecasts of REC prices to actual market prices to account for the economic imperfections in REC markets, such as illiquidity, imperfect information, and surplus capacity. The following steps were utilized:

- The REC price forecast was developed using a methodology similar to past forecasts where revenue stream from REC sales provides the incremental revenue (in addition to energy and capacity revenue) necessary to support renewable development.
- The forecast was then benchmarked to actual market pricing with the near-term years of the forecast reflecting actual forward market REC prices. The longer-term forecast was discounted based on historical deviations in developer required cost recovery and actual realized REC prices. The benchmarking of the forecast was applied to all years in which projected prices exceed an anticipated price floor reflective of administrative cost.
- The discounting of long-term REC prices in the forecast would be a function of historic renewable generation development cost along with historic energy, capacity and REC prices. The discount would reflect the difference between the REC prices forecasted to provide the required incremental revenue utilizing the traditional REC price forecast methodology and the historic market prices for RECs.

Figure 10 – REC Price Comparison

	2019 - 2033 Average Value (Nominal \$)		
	Federal CO ₂	No CO ₂	VA RGGI
	Commodity Forecast	Commodity Forecast	Commodity Forecast
PJM Tier 1 REC Prices (\$/MWh)	7.04	9.19	9.06
Market Adjusted - PJM Tier 1 REC Prices (\$/MWh)	5.73	6.93	6.84

4. GENERAL ASSUMPTIONS

General assumptions discussed above and reflected in the updated tables below that were utilized across Alternative Plans A through F include the following:

- NPV includes solar integration costs, retirement write-offs, and RGGI adjustments in Alternative Plan B
- 458 MW represents two large CTs
- 3x1 CCs made available in all plans
- Nuclear extensions selected in each plan
- Solar capacity factors at 23.0% net
- Solar build 25% PPA, 75% Company-owned
- Runs utilize 2018 PJM Load Forecast
- Cold reserve units retired in all plans in 2021

Assumptions utilized in Alternative Plans B through F include the following:

- CVOW included in 2021
- Approximately 5,000 MW of solar included from 2020-2028
- 30 MW of the battery storage pilot included
- Existing, proposed, and generic DSM totaling \$870 million

Assumptions utilized in Alternative Plans B through D also include:

- Additional coal retirements of Chesterfield 5-6 and Clover 1-2

5. TABLES AND FIGURES

The following table presents the NPV results for the 2018 Compliance Filing using the assumptions described above, broken down to show specific line items.

Table 1 – NPV Results

2018 \$	Plan A: No CO ₂ Tax	Plan B: Virginia RGGI (GT Plan with unlimited imports)	Plan C: RGGI (GT Plan with unlimited imports)	Plan D: RGGI (GT Plan with limited imports)	Plan E: Federal CO ₂ Program (with GT Plan)	Plan F: No CO ₂ Tax (with GT Plan)
Total System Costs (\$M) ¹	\$ 25,026	\$ 28,812	\$ 30,329	\$ 31,048	\$ 29,779	\$ 26,489
DSM Existing and Proposed (\$M)	\$ 391	\$ 391	\$ 391	\$ 391	\$ 391	\$ 391
DSM Related to \$870 M (\$M)	\$ -	\$ 388	\$ 388	\$ 388	\$ 388	\$ 388
GT Plan (\$M)	\$ -	\$ 2,219	\$ 2,219	\$ 2,219	\$ 2,219	\$ 2,219
SUP (\$M)	\$ -	\$ 1,398	\$ 1,398	\$ 1,398	\$ 1,398	\$ 1,398
UG Pilot (\$M)	\$ -	\$ 344	\$ 344	\$ 344	\$ 344	\$ 344
Total Plan NPV (\$B)	\$ 25.42	\$ 33.55	\$ 35.07	\$ 35.79	\$ 34.52	\$ 31.23
Plan Delta (\$B) vs. Plan A		\$ 8.14	\$ 9.65	\$ 10.37	\$ 9.10	\$ 5.81
Less Benefits of GT Plan ² (\$M)	\$ -	\$ (1,463)	\$ (1,463)	\$ (1,463)	\$ (1,463)	\$ (1,463)
Total Plan NPV (\$B)	\$ 25.42	\$ 32.09	\$ 33.61	\$ 34.33	\$ 33.06	\$ 29.77
Plan Delta (\$B) vs. Plan A		\$ 6.67	\$ 8.19	\$ 8.91	\$ 7.64	\$ 4.35

Note: 1) Plans B through F included 5,000 MW solar, CVOW, and 30 MW battery storage.
2) See supra Part 3.c.vi.

The Company has also revised the following figures and appendices from the 2018 Plan in order to incorporate the 2018 Compliance Filing assumptions described above.

a. Figure 1.4.1 – Alternative Plans (A-F)

Year	Plan A: No CO ₂ Tax	Plan B: Virginia RGGI (GT Plan with unlimited imports)	Plan C: RGGI (GT Plan with unlimited imports)	Plan D: RGGI (GT Plan with limited imports)	Plan E: Federal CO ₂ Program (with GT Plan)	Plan F: No CO ₂ Tax (with GT Plan)
2019	Greensville SLR NUG ⁽¹⁾	Greensville SLR NUG ⁽¹⁾	Greensville SLR NUG ⁽¹⁾	Greensville SLR NUG ⁽¹⁾	Greensville SLR NUG ⁽¹⁾	Greensville SLR NUG ⁽¹⁾
2020	SLR (160 MW)	US-3 Solar 1 SLR (320 MW)	US-3 Solar 1 SLR (320 MW)	US-3 Solar 1 SLR (320 MW)	US-3 Solar 1 SLR (320 MW)	US-3 Solar 1 SLR (320 MW)
2021	SLR (160 MW) Belle ⁽²⁾ , Bremono3-4 ⁽²⁾ CH3-4 ⁽⁴⁾ , MB1-2 ⁽²⁾ Pitt ⁽³⁾ , PP3-4 ⁽⁴⁾ PP5	CVOW US-3 Solar 2 SLR (400 MW) Belle ⁽²⁾ , Bremono3-4 ⁽²⁾ CH3-4 ⁽⁴⁾ , MB1-2 ⁽²⁾ Pitt ⁽³⁾ , PP3-4 ⁽⁴⁾ PP5	CVOW US-3 Solar 2 SLR (400 MW) Belle ⁽²⁾ , Bremono3-4 ⁽²⁾ CH3-4 ⁽⁴⁾ , MB1-2 ⁽²⁾ Pitt ⁽³⁾ , PP3-4 ⁽⁴⁾ PP5	CVOW US-3 Solar 2 SLR (400 MW) Belle ⁽²⁾ , Bremono3-4 ⁽²⁾ CH3-4 ⁽⁴⁾ , MB1-2 ⁽²⁾ Pitt ⁽³⁾ , PP3-4 ⁽⁴⁾ PP5	CVOW US-3 Solar 2 SLR (400 MW) Belle ⁽²⁾ , Bremono3-4 ⁽²⁾ CH3-4 ⁽⁴⁾ , MB1-2 ⁽²⁾ Pitt ⁽³⁾ , PP3-4 ⁽⁴⁾ PP5	CVOW US-3 Solar 2 SLR (400 MW) Belle ⁽²⁾ , Bremono3-4 ⁽²⁾ CH3-4 ⁽⁴⁾ , MB1-2 ⁽²⁾ Pitt ⁽³⁾ , PP3-4 ⁽⁴⁾ PP5
2022	CT SLR (160 MW) YT3	CT SLR (480 MW) YT3	CT SLR (480 MW) YT3	CT SLR (480 MW) YT3	CT SLR (480 MW) YT3	CT SLR (480 MW) YT3
2023	CT	CT SLR (480 MW) CH5-6	CT SLR (480 MW) CH5-6	CT SLR (480 MW) CH5-6	CT SLR (480 MW)	CT SLR (480 MW)
2024	CT	CT SLR (480 MW)	CT SLR (480 MW)	CT SLR (480 MW)	SLR (480 MW)	SLR (480 MW)
2025	CT	CT SLR (480 MW) CL1-2	CT SLR (480 MW) CL1-2	2X1 CC SLR (480 MW) CL1-2	SLR (480 MW)	SLR (480 MW)
2026		CT SLR (480 MW)	CT SLR (480 MW)	SLR (480 MW)	SLR (480 MW)	SLR (480 MW)
2027		SLR (480 MW)	SLR (480 MW)	SLR (480 MW)	SLR (480 MW)	SLR (480 MW)
2028	CT	SLR (1,200 MW)	SLR (1,200 MW)	SLR (1,200 MW)	SLR (1,200 MW)	SLR (1,200 MW)
2029		CT	CT		CT	CT
2030				CT		
2031	CT	CT	CT			
2032				CT	CT	CT
2033	CT					

Key: Belle: Bellemeade Power Station; Bremono: Bremono Power Station; CC: Combined-Cycle; CH: Chesterfield Power Station; CL: Clover Power Station; CT: Combustion Turbine (2 units); CVOW: Coastal Virginia Offshore Wind Technology Advancement Project; Greensville: Greensville County Power Station; MB: Mecklenburg Power Station; Pitt: Pittsylvania Power Station; PP: Possum Point Power Station; SLR: Generic Solar; SLR NUG: Solar NUGs; YT: Yorktown Power Station.

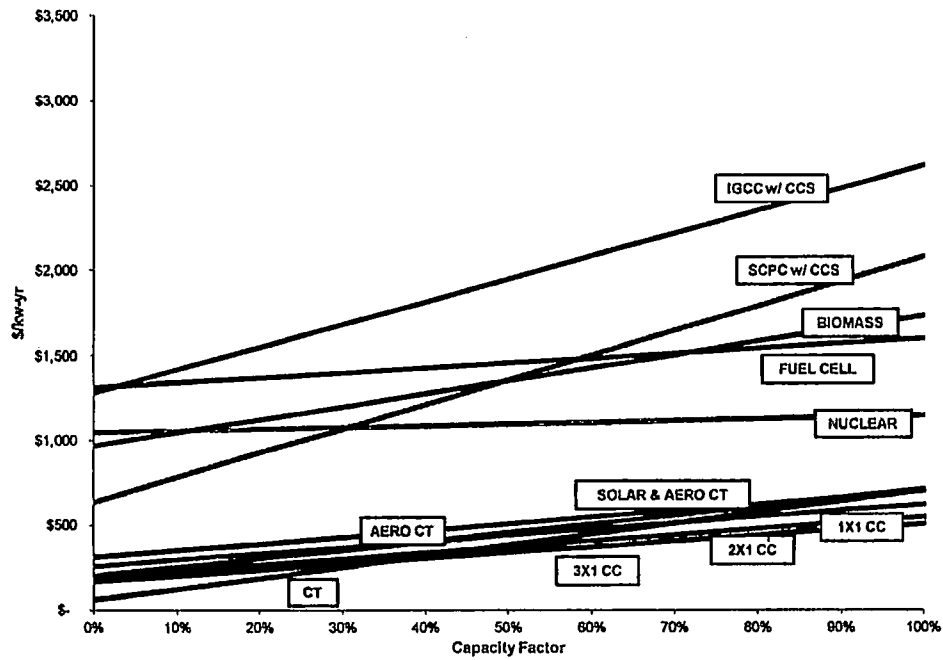
1) Solar NUGs include 660 MW of NC Solar NUGs and 100 MW of VA Solar NUGs that come online by 2020.

2) These units entered into cold storage in April 2018.

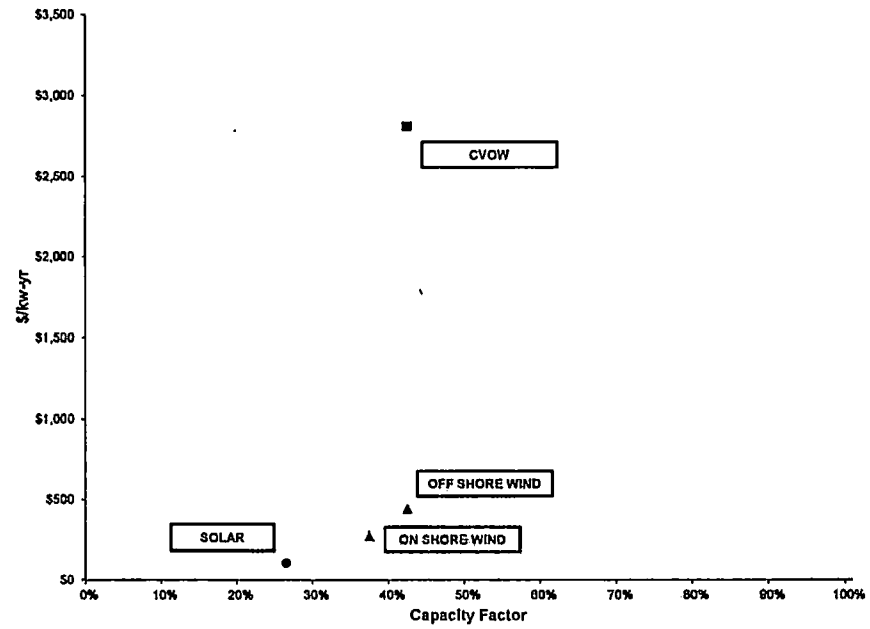
3) Pittsylvania was modeled to enter cold storage in 2018.

4) These units were modeled to enter into cold storage in 2018.

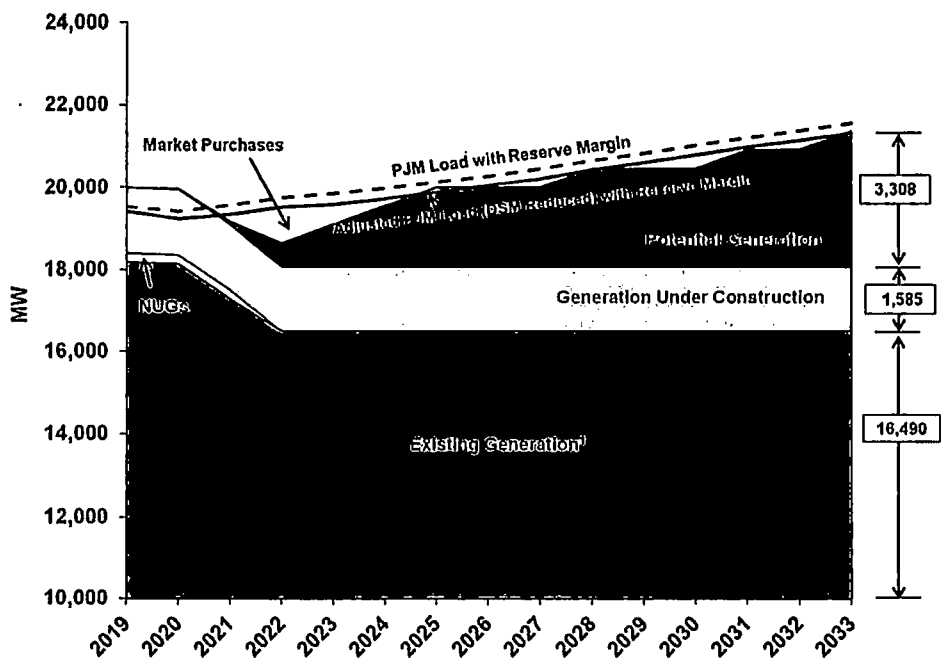
b. Figure 5.2.1 – Dispatchable Levelized Busbar Costs (2023 COD)



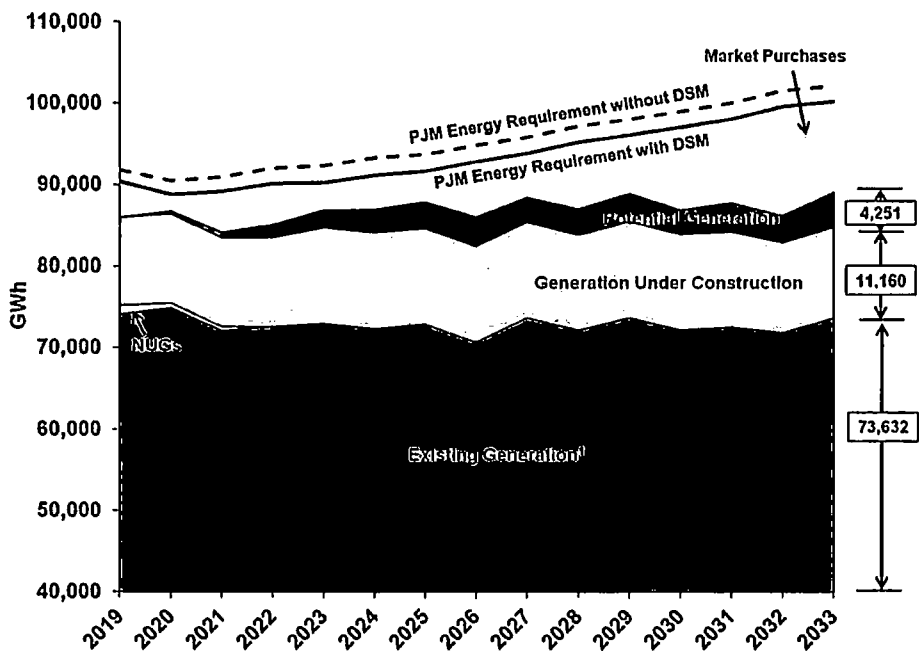
c. Figure 5.2.2 – Non-Dispatchable Levelized Busbar Costs (2023 COD)



d. Appendix 1A – Plan A – Capacity

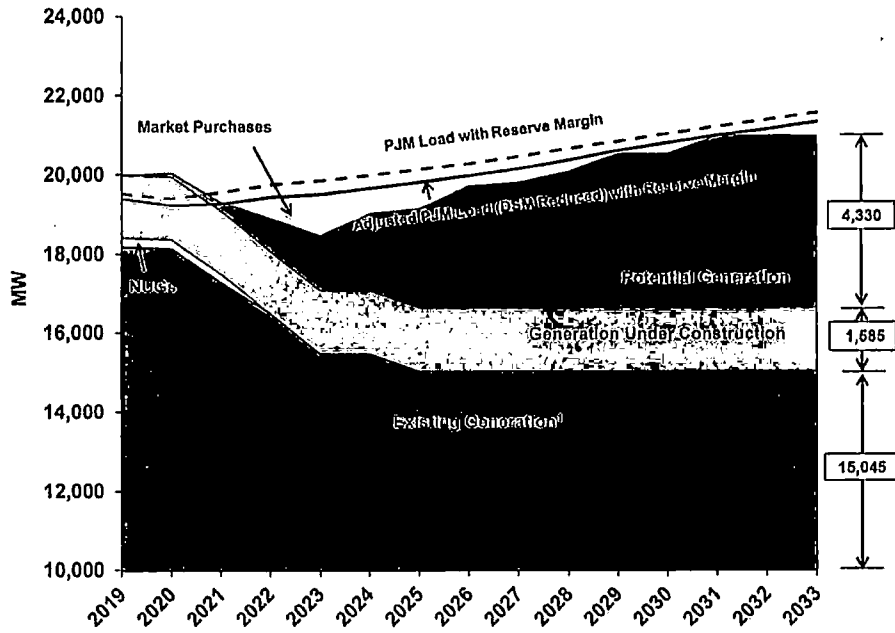


e. Appendix 1A – Plan A – Energy

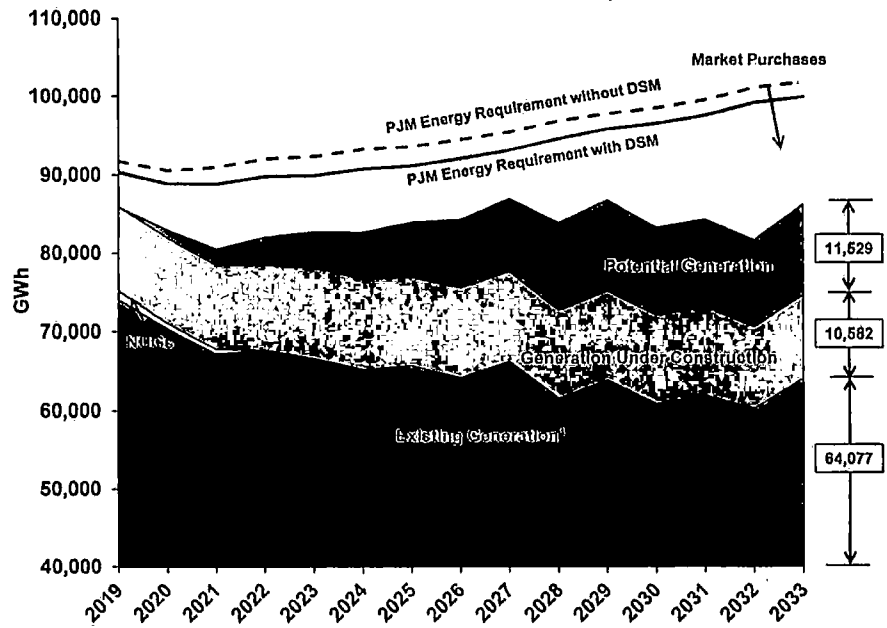


Note: 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

f. Appendix 1A – Plan B – Capacity

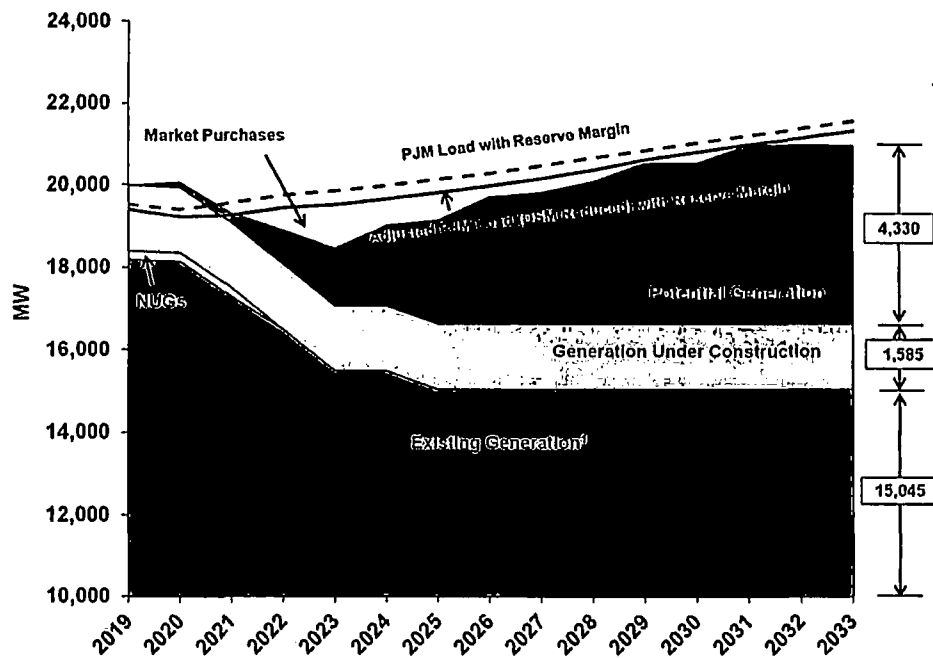


g. Appendix 1A – Plan B – Energy

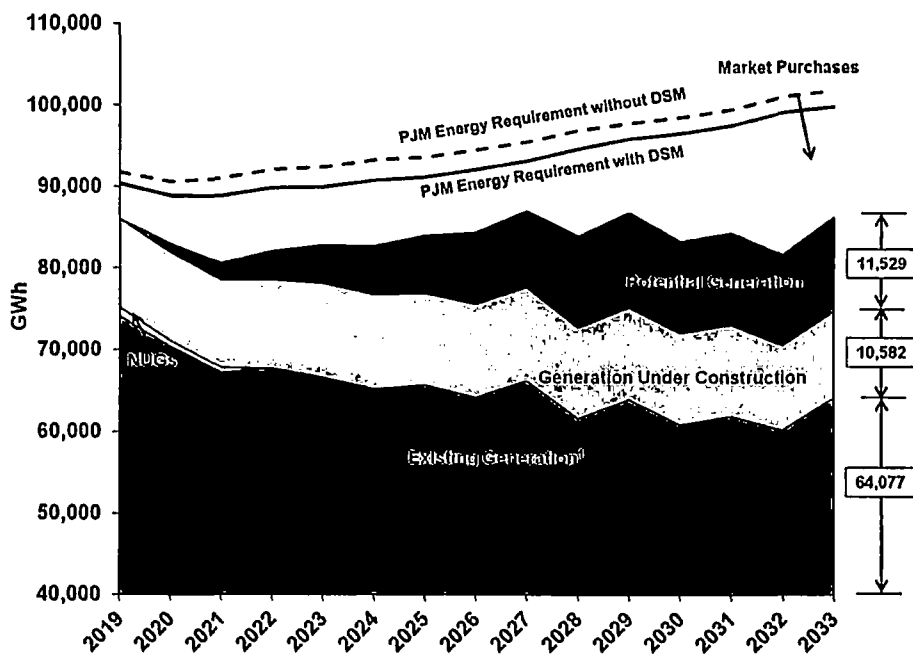


Note: 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

h. Appendix 1A – Plan C – Capacity

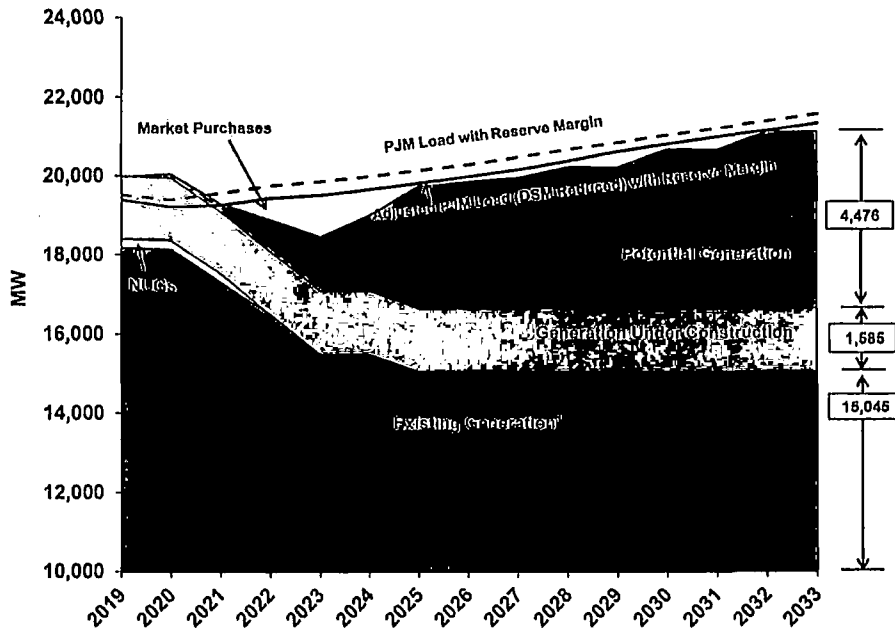


i. Appendix 1A – Plan C – Energy

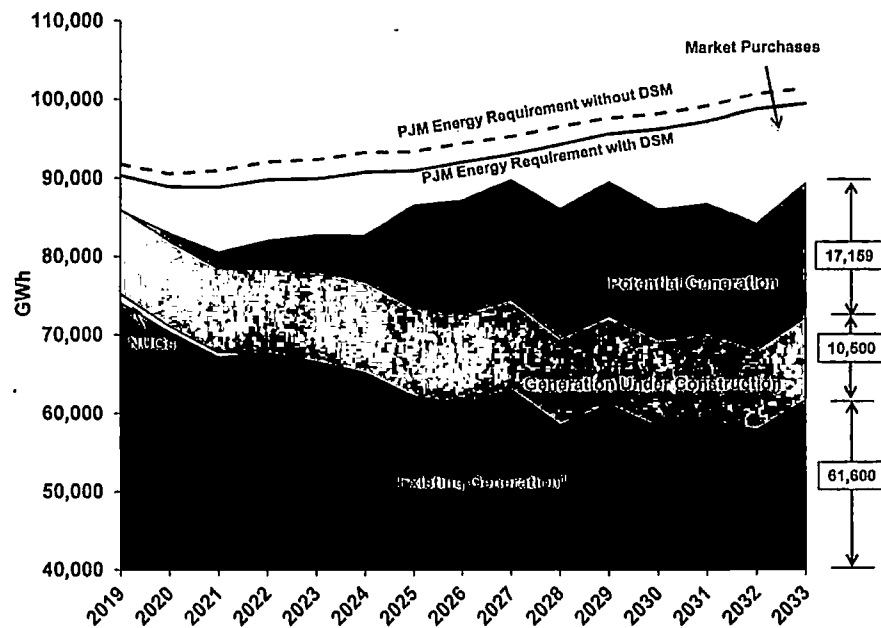


Note: 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

j. Appendix 1A – Plan D – Capacity

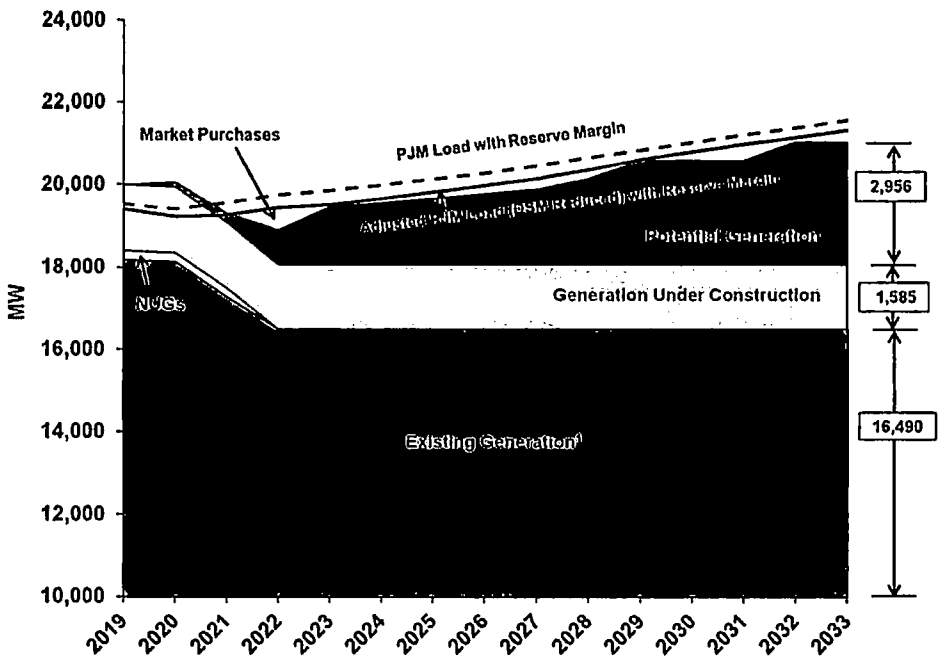


k. Appendix 1A – Plan D – Energy

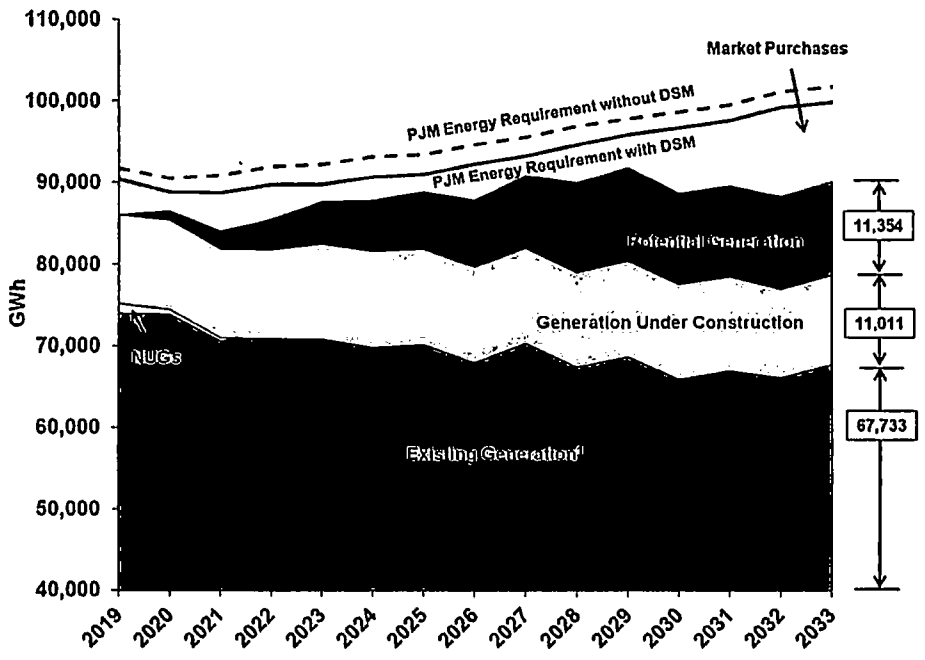


Note: 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

I. Appendix 1A – Plan E – Capacity

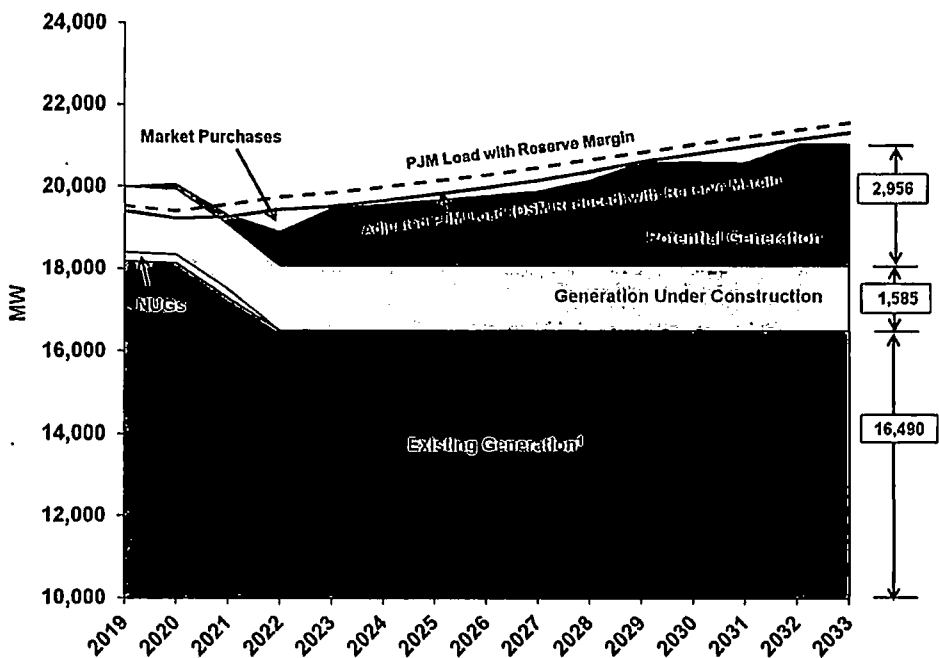


m. Appendix 1A – Plan E – Energy

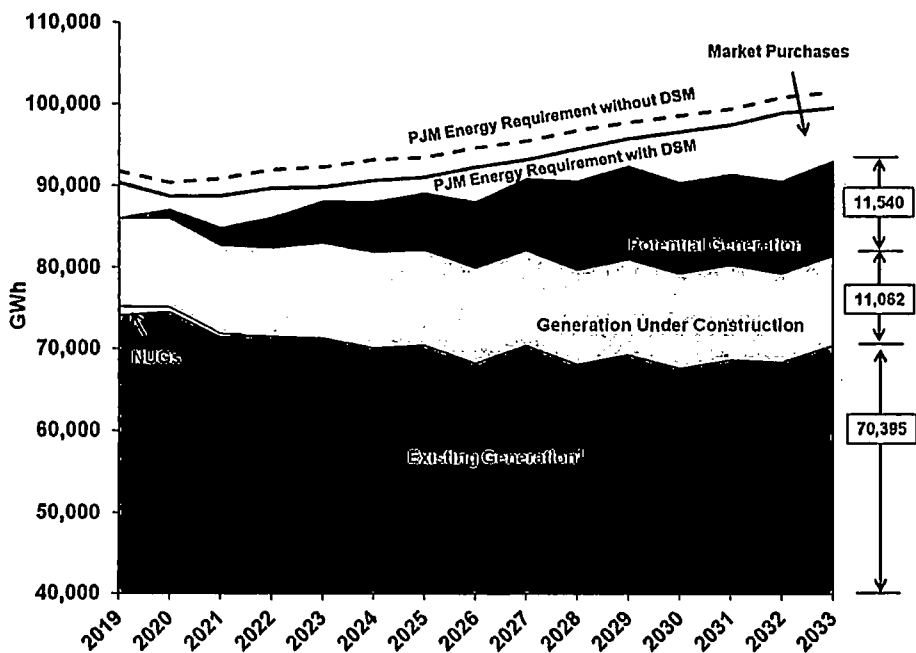


Note: 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

n. Appendix 1A – Plan F – Capacity



o. Appendix 1A – Plan F – Energy



Note: 1) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

6. CONCLUSION

As described herein, the Company respectfully submits this 2018 Compliance Filing pursuant to the Commission's requirements in the 2018 Order. Specifically, the Company has included in this filing a "true least-cost plan" as defined by the 2018 Order, and has addressed all of the "mandates" from the GTSA identified by the Commission in the 2018 Order. Accordingly, the Company respectfully requests that, with the submission of this 2018 Compliance Filing per the 2018 Order, the Commission issue a determination that the Company's 2018 Plan is reasonable and in the public interest pursuant to Va. Code § 56-599 E.

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COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

COMMONWEALTH OF VIRGINIA, <i>ex rel.</i>)	
)	
STATE CORPORATION COMMISSION)	
)	Case No. PUR-2018-00065
In re: Virginia Electric and Power Company's)	
Integrated Resource Plan filing pursuant to)	
Va. Code § 56-597 <i>et seq.</i>)	

**IDENTIFICATION AND SUMMARIES OF DIRECT WITNESSES
OF VIRGINIA ELECTRIC AND POWER COMPANY
FOR THE 2018 COMPLIANCE FILING**

Robert G. Thomas

Witness Direct Testimony Summary and Portions of 2018 Compliance Filing Adopted and Sponsored

Glenn A. Kelly

Witness Direct Testimony Summary and Portions of 2018 Compliance Filing Adopted and Sponsored

Deanna R. Kesler

Witness Direct Testimony Summary and Portions of 2018 Compliance Filing Adopted and Sponsored

Witness Direct Testimony Summary – 2018 Compliance Filing

Witness: Robert G. Thomas

Title: Director – Energy Market Analysis & Integrated Resource Planning

Summary:

Company Witness Robert G. Thomas adopts and sponsors Sections 1, 2, 3 Introduction, 3.a, and 6, which provide an overview of the 2018 Compliance Filing, including an overview of the 2018 Plan proceeding to date and the Commission Order dated December 7, 2018, directing the submission of the 2018 Compliance Filing (the “2018 Order”).

Mr. Thomas also adopts and sponsors those portions of the 2018 Compliance Filing describing the Company’s load forecast and planning assumptions; and the cost assumptions used for specific programs as follows:

- Section 3.c Introduction, 3.c.v, 3.c.vi, 3.c.vii: These sections describe how the Company complied with the directives in the 2018 Order to include incremental cost impacts related to the GTSA in the 2018 Compliance Filing. These specific sections relate to the Strategic Undergrounding Program, the Grid Transformation Plan, and the Transmission Line Undergrounding Pilot.
- Section 3.d: This section describes how the Company complied with the directives in the 2018 Order regarding the load forecast.
- Section 3.f: This section describes how the Company complied with the directives in the 2018 Order regarding the REC price forecasting methodology.

Additionally, Company Witness Thomas adopts and co-sponsors the following portions of the 2018 Compliance Filing, as they pertain to load forecast and planning assumptions, as follows:

- Section 3.c.iii (co-sponsored with Company Witness Deanna R. Kesler): This section describes how the Company complied with the directive to include incremental cost impacts related to the GTSA in the 2018 Compliance Filing. This specific section relates to energy efficiency programs.
- Section 4 (co-sponsored with Company Witness Glenn A. Kelly): This section describes the general assumptions used in the 2018 Compliance Filing.
- Section 5 Introduction (co-sponsored with Company Witness Glenn A. Kelly): This section presents the NPV results for the 2018 Compliance Filing using the assumptions described.
- Section 5.d through 5.o (co-sponsored with Company Witness Glenn A. Kelly): These sections illustrate the capacity and energy gap for the alternative plans presented in the 2018 Compliance Filing.

Witness Direct Testimony Summary – 2018 Compliance Filing

Witness: Glenn A. Kelly

Title: Director – Generation System Planning

Summary:

Company Witness Glenn A. Kelly adopts and sponsors those portions of the 2018 Compliance Filing describing the Company's existing and planned supply-side resources, and the Company's modeling, as follows:

- Section 3.b: This section describes how the Company complied with the directives in the 2018 Order regarding modeling the least cost plan.
- Section 3.c.i, 3.c.ii, 3.c.iv: These sections describe how the Company complied with the directive to include incremental cost impacts related to the GTSA in the 2018 Compliance Filing. These specific sections relate to CVOW, solar resources, and the battery storage pilot.
- Section 3.e: This section describes how the Company complied with the directive regarding the solar capacity factor.
- Section 5.a, 5.b, 5.c: These sections update figures from the 2018 Plan to reflect the results of the 2018 Compliance Filing incorporating the directives in the 2018 Order.

Additionally, Company Witness Kelly adopts and co-sponsors the following portions of the 2018 Compliance Filing as they pertain to the Company's existing and planned supply-side resources; and the Company's modeling, as follows:

- Section 4 (co-sponsored with Company Witness Robert G. Thomas): This section describes the general assumptions used in the 2018 Compliance Filing.
- Section 5 Introduction (co-sponsored with Company Witness Robert G. Thomas): This section presents the NPV results for the 2018 Compliance Filing using the assumptions described.
- Section 5.d through 5.o (co-sponsored with Company Witness Robert G. Thomas): These sections illustrate the capacity and energy gap for the alternative plans presented in the 2018 Compliance Filing.

Witness Direct Testimony Summary – 2018 Compliance Filing

Witness: Deanna R. Kesler

Title: Regulatory Consultant – Demand-Side Planning

Summary:

Company Witness Deanna R. Kesler adopts and co-sponsors those portions of the 2018 Compliance Filing describing the Company’s demand-side management (“DSM”) resources and initiatives as follows:

- Section 3.c.iii (co-sponsored with Company Witness Robert G. Thomas): This section describes how the Company complied with the directive to include incremental cost impacts related to the GTSA in the 2018 Compliance Filing. This specific section relates to energy efficiency programs.

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CERTIFICATE OF SERVICE

I hereby certify that on this 7th day of March, 2018, true and accurate copies of the foregoing filed in Case No. PUR-2018-00065 were hand delivered, electronically mailed, and/or mailed first class postage pre-paid to the following:

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