

**REPORT OF THE  
STATE CORPORATION COMMISSION**

**Assessing the Updated Integrated Resource Plan  
of Any Investor-owned Incumbent Electric Utility  
as Required by Chapter 6 of the 2015 Virginia  
Acts of Assembly.**



**COMMONWEALTH OF VIRGINIA  
RICHMOND  
2015**

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COMMISSIONER

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# COMMONWEALTH OF VIRGINIA



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## STATE CORPORATION COMMISSION

November 24, 2015

The Honorable Terence R. McAuliffe  
Governor, Commonwealth of Virginia

The Honorable John C. Watkins  
Chairman, Senate Committee on Commerce and Labor

The Honorable Terry G. Kilgore  
Chairman, House Committee on Commerce and Labor

Gentlemen:

The State Corporation Commission herewith transmits its report in response to Chapter 6 of the 2015 Virginia Acts of Assembly.

Please let us know if you need additional information or assistance.

Respectively Submitted,

Mark C. Christie, Chairman

Judith Williams Jagdmann, Commissioner

James C. Dimitri, Commissioner

cc: Franklin D. Munyan  
Division of Legislative Services

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## EXECUTIVE SUMMARY

In accordance with Chapter 6 of the 2015 Virginia Acts of Assembly ("Chapter 6"), the State Corporation Commission ("Commission") is pleased to provide a report to the Governor and the General Assembly outlining its assessments of integrated resource plans ("IRP") filed annually by investor-owned electric utilities and the impact of the U.S. Environmental Protection Agency's ("EPA") Final Rule under § 111(d) of the Federal Clean Air Act ("Final Rule"). The EPA issued its Final Rule on August 3, 2015,<sup>1</sup> which included significant modifications to the EPA's proposed rules that were issued in 2014.

The most recent IRPs filed by Virginia's electric utilities, Dominion Virginia Power ("DVP"), Appalachian Power Company ("APCo") and Kentucky Utilities Company d/b/a Old Dominion Power Company ("KU"), were filed on July 1, 2015, prior to the issuance of the Final Rule and consequently did not address the implications of the Final Rule for future generation expansion plans. The Final Rule is quite complex and offers numerous options to states for developing state implementation plans. Such plans have not yet been issued and efforts to develop implementation plans are ongoing. In the absence of state implementation plans and responsive IRP filings, the Commission cannot offer any definitive analysis on how the Final Rule will impact at this time "the amount, reliability, and type of generation facilities needed to serve Virginia native load" or the specific impact on the rates paid by Virginia's electricity consumers. The Commission will continue to assess the Final Rule and related developments as part of an ongoing effort to better understand the ultimate implications of the Final Rule. We expect that the 2016 IRPs to be filed next May will enable us to provide you with more detailed information on the impacts of the Final Rule in our report next year.

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<sup>1</sup> The Final Rule was published in the Federal Register on October 23, 2015. *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, 80 Fed. Reg. 64,662, Final Rule (Oct. 23, 2015).

## I. BACKGROUND AND INTRODUCTION

The Commission is pleased to submit this Report in response to Chapter 6 which, among other things, directs the Commission to:

... submit a report and make recommendations to the Governor and the General Assembly annually on or before December 1 of each year assessing the updated integrated resource plan of any investor-owned incumbent electric utility. The report shall include an analysis of, among other matters, the amount, reliability, and type of generation facilities needed to serve Virginia native load compared to what is then available to serve such load and what may be available to serve such load in the future in view of market conditions and current and pending state and federal environmental regulations. As a part of such report, the State Corporation Commission shall update its estimate of the impact upon electric rates in Virginia of the implementation of carbon emission guidelines for existing electric power generation facilities that the U.S. Environmental Protection Agency has issued pursuant to § 111(d) of the federal Clean Air Act.

The EPA issued its Final Rule on August 3, 2015. The Final Rule included significant modifications to the EPA's proposed rules that were issued on June 18, 2014. The more substantive changes: (i) delayed the implementation date by two years; (ii) modified the treatment of new gas units;<sup>2</sup> (iii) made numerous changes to the EPA's building blocks used to calculate state targets, including elimination of mandatory energy efficiency and "at risk" nuclear from the formula; (iv) provided states with six potential pathways for developing state implementation plans; and thereby (v) addressed, at least in part, the inequitable treatment of Virginia compared to other states. The six potential compliance pathways include three mass based and three rate based alternative approaches. A rate based approach gauges compliance on a pounds per megawatt basis while a mass based approach considers compliance on a total tons of carbon dioxide ("CO<sub>2</sub>") emissions basis.

Chapter 6 also modified the filing schedules for IRPs filed with the Commission by investor-owned electric utilities. Specifically, Chapter 6 required that each electric utility file an updated IRP by July 1, 2015, and annually by May 1 thereafter. DVP, APCo and KU filed IRPs on July 1, 2015.<sup>3</sup>

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<sup>2</sup> Units that were not operating or under construction by January 8, 2014.

<sup>3</sup> *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-2015-00035, Integrated Resource Plan for 2015 (July 7, 2015) ("*VEPCo 2015 IRP*"); *Commonwealth of Virginia, ex rel., State Corporation Commission, In re: Appalachian Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.*, Case No. PUE-2015-00036, 2015 Integrated Resource Plan (July 1, 2015) ("*APCo 2015 IRP*"); and *Commonwealth of Virginia, ex rel., State Corporation Commission, In re: Kentucky Utilities Company d/b/a Old Dominion Power Company's Integrated Resource Plan filing pursuant to Va. Code § 56-597 et seq.*, Case No. PUE-2015-00037, Integrated Resource Plan (July 1, 2015) ("*KU 2015 IRP*"). All three of these cases are pending before the Commission.

## II. RESOURCE PLANS

### A. Introduction

The July 1, 2015 IRPs were filed prior to the EPA's issuance of the Final Rule and consequently did not address the modifications described above. As such, the resource plans included in those filings are not optimized<sup>4</sup> for compliance with the Final Rule. Accordingly, the Commission cannot offer any meaningful analysis of how the Final Rule will impact "the amount, reliability, and type of generation facilities needed to serve Virginia native load" at this time. However, the current IRPs can be used in a limited fashion to begin assessing the Final Rule and its implications. For example, the carbon intensities of planning scenarios contained in each plan can be examined to assess the relative difficulty of meeting the new carbon standards. The Commission Staff conducted carbon intensity analyses in the DVP and APCo IRP proceedings.<sup>5</sup> KU does not own any generation in Virginia and did not submit an assessment of the Final Rule in conjunction with its IRP filing. KU's Final Rule impacts will be examined in greater detail in future IRP proceedings and we will provide information on the impacts of the Final Rule on KU in our report next year.

### B. DVP

DVP's IRP filing contains a number of resource planning scenarios, including a Base Case, Plan A Solar, Plan B Co-fire, Plan C Nuclear, and Plan D Wind. The Staff compared the carbon intensities of these plans to the Final Rule rate and mass limits for Virginia.<sup>6</sup> These comparisons are summarized on Appendix A to this report. In considering these results, it is important to note that the Final Rule has differing implications for new natural gas<sup>7</sup> and nuclear units depending on whether a rate based or a mass based approach is adopted. The results shown on Appendix A reflect only those existing units that are directly impacted by the Final Rule and do not consider the Final Rule's implications for new gas units that would be impacted by the adoption of mass limits, including compliance implications of a concept introduced and identified in the Final Rule as "leakage."<sup>8</sup> These comparisons do not reflect the potential for early action emission rate credits and allowances that may be available for qualified renewable energy or demand-side energy efficiency measures. The Final Rule provides incentives for the "early adoption" of certain compliance schemes. The "% compliance" columns shown on the Appendix are indicative of compliance or non-compliance. Values in excess of 100% indicate over-compliance while values less than 100% indicate under-compliance.

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<sup>4</sup> In other words the plans were not developed with a goal of minimizing costs incurred under the requirements of the Final Rule.

<sup>5</sup> *VEPCo 2015 IRP*, Direct Pre-filed Testimony of Cody D. Walker (Sept. 28, 2015; Oct. 7, 2015); *APCo 2015 IRP*, Direct Pre-filed Testimony of Cody D. Walker (Nov. 10, 2015).

<sup>6</sup> DVP's estimated share of Virginia's mass limit was assumed to be 70%.

<sup>7</sup> Units that were not operating or under construction by January 8, 2014.

<sup>8</sup> As described by the EPA in the context of the Final Rule, "leakage" generally refers to the EPA's concern about existing units regulated under 111(d) shifting generation to new generation facilities that are subject to less stringent standards issued by the EPA under Section 111(b). For example, the EPA is concerned that a new natural gas unit that is subject to a less stringent standard under Section 111(b) would be constructed solely for the purpose of eliminating generation from an existing unit that is subject to Section 111(d) and thereby effectively circumvent the more rigid Section 111(d) standard.

Focusing first on a rate based approach, the Base Case would not comply with the Final Rule after 2024. Plans A through D are expected to satisfy the rate requirement for the foreseeable future.<sup>9</sup> Plans A, B, and D achieve roughly the same level of compliance in the near term. Plan C, the nuclear plan, would achieve a lower level of compliance through 2027 and a higher level of compliance thereafter when compared to Plans A, B and D.

The Base Case would not achieve compliance in any year under a mass based approach while Plans A through D seem to meet a mass limit throughout the study period. Although the alternative plans seem to achieve a greater level of compliance under a mass approach,<sup>10</sup> it should not be concluded from these results that a mass based approach would be more favorable for DVP. As indicated earlier, a mass based approach includes limits associated with new gas units, and such limits have not been included on the Appendix.

All of the compliant plans considered by DVP are more expensive than DVP's Base Case. Plan A, the solar scenario, is the lowest cost compliant plan considered by DVP. The net present value cost of Plan A exceeds the cost of a no CO<sub>2</sub> compliance cost scenario by approximately \$4.3 billion. Plan A is expected to over comply with the Final Rule and, in the Commission Staff's opinion, does not reflect an optimized approach to meeting the Final Rule. For example, Plan A includes earlier capacity additions and unit retirements that are not reflected in the Base Case. These retirements and additions or at least some portion thereof could potentially be deferred or delayed given the delayed implementation date and revised limits included in the Final Rule. Any such revision could potentially lower the net present value cost differential between the Base Case and Plan A. As such, the \$4.3 billion differential could be viewed as being indicative of the direction and relative magnitude of the cost of compliance but an over statement of the actual expected cost of compliance.

The cost differentials between the Co-fire (Plan B) and Wind (Plan D) scenarios as compared to the no CO<sub>2</sub> compliance cost scenario are approximately \$5 billion and \$15.3 billion, respectively. As discussed for Plan A, while these cost differentials are indicative of the direction and relative magnitude of the cost of compliance, the differentials may overstate the actual expected cost of compliance associated with these scenarios.<sup>11</sup>

DVP's nuclear planning scenario (Plan C) has a cost differential of approximately \$7.2 billion and, like the other alternative planning scenarios, may have a lower cost differential once changes reflected in the Final Rule are incorporated into DVP's modeling, all other things being equal. The nuclear scenario warrants additional comment in that the addition of a nuclear unit produces greater CO<sub>2</sub> related benefits under a rate based compliance model than it does under the mass based compliance model. The nuclear scenario would essentially receive greater compliance related recognition under a rate based compliance regime. As such, Plan C may provide greater benefits under compliance approaches that incorporate rate based compliance and carbon trading.

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<sup>9</sup> Plans A and B would fail to meet a rate limit in 2040 under the company's projections.

<sup>10</sup> Plan C Nuclear is less effective for compliance beginning in 2028 under a mass based approach.

<sup>11</sup> Plan B has fewer retirements and capacity additions than the other alternative scenarios, and its associated optimal resource mix may not be impacted as much by the revisions reflected in the Final Rule.

### C. APCo

In its IRP filing APCo, like DVP, considered a number of planning scenarios. These scenarios included a Base Case, Early Coal Substitution, Combined Cycle Substitution, and Hybrid Plan scenarios. Staff utilized information provided by APCo to calculate annual carbon intensities for the above planning scenarios. APCo also provided its baseline (2012) percentages of affected steam generation and affected natural gas combined-cycle generation consistent with the approach utilized by the EPA in calculating state emission rate goals under the Final Rule. The Staff utilized the APCo specific baseline percentages and the EPA's state specific approach to calculate source specific emission target rates for APCo's overall operations.

The Staff then compared these source specific rates against the carbon intensities of APCo's planning scenarios. This comparison is summarized on Appendix B. In considering the results presented on Appendix B, it is important to note that it is very unlikely that APCo's overall compliance requirements will be developed in a manner consistent with this source specific target estimate. With affected generation in four states and six potential compliance pathways in each state, there are numerous possible combinations of future state compliance pathways to which APCo may be subject. As such, the Staff's comparison was only intended to provide a very high level "ballpark" assessment of the potential implications of the Final Rule for APCo.

As can be seen from Appendix B, the Staff's comparison indicates that none of APCo's planning scenarios would achieve compliance with the Final Rule. APCo's Hybrid Plan reduces carbon intensities significantly but falls well short of compliance.

### **III. FINAL RULE RATE IMPACTS**

Given the relatively recent issuance of the Final Rule, its extremely complex nature, the pending development of state implementation plans, and the lack of optimized utility resource plans, the Commission is unable to develop meaningful rate impact estimates at this time. Any prediction at this time of the Final Rule's estimated rate impacts estimate would be extremely speculative and unsupported given the amount of information currently available. Following the May 2016 IRP filings, we expect to have much more definitive analysis.

### **IV. SUMMARY AND CONCLUSIONS**

The EPA issued its Final Rule on August 3, 2015. The Final Rule included significant modifications to the rules that the EPA proposed in 2014. DVP, APCo and KU filed IRPs on July 1, 2015. As such, the July 1, 2015 IRPs were filed prior to the issuance of the Final Rule and consequently did not address the implications of the Final Rule for future generation expansion plans. Consequently, the most recent electric utility resource plans filed are not optimized for compliance with the Final Rule. Accordingly, the Commission cannot offer any meaningful analysis on how the Final Rule will impact "the amount, reliability, and type of generation facilities needed to serve Virginia native load" at this time nor can we make definitive projections of rate impacts at this time. The Commission will continue to assess the Final Rule and related developments as part of an ongoing effort to better understand the ultimate implications of the Final Rule. Following the next round of IRP filings in May 2016, more detailed and meaningful will be available.



**Appendix A**  
**EPA Final Rule Compliance**  
**Achieved by Dominion Virginia Power's Current Planning Scenarios**  
**Rate Based Approach**

Expansion Plan	Average 2022-2024		Average 2025-2027		Average 2028-2029		2030	
	(lbs/Net MWh)	% Compliance <sup>2</sup>	(lbs/Net MWh)	% Compliance <sup>2</sup>	(lbs/Net MWh)	% Compliance <sup>2</sup>	(lbs/Net MWh)	% Compliance <sup>2</sup>
Final CPP Rates	1,120		1,026		966		934	
Base Case <sup>1</sup>	1,120	100%	1,097	93%	1,116	84%	1,145	77%
Plan A: Solar	984	112%	895	113%	893	108%	856	108%
Plan B: Co-fire	952	115%	899	112%	894	107%	879	106%
Plan C: Nuclear	1,017	109%	974	105%	731	124%	736	121%
Plan D: Wind	979	113%	887	114%	919	105%	859	108%

**Mass Based Approach**

Expansion Plan	Average 2022-2024		Average 2025-2027		Average 2028-2029		2030	
	(1000 tons)	% Compliance <sup>2</sup>	(1000 tons)	% Compliance <sup>2</sup>	(1000 tons)	% Compliance <sup>2</sup>	(1000 tons)	% Compliance <sup>2</sup>
Final CPP Mass Targets	21,903		20,294		19,529		19,203	
Base Case <sup>1</sup>	23,466	93%	22,506	89%	23,191	81%	23,744	76%
Plan A: Solar	18,677	115%	16,815	117%	17,598	110%	15,574	119%
Plan B: Co-fire	17,962	118%	16,761	117%	17,181	112%	15,261	121%
Plan C: Nuclear	18,843	114%	17,216	115%	16,770	114%	16,374	115%
Plan D: Wind	18,722	115%	16,913	117%	17,874	108%	15,744	118%

<sup>1</sup>The Base Case assumes a business as usual approach which reflects some redispach of units to limit carbon emissions.

<sup>2</sup>A "% Compliance" below 100% indicates that the plan fails to satisfy the final rule and conversely a "Compliance" exceeding 100% represents over-compliance with the final rule.

<sup>3</sup> The mass targets and plan emissions levels do not include "leakage" requirements for new units or emissions associated with new units.

**Appendix B**  
**Appalachian Power Company**  
**Source Specific Compliance Rate Comparison**

Expansion Plan	Average 2022-2024		Average 2025-2027		Average 2028-2029	
	(lbs/Net MWh)	% Compliance	(lbs/Net MWh)	% Compliance	(lbs/Net MWh)	% Compliance
APCo source subcategory specific rate	1,587		1,427		1,316	
Base Scenario	1,915	83%	1,866	76%	1,764	75%
Early Coal Substitution Scenario	1,915	83%	1,849	77%	1,731	76%
CC Substitution Scenario	1,913	83%	1,863	77%	1,761	75%
Hybrid Plan Scenario	1,779	89%	1,675	85%	1,595	83%