GEORGIA DEPARTMENT OF LAW
40 CAPITOL SQUARE SW
ATLANTA, GA 30334-1300

SAMUEL S. OLENS
ATTORNEY GENERAL

www.law.ga.gov
(404) 656-3300

Comments of

Samuel S. Olens

Attorney General of Georgia

on behalf of

The State of Georgia

on

the Environmental Protection Agency's

Carbon Pollution Emission Guidelines for Existing Stationary Sources:

Electric Utility Generating Units

79 Fed. Reg. 34,830 (June 18, 2014)

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I. INTRODUCTION AND SUMMARY OF COMMENTS.

The following comments are submitted in response to the Environmental Protection Agency's (EPA) Proposed Rule to establish carbon dioxide (CO_2) emission guidelines for existing fossil-fueled electric generating units (EGUs) under section 111(d) of the Clean Air Act (CAA or Act).[1]

The State of Georgia has submitted several comments to EPA that address various aspects of the Proposed Rule.[2] The following comments specifically address the legal and practical problems arising from the Proposed Rule's treatment of under-construction and at-risk nuclear generation. They are intended to supplement the issues and concerns raised in other comments the State has submitted on the Proposed Rule.

In brief, EPA's proposal to include under-construction and at-risk nuclear generation as components of the "Best System of Emission Reduction" (BSER) for existing EGUs is illegal, unfair, and unwise. EPA's inclusion of under-construction nuclear reactors in setting state goals is particularly unfair to Georgia and the two other states in which these large sources of carbon-free power are being constructed. As we explain in further detail below, inclusion of under-construction nuclear generation in Georgia, South Carolina, and Tennessee's CO_2 emission rate goals dramatically increases the stringency of these goals and presents unique compliance risks for these three states that are unlike those faced by any other state. Inclusion of under-construction and at-risk nuclear generation in state goals also exceeds EPA's authority under section 111(d) of the CAA because these measures are not "systems of emission reduction" that can be applied or implemented at regulated sources. Furthermore, EPA's decision to include these sources in the goal computation is illegal because

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[1] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, Proposed Rule, 79 Fed. Reg. 34,830 (June 18, 2014) [hereinafter "Proposed Rule"].

[2] Comments of the Georgia Environmental Protection Division, Docket No. EPA-HQ-OAR-2013-0602 (Sept. 16, 2014); Comments of the Georgia Environmental Protection Division, Docket No. EPA-HQ-OAR-2013-0602 (Dec. 1, 2014) [hereinafter "Georgia EPD Final Comments"]; Comments from the Attorneys General of the States of Oklahoma, West Virginia, Nebraska, Alabama, Florida, Georgia, Indiana, Kansas, Louisiana, Michigan, Montana, North Dakota, Ohio, South Carolina, South Dakota, Utah and Wyoming, Docket No. EPA-HQ-OAR-2013-0602 (Nov. 24, 2014) [hereinafter "State AGs Comments"].

- the assumptions underlying EPA's quantification of the emission reductions that may be achievable from under-construction and at-risk nuclear generation are erroneous; and
- the Proposed Rule's treatment of these sources of nuclear generation is arbitrarily and inexplicably different from its treatment of other emission-free generation sources, including renewable energy (RE).

For these reasons, we believe that EPA should withdraw its proposal to treat under-construction and at-risk nuclear generation as BSER, and adjust Georgia's state goal accordingly.

II. INCLUSION OF UNDER-CONSTRUCTION NUCLEAR GENERATION DRAMATICALLY INCREASES THE STRINGENCY OF GEORGIA, SOUTH CAROLINA, AND TENNESSEE'S GOALS AND PRESENTS UNIQUE COMPLIANCE RISKS.

EPA's proposal to include expected generation from new, under-construction nuclear facilities in setting state goals affects only three states' goals: Georgia, South Carolina, and Tennessee. Whereas the other aspects of EPA's proposed BSER "building blocks" increase the stringency of nearly every state, EPA's proposal for under-construction nuclear inexplicably singles out and penalizes the three states that have done the most in recent years to replace their emitting fossil generators with new, zero-emission generation. Due to the large size of the five under-construction generators that EPA singles out for this unfair treatment, Georgia, South Carolina, and Tennessee's goals are 14%, 22%, and 14% more stringent, respectively, than these goals would be without including under-construction nuclear. If EPA retains this approach in the final rule, it will have sent a message to Georgians and others who are contemplating taking bold, early action to reduce greenhouse gas emissions that their efforts to reduce emissions while providing low-cost, reliable power will be punished instead of rewarded.

Apart from the inherent unfairness in singling out Georgia, South Carolina, and Tennessee for such significant emission reductions, EPA's incorporation of 90% of the expected generation from the five under-construction reactors in state goals creates compliance risks for Georgia, South Carolina, and Tennessee that are unlike those faced by any other state. In Georgia's case, under-construction nuclear generation accounts

for 31% of the emission reductions EPA expects Georgia to achieve, relative to the 2012 baseline.[3] This impact would be even greater if EPA adopts the proposed changes to the goal-computation methodology that are discussed in the October 30 Notice of Data Availability.[4] The required reduction from under-construction nuclear is the single largest component of Georgia's required reductions, and is greater than the reductions EPA projects from RE, energy efficiency (EE), and at-risk nuclear generation combined. Because Georgia is already expected to increase the capacity factor of its natural gas combined cycle (NGCC) units to 70% under the Proposed Rule, if the under-construction nuclear facilities fail to come on-line, or are later shut down due to safety or other unforeseen reasons, Georgia would have to more than double the already ambitious levels of RE and EE that EPA expects the State to develop in the coming years just to meet the State CO_2 emission goal. As we and others explain elsewhere, EPA's assessment of the level of generation that states like Georgia can obtain from RE, EE, and redispatch is already unrealistically ambitious and likely unachievable. Therefore, if EPA's assumptions about the level of generation that the two under-construction nuclear facilities in Georgia will produce by 2020 are incorrect, Georgia will likely be unable to meet its emission goal.

The size of the five under-construction nuclear facilities, as well as their high expected capacity factor, thus present compliance risks for Georgia, South Carolina, and Tennessee that are unlike those faced by any other state. The other building blocks on which state goals are based generally involve relatively small changes in generation and emission. For example, increasing the capacity factor of a typical 150 megawatt (MW) NGCC facility from 50 to 70 percent involves an increase in generation of approximately 260,000 megawatt-hours (MWh) per year. A typical large (300 MW) wind facility operating at a 30% capacity factor, meanwhile, can be expected to produce approximately 790,000 MWh. A typical end-use EE or heat rate improvement measure involves much smaller changes in generation. Therefore, if a the capacity factor of a single NGCC in the state fails to increase to 70%, or a planned wind farm is unable to finish construction, the loss of these compliance options could theoretically be made up for through increases in other compliance measures. By contrast, the loss of even one of

[3] *See* Georgia EPD Final Comments at 4.

[4] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, Notice of Data Availability, 79 Fed. Reg. 64,543 (Oct. 30, 2014).

the 1,117 MW under-construction Vogtle reactors would lead to a compliance gap of nearly 9,000,000 MWh in a single year.[5] To make up for such a gap, Georgia would have to obtain an amount of new, carbon-free electricity equivalent to the annual electrical output of more than 11 large wind farms—putting aside that wind, unlike nuclear energy, is not a viable baseload power source in Georgia.[6]

The magnitude of this compliance risk from a single facility dwarfs that faced by other states. States that fail to complete construction of a single proposed wind farm or fail to increase the capacity factor of one of the NGCC units in the state to the levels anticipated by EPA will also face a compliance deficit, but the relatively small size of this deficit means that it can relatively easily be made up. For Georgia, by contrast, the loss of a single under-construction reactor will all but guarantee that the State will fail to meet its goal. This aspect of EPA's proposal therefore puts Georgia and the other two states with under-construction nuclear facilities, more than any others, on a dangerous high-wire for compliance.

Moreover, even without including under-construction nuclear in the goal calculation process, Georgia's final emission target would still be extremely stringent. In particular, if under-construction nuclear generation were excluded from the goal calculation, Georgia would be expected to reduce its fossil emission rate from 1,598 lbs. CO_2/MWh in 2012 to 970 lbs. CO_2/MWh by 2030—a decrease of 39%. In other words, EPA's incorporation of under-construction nuclear generation—apart from being unfair and illegal—is not necessary to ensure that Georgia is incentivized to further reduce emissions from existing EGUs. Conversely, excluding the five under-construction units from state goals would have almost no impact on the Proposed Rule's contribution to emission reductions. The five under-construction units account for only 1.4% of the 2030 generation total that is included in EPA's goal computations. Were EPA to treat the five under-construction reactors like new units (i.e., excluding them from the goal calculation, but allowing states to count MWh from these units toward compliance if the units are actually built), the national average emission rate would increase by only 1.2% compared to the rate as currently proposed. Consequently, despite exposing the three under-construction nuclear states and their citizens to an insurmountably high

[5] Assuming that it operates at EPA's assumed 90% capacity factor, a single 1,117 MW nuclear facility would produce 8,806,428 MWh in a single year.

[6] *See* Georgia EPD Final Comments at 16.

compliance penalty if even a single reactor is delayed or later decommissioned, the inclusion of these five units in state goals has almost no impact on the stringency of the Proposed Rule. In light of the manifest unfairness of singling out these three states, and the massive risk to which this aspect of the Proposed Rule exposes Georgia, EPA should abandon its proposal to include generation from under-construction nuclear facilities in calculating state goals.

III. DESIGNATION OF NUCLEAR ENERGY AS BSER EXCEEDS EPA STATUTORY AUTHORITY BECAUSE NUCLEAR ENERGY IS A BEYOND-THE-UNIT MEASURE AND TREATING IT AS BSER WOULD IMPERMISSIBLY REDEFINE THE SOURCE.

As we discuss in comments submitted on behalf of Georgia and 16 other state attorneys general**,** the Proposed Rule is invalid, among other reasons, because it bases state emission guidelines on a purported BSER that cannot be implemented by or applied to existing EGUs.[7] Because nuclear generation—like RE, EE, and redispatch to NGCCs—is a beyond-the-unit measure, EPA's proposed reliance on both under-construction and at-risk nuclear generation in calculating state goals is illegal and must be withdrawn.

In addition, the inclusion of nuclear generation as a component of BSER violates the CAA's prohibition on redefining the regulated source category. In analogous contexts, courts and EPA itself have hewn closely to the common-sense principle that EPA may not set emission limits that would only be achievable if the emission source were fundamentally "redefined" into a different type of source.[8] Thus, for example, EPA may not require a facility that was designed as a coal-fired power plant to completely redesign so that it can burn natural gas.

Similarly, EPA cannot use its rulemaking authority under section 111(d) of the Act to effectively redraw the designs of existing fossil-fuel generating sources to include

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[7] State AGs Comments at 16-22.

[8] *See, e.g., Sierra Club v. EPA*, 499 F.3d 653, 655 (2007); *Longleaf Energy Assocs., LLC v. Friends of the Chattahoochee, Inc.*, 681 S.E.2d 203 (Ga. App. 2009); EPA, Draft New Source Review Workshop Manual at B.13 (1990), http://www.epa.gov/ttn/nsr/gen/wkshpman.pdf ("Historically, EPA has not considered the BACT requirement as a means to redefine the design of the source when considering available control alternatives. For example, applicants proposing to construct a coal-fired electric generator, have not been required by EPA as part of a BACT analysis to consider building a natural gas-fired electric turbine although the turbine may be inherently less polluting per unit product (in this case electricity).").

generation from distant nuclear generators that are neither under the control of the affected EGU, nor operated in tandem or coordination with the EGU. Rather, EPA's proposal that nuclear generation from existing and under-construction facilities constitutes BSER for coal, oil, and gas-fired EGUs amounts to an illegal redefinition of each of those sources. If EPA can simply redefine a coal-fired power plant to include nuclear reactors, renewable energy facilities, and even end-users (who must implement the energy efficiency measures on which EPA relies in the Proposed Rule), it is difficult to see what limits, if any, the provisions of section 111 would place on the agency. Rather than adopting an interpretation of the term BSER that is supported neither by the statute nor by EPA's past practices, therefore, EPA should adhere to the prohibition on redefining the source, and avoid designating beyond-the-unit measures, such as nuclear energy, as BSER.

IV. THE PROPOSED RULE'S APPROACH TO UNDER-CONSTRUCTION NUCLEAR FACILITIES IS ARBITRARILY INCONSISTENT WITH ITS APPROACH TO OTHER SOURCES OF NUCLEAR ENERGY.

In addition to being illegal and unprecedented in EPA's over 40-year history of implementing section 111, the Proposed Rule's approach to under-construction nuclear facilities is arbitrarily inconsistent with the proposal's treatment of existing and planned nuclear reactors, as well as nuclear uprates. Under the Proposed Rule, all future nuclear facilities other than the five deemed under-construction—including the 12 new nuclear reactors that are currently under Nuclear Regulatory Commission (NRC) review[9]—would be completely excluded from the state goal calculation,[10] even though most of these facilities are currently projected to come on line during the Proposed Rule's interim compliance period. EPA has not explained why it has chosen to include nearly *all* of the expected generation from the five reactors that began construction before the Proposed Rule, while completely excluding the projected generation from the 12 facilities whose applications are currently under review, and which could also begin generating electricity during the first compliance period.

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[9] *See* NRC, Combined License Applications for New Reactors, http://www.nrc.gov/reactors/new-reactors/col.html (last visited Nov. 19, 2014).

[10] *Id.*

Like new facilities, increased generation from uprates at existing nuclear facilities—including uprates that were planned, approved, or under construction before the issuance of the Proposed Rule—also would not be included in the goal calculation. A review of the NRC's licensing database reveals that the NRC approved 16 separate uprate projects between May 2012 and August 2014.[11] Of these, eight were "extended" uprates,[12] meaning that substantial construction and equipment upgrades would be involved. Like the five "under-construction" reactors identified by EPA, each of these uprates either came online or will complete construction after the proposed 2012 baseline year (meaning that generation from these uprates represents additional generation above the baseline). Similarly, some of these uprates were likely still under construction or about to commence construction when EPA issued the Proposed Rule. Inexplicably, however, the expected MWh from these under-construction nuclear uprates—some of which will add substantial capacity to existing facilities—also were not included in state goals, despite EPA's proposal that the MWh from these uprates would be eligible for use as a compliance option.[13] EPA's proposal that all of the expected generation from the five under-construction nuclear reactors would be included in state goals, while generation from planned reactors and under-construction nuclear uprates would be entirely excluded, defies explanation, and is clearly both arbitrary and capricious.

Finally, in contrast to its treatment of all other sources of nuclear energy, the Proposed Rule would include 5.8% of a state's existing nuclear capacity in the state goal calculation.[14] As we explain below, inclusion of this existing nuclear generation is both illegal and unreasonable. It is also arbitrarily different from EPA's approach to under-construction facilities. EPA states that the five under-construction reactors have "long been known to grid operators for planning purposes."[15] Similarly, EPA asserts that inclusion of these facilities as elements of BSER is effectively cost-less, which

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[11] NRC, Approved Applications for Power Uprates, http://www.nrc.gov/reactors/operating/licensing/power-uprates/status-power-apps/approved-applications.html (last visited Nov. 19, 2014).

[12] *Id.*

[13] Proposed Rule, 79 Fed. Reg. at 34,923.

[14] Proposed Rule, 79 Fed. Reg. at 34,871.

[15] EPA, Legal Memorandum for Proposed Carbon Pollution Emission Guidelines for Existing Electric Utility Generating Units 69 (June 2014), http://www2.epa.gov/sites/production/files/2014-06/documents/20140602-legal-memorandum.pdf.

means, effectively, that EPA considers these under-construction facilities to be functionally equivalent to existing facilities (incremental costs for which would also be zero). Logically, therefore, the agency should apply the same assumptions to the five under-construction facilities that it applies to other already-built facilities. Assuming, for the sake of argument that EPA's stated rationale for including a share of existing nuclear generation in state goals (i.e., that this percentage of the nation's nuclear generation is "at risk" of retirement[16]) is reasonable, the logical extension of this argument would require inclusion of only 5.8% of the expected generation from under-construction facilities as well. Presumably, if a generic 5.8% of the nation's nuclear capacity will be at risk of retirement during the Proposed Rule's compliance periods, the market forces that EPA asserts may lead to retirement would also affect the under-construction facilities that EPA assumes will be operational during the same period. Yet for reasons that EPA has not (and likely cannot) explain, EPA has opted to include *all* of the expected generation from the five under-construction facilities while including only 5.8% of existing reactors' generation.

Rather than treating under-construction nuclear facilities as if they are already built—an approach that, as we explain below, ignores the very real risk that one or more of these facilities will not be built or will cost significantly more than is projected—the Proposed Rule should treat these un-built facilities as new facilities, applying the same approach the proposal uses for under-construction nuclear uprates and new nuclear facilities that are currently in the planning and permitting stage.[17] In other words, EPA should calculate state goals without including a projection of future generation from under-construction reactors, while allowing generation from these emission-free sources to be used for compliance if and when they are actually built. Any other treatment would be arbitrary and capricious.

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[16] Proposed Rule, 79 Fed. Reg. at 34,871.

[17] We note that although section 111 requires EPA to treat fossil-fueled EGUs and other stationary sources as "existing" sources if they commenced construction before the issuance of a proposed emission guideline or performance standard, this requirement does not even arguably apply to nuclear reactors because they are not stationary sources. *See* 42 U.S.C. § 7411(a)(6) (2012). Therefore, EPA's arbitrary approach to under-construction nuclear facilities is not required by section 111.

V. THE PROPOSED RULE'S TREATMENT OF UNDER-CONSTRUCTION NUCLEAR ENERGY IS ARBITRARILY DIFFERENT FROM ITS TREATMENT OF OTHER SOURCES OF EMISSION-FREE GENERATION.

In addition to being internally inconsistent in terms of its treatment of other forms of nuclear energy, EPA's proposal to include generation from under-construction reactors in calculating state goals is also inconsistent with the Proposed Rule's approach to other sources of emission-free electricity in several ways. These inconsistencies further emphasize the arbitrariness of EPA's approach to under-construction nuclear reactors.

The first inconsistency relates to EPA's unequal assumptions about the achievability of state commitments to emission-free electricity. Although the Proposed Rule effectively assumes that every state and utility that has committed to constructing one of the five under-construction nuclear facilities will do so, the proposal does not apply this assumption to state and utility commitments to building additional renewable energy facilities.

In many ways, states' commitments to building additional RE—particularly those that are codified in renewable portfolio standards (RPS) or binding targets for particular utilities—are more certain to lead to the required level of deployment than are states' and utilities' commitments to completing the construction of the five under-construction nuclear facilities. Although Georgia has supported the construction of Plant Vogtle's under-construction reactors through state incentives and other measures, none of these measures comes close to imposing a binding legal requirement to complete construction of any of these facilities on a particular schedule, or, indeed, at all. Most RPS programs, on the other hand, impose binding schedules for implementing RE deployment that are typically enforceable through the possibility of injunctions, penalties, or other sanctions.[18] These state programs are specifically designed to ensure that electric utilities develop a specific amount of new RE capacity in order to meet the RPS mandate.

[18] As noted in the Georgia EPD Final Comments, however, the North Carolina RPS—upon which EPA bases Georgia's RE target—contains several off-ramps and does not establish a truly binding or enforceable standard in that state. *See* Georgia EPD Final Comments at 6-8.

In spite of their binding nature, EPA has not calculated state goals based on the assumption that the RPS or utility-specific RE targets that states have established will be achieved. For example, unlike the three states where new nuclear facilities are currently under construction, the emission goals for California, Colorado, and Minnesota—three states with aggressive RPS standards—are not based on the full level of RE to which these states have committed:

- Although California's RPS requires the state to meet 33% of its load from RE by 2020, while Colorado's RPS imposes a 30% requirement,[19] EPA's goal-setting methodology only expects California and Colorado to obtain 21% of each state's in-state generation from renewable resources by 2030.
- Similarly, although Minnesota's RPS program requires its utilities to obtain 30% of their retail sales from RE by 2020,[20] EPA's goal-setting approach only assumes that Minnesota will reach 15% RE deployment by 2030—a proportion of sales that is even lower than the state's actual level for 2012.[21]

EPA has not explained why it assumes that states whose utilities have committed to building under-construction nuclear capacity will construct and operate that capacity at 100% of the expected level, but does not assume that states that have adopted binding RPS programs will construct and operate 100% of their RE commitments.[22] This inconsistency is especially puzzling in light of the fact that many RE commitments are

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[19] *See* EPA, Technical Support Document (TSD) for Carbon Pollution Guidelines for Existing Power Plants: Emission Guidelines for Greenhouse Gas Emissions from Existing Stationary Sources: Electric Utility Generating Units: GHG Abatement TSD at 4-11 (June 2014), http://www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf.

[20] *See id*.

[21] *Id.* at 4-17.

[22] In addition, EPA has not followed the same approach to quantifying the level of emission reductions achievable from under-construction nuclear generation as it has for all of the other building blocks. For the other building blocks, EPA benchmarked the performance level that EPA believes coal-fired EGUs, NGCC, RE generators, and EE programs could achieve based on a review of these building blocks in all 50 states, and then applied that benchmark assumption to each state. For under-construction nuclear, by contrast, EPA has neither evaluated what a reasonable national or regional benchmark for new nuclear generation might be, nor applied that benchmark uniformly to the states. Thus, EPA has taken a more punitive, unfair, and arbitrary approach to the three states with under-construction nuclear reactors than it has taken under the other building blocks. The arbitrariness of this approach is yet another reason why EPA's proposal to include under-construction nuclear generation in state goals should be withdrawn.

legally enforceable obligations, whereas commitments to build new nuclear generation are neither required nor enforceable through any state or federal regulatory requirement.

The Proposed Rule's approach to under-construction nuclear reactors is also inconsistent with its treatment of other under-construction emission-free sources of electricity. For example, although it has identified and included all five of the nuclear reactors that are currently under construction in state goals, EPA has ignored the thousands of MW of renewable generation that are currently under construction throughout the country.[23] Similarly, EPA has not included generation from the over 500 MW of new hydroelectric capacity that was under construction in 2013 and 2014.[24] Further still, EPA's state goal calculation omits projected emission reductions from large carbon-capture and sequestration (CCS) generating facilities such as Mississippi Power's Kemper facility, which is now under construction and slated to come on-line in 2016.[25]

Even more inexplicably, EPA does not even incorporate 100% of the generation from RE facilities that are already online and operating into some states' goals. For example, EPA's projected RE performance levels for Iowa, Maine, Minnesota, and South Dakota are lower than the levels that these states actually obtained from RE in 2012. EPA's proposed approach does not take into to account the full amount of either under-construction or actually-operating RE generation when calculating these states' goals. Thus, EPA's proposal would arbitrarily penalize states that have chosen to reduce

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[23] *See, e.g.*, American Wind Energy Association, Get the Facts, Construction & Power Contracts, http://www.awea.org/AnnualMarketReport.aspx?ItemNumber=6310 (last visited Nov. 19, 2014) ("At the end of 2013, there was more U.S. wind power capacity under construction than at any time in history. Over 12,000 MW of new wind energy capacity was under construction across 95 projects, with a record-breaking 10,900 MW starting physical work during the fourth quarter of 2013."); Solar Energy Industries Association, Major Solar Projects List, http://www.seia.org/research-resources/major-solar-projects-list (last updated Nov. 18, 2014) ("[O]ver 31 GW of [photovoltaic] and [concentrated solar power] projects [were] either under construction or under development" as of August 2014).

[24] *See* Federal Energy Regulatory Commission, Energy Infrastructure Update 3 (Aug. 2014), https://www.ferc.gov/legal/staff-reports/2014/aug-infrastructure.pdf (141 MW of new hydroelectric generation entered service from January to August 2014); Federal Energy Regulatory Commission, Energy Infrastructure Update, at 4 (Dec. 2013), http://www.ferc.gov/legal/staff-reports/2013/dec-energy-infrastructure.pdf (387 MW of new hydroelectric generation entered service in 2013).

[25] *See* Mississippi Power News, *Kemper Filing Includes Revised Cost Estimate, 2016 In-Service Date* (Oct. 28, 2014), http://mississippipowernews.com/2014/10/28/kemper-filing-includes-revised-cost-estimate-2016-in-service-date/.

emissions by building one form of emission-free energy (nuclear energy) while adopting a less stringent approach to states and utilities that are moving forward with (or have already built) other sources of emission-free energy such as RE, hydroelectricity, or CCS.

VI. THE PROPOSED RULE'S ASSUMPTIONS IN QUANTIFYING THE EMISSION REDUCTIONS AND COSTS ASSOCIATED WITH UNDER-CONSTRUCTION NUCLEAR GENERATION ARE ARBITRARY AND CAPRICIOUS.

In addition to being arbitrarily different from the treatment of other nuclear and emission-free sources of energy, EPA's approach to quantifying the level of emission reductions that may be achievable from deploying under-construction nuclear facilities is based on several erroneous assumptions. The incorrect assumptions include the following:

- the five under-construction facilities will be completed and operational by 2020;
- these facilities will operate at an average 90% capacity factor throughout their lives; and
- the costs of reducing emissions by completing construction of these facilities is effectively zero.

Each of these erroneous assumptions further weighs in favor of excluding nuclear generation from the goal computation methodology.

A. EPA's Assumption that Each of the Under-Construction Reactors Will Be Operating by 2020 is Unreasonable and Contradicted by the Projects' Own Construction History.

Nuclear power is far and away the most complex, technical, and highly regulated generation source on the planet. Every step in the construction, installation, and operation of a nuclear reactor is overseen by regulators and inspectors at the NRC. Any design or equipment changes that may be necessitated by site or market conditions must also be separately approved before they can be implemented. In addition, although the AP1000 design of the new Vogtle reactors in Georgia has been used at other locations, the key components of every new nuclear reactor must be specially manufactured by a small handful of precision manufacturers who can meet the NRC's standards for quality, security, and accuracy. The technical and regulatory complexity involved in constructing a new nuclear reactor and the significant regulatory hurdles

involved in adjusting design or fabrication assumptions can lead to long delays and unexpected increases in costs.

Moreover, unforeseen events such as Three-Mile Island, Chernobyl, and the more recent tsunami-induced meltdown at the Fukushima Daiichi reactor in Japan, could trigger new safety regulations, regulatory reviews, and major design changes that could significantly delay completion of under-construction reactors. Depending on the nature of the event and regulators' reactions to it, these changes greatly increase uncertainty on completion of the construction process. Thus, although utilities in Georgia and elsewhere may now be committed to building the five reactors identified in the Proposed Rule, it is possible that changes in NRC regulations, the cost of reactor components, or the availability of financing could result in major delays and possibly even the abandonment of one or more of these projects.

The Tennessee Valley Authority's (TVA) Watts Bar Unit 2—which is one of the five "under-construction" facilities the Proposed Rule assumes will be completed by 2020—is perhaps the best example of the uncertainty inherent in predicting when new nuclear facilities will be operational. The NRC issued the TVA a construction permit for Watts Bar Unit 2 more than 40 years ago, in 1973.[26] TVA began construction on Unit 2 shortly thereafter, but had only completed approximately 80% of construction by 1985, when construction was halted, only to be resumed in 2007.[27] Watts Bar Unit 2 is an important and highly relevant cautionary tale: although the reactor was expected to enter commercial operation within three years of receiving its license,[28] it was mothballed a decade later, then construction was restarted more than 20 years later. Indeed, Watts Bar Unit 2 is still under construction today, more than four decades after it began construction.

Although Watts Bar Unit 2's lengthy construction schedule may not be typical of every nuclear reactor, the fact remains that large nuclear projects such as Plant Vogtle Units 3 and 4 face numerous risks, long construction timelines, and a greater potential

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[26] NRC, History of Watts Bar Unit 2 Reactivation, http://www.nrc.gov/info-finder/reactor/wb/watts-bar/history.html (last visited Nov. 25, 2014).
[27] TVA, Watts Bar Nuclear Unit 2: The Way Forward to Complete TVA's Seventh Reactor 1-2 (Apr. 2012), http://www.tva.com/power/nuclear/pdf/Watts_Bar_2_White_Paper.pdf.
[28] World Nuclear Industry Status Report 2012 (July 2012), http://www.worldnuclearreport.org/The-World-Nuclear-Industry-Status.html#wb243yc (last visited Nov. 25, 2014).

for multi-year delays and potential risks of abandonment than almost any other type of energy project. Indeed, both the Vogtle project in Georgia and the V.C. Summer project in South Carolina have already experienced lengthy construction delays.[29] Therefore, EPA's assumption that these units will complete construction according to schedule is highly suspect, and is not supported by the actual construction history of these and other nuclear reactors.

B. Industry Statistics and Other Factors Indicate that EPA's Assumption that the Under-Construction Reactors Will All Operate at a 90% Capacity Factor is Erroneous.

Even if the under-construction reactors in Georgia and elsewhere are able to complete construction by 2020—as EPA's Proposed Rule assumes—there are a number of reasons why these units may not operate at a 90% capacity factor throughout their lifetimes. First, new facilities typically require lengthy testing and fine-tuning periods before they are able to run at their designed capacity factor. Therefore, the new Vogtle units may well operate at low capacity factors during the first few years they come on-line, which could create a significant compliance deficit for Georgia that would have to be made up by higher-than-90% capacity factors in the future, or by the addition of other emission-free energy or EE.

Second, despite the fact that the national *average* capacity factor for nuclear reactors has been approximately 90% for the last several years, there is no guarantee that the five individual facilities will operate at that level for their entire lives. Occasional outages for refueling, turbine replacement, or safety issues are all but inevitable. For example, a typical reactor must refuel at least once every 18 months—an event that requires a shutdown lasting six weeks or more. Unexpected shutdowns for maintenance or safety issues, meanwhile, can last six months or more. The Nuclear

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[29] Southern Alliance for Clean Energy, *Delays and Cost Increases Plague New Vogtle Nuclear Reactors* (Aug. 14, 2014), http://www.cleanenergy.org/delays-and-cost-increases-plague-new-vogtle-nuclear-reactors/; Ray Henry, *Delays Could Grow at Plant Vogtle Nuclear Plant and Cause Price to Rise $2 Million Per Day, Government Monitors Say*, FLA. TIMES UNION (June 23, 2014, 4:33 PM), http://jacksonville.com/news/georgia/2014-06-23/story/delays-could-grow-plant-vogtle-nuclear-plant-and-cause-price-rise-2; Roddie Burris, *SCE&G Nuclear Plants Facing More Delays, Cost Overruns*, THE STATE (Aug. 12, 2014), http://www.thestate.com/2014/08/12/3616030/sceg-nuclear-plants-facing-more.html; Ray Henry, *Delays for SC Nuclear Plant Pressure Industry*, YAHOO! NEWS (Aug. 16, 2014, 1:03 PM), http://news.yahoo.com/delays-sc-nuclear-plant-pressure-industry-135009585.html.

Energy Institute, which compiles reports of outages for the nation's existing nuclear fleet indicates that, between 2000 and 2014, reactors experienced at least six planned outages lasting more than 100 days.[30] The average duration of all planned outages during the same period was almost three months.[31] According to the Energy Information Administration (EIA), meanwhile, the average lifetime capacity factor of the U.S. nuclear fleet is only 80.3%[32]—ten percent lower than EPA's proposed capacity factor assumption for nuclear generation. Moreover, in the last three years, the lowest quartile of U.S. nuclear facilities operated at an average capacity factor of only 70.8%.

In addition, recent history demonstrates that capacity factors at individual units can dip even lower due to safety and other reasons. For example, a 2013 report by the EIA details the following major outages:

- Southern California Edison's San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 (2,150 MW total) near San Diego, California, have both been offline since January 2012 as a precaution after a steam generator tube leak led to the discovery of excessive wear in the plant's new steam generators. The units remain offline while the problems are evaluated and repairs are made, which tightened electricity supply for Southern California last summer. Ultimately, the problems proved to be so significant that both units were prematurely retired from service.
- Omaha Public Power District's (OPPD) Fort Calhoun reactor (478 MW) has been offline since April 9, 2011, initially due to flooding on the Missouri River. A subsequent inspection by the U.S. Nuclear Regulatory Commission identified additional problems, and OPPD is working through a checklist of repairs and changes to be addressed before restarting the plant. . . .
- Progress Energy Florida's Crystal River Unit 3 (860 MW) about 60 miles southwest of Gainesville, Florida, has been offline since September 2009 to repair the reactor containment vessel. . . .
- At NextEra Energy's Turkey Point plant outside Miami, Florida, Unit 3 (802 MW) went offline in late February 2012 for refueling, underwent additional repairs through the summer and early fall, and only returned to service in

[30] Nuclear Energy Institute, Durations of Steam Generator Replacements Spreadsheet (2014).
[31] *Id.*
[32] *See generally* EIA, Annual Energy Outlook 2014, with Projections to 2040 (Apr. 2014), http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf [hereinafter "EIA Annual Outlook 2014"].

late October. In early November, Turkey Point Unit 4 (693 MW) was taken offline for a planned four-month refueling and maintenance outage.[33]

In light of these statistics, it would be arbitrary and unreasonable for EPA to assume that each of the under-construction reactors will run at an average capacity of 90% for their entire lives, or even for the entire span of a single compliance period.

C. EPA's Assumptions About the Cost of Completing the Five Under-Construction Reactors Are Incorrect.

The Proposed Rule asserts that completing construction of the five under-construction reactors would be associated with zero "incremental" cost because "the decisions to construct these units were made prior to this proposal."[34] This simplistic conclusion overlooks numerous incremental costs that are associated with constructing and operating these units. To begin with, constructing and operating new nuclear reactors such as those that are being constructed in Georgia implies a cost of more than $54/metric ton of CO_2 avoided[35]—well above EPA's estimates for the other building blocks.[36] Furthermore, completion of the two Vogtle units is expected to cost approximately $14 billion. These construction costs are being paid for through a 9.3141% "Nuclear Construction Cost Recovery Schedule" rider on Georgia Power's customers' electric bills and similar rate increases for the other utilities involved in the

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[33] EIA, Today in Energy, Above-Normal Outages of U.S. Nuclear Capacity Persist at the Start of 2013 (Mar. 14, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=10371.

[34] *See* Proposed Rule, 79 Fed. Reg. at 34,870.

[35] Assuming that the next most likely alternative for large baseload power would be a new NGCC unit—which typically performs at 800 lbs. CO_2/MWh (0.3629 metric tons CO_2/MWh), and that the 2019 levelized costs of electricity (LCOE) for gas and nuclear generation are $66.30 for NGCC and $86.10 for Advanced Nuclear with the federal subsidy, the implied carbon cost of building new nuclear in place of NGCC would be the difference in LCOEs between the two technologies ($19.80/MWh) divided by the difference in their emission rates. Dividing $19.80/MWh by the difference in gas and nuclear emission rates (0.3629 metric tons CO_2/MWh) yields an implied carbon cost of $54.56/metric ton CO_2. Levelized cost of electricity data is available from EIA's *Annual Energy Outlook 2014*. EIA, Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2014 at 6 (Apr. 17, 2014), http://www.eia.gov/forecasts/aeo/pdf/electricity_generation.pdf (Table 1: Estimated Levelized Cost of Electricity (LCOE) for New Generation Resources, 2019).

[36] EPA estimates that the cost of emission reductions from building block one are $6-12/metric ton CO_2. Proposed Rule, 79 Fed. Reg. at 34,856. The cost of reducing emissions through redispatch under building block two is $30/metric ton, *id.* at 34,857, while the cost of reducing emissions from RE and EE under building blocks three and four is $10-40/metric ton and $16-24/metric ton, respectively. *Id.* at 34,869, 34,858.

development of the new Vogtle units. In addition, once construction is complete, the operation of these units is expected to add 6-8% to ratepayers' bills for many years into the future. Moreover, as we discuss above, it is possible that additional complications could arise during construction of the units, which could increase these costs even further or require renegotiation of commercial contracts. For example, according to press reports, each day that construction is delayed at Vogtle could add $2 million to the costs of this complex project.[37]

These costs are incremental to the Proposed Rule because they would not necessarily continue to be incurred in the absence of the Proposed Rule. In the Proposed Rule, EPA recognizes that "a host of factors—increasing fixed operation and maintenance costs, relatively low wholesale electricity prices, and additional capital investment associated with ensuring plant security and emergency preparedness—have altered the outlook for the U.S. nuclear fleet in recent years."[38] Although, the importance of these factors varies dramatically from reactor to reactor, the same cost pressures that apply to some existing facilities apply to these *under-construction* nuclear facilities. Without the Proposed Rule, stakeholders in these projects would have the option of delaying or modifying the projects if costs reach unacceptable levels—just as TVA decided to do in 1985 with Watts Bar Unit 2.

Therefore, the inclusion of under-construction generation in state goals is not cost-less; rather, the additional policy constraint created by the Proposed Rule will cause the developers and operators of these units to incur additional costs above those that they would have incurred in the absence of the Proposed Rule. EPA should reflect these real, incremental costs in its evaluation of this aspect of BSER, and the agency's failure to do so violates the requirements of EPA's own regulations as well as the plain language of section 111.[39]

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[37] *See* Henry, *Delays for SC Nuclear Plant Pressure Industry*, *supra* note 26.

[38] Proposed Rule, 79 Fed. Reg. at 34,871.

[39] *See* 42 U.S.C. § 7411(a)(1) (requiring that standards of performance be based on "application of the best system of emission reduction which (*taking into account the cost of achieving such reduction* and [other factors]) the Administrator determines has been adequately demonstrated.") (emphasis added); 40 C.F.R. § 60.22(b)(5) (2014) (requiring EPA emission guidelines to "reflect[] the application of the best system of emission reduction (*considering the cost of such reduction*) that has been adequately demonstrated for designated facilities . . . .") (emphasis added).

VII. THE PRESERVATION OF EXISTING "AT-RISK" NUCLEAR CAPACITY IS NOT A VALID SYSTEM OF EMISSION REDUCTION.

As we discuss above and in other comments on the proposed Clean Power Plan, EPA may not determine the stringency of state guidelines based on the application of beyond-the-unit systems of emission reduction, such as increased generation from nuclear generators and other non-stationary sources. Consequently, neither generation from under-construction nor generation from existing nuclear reactors may be used to determine the stringency of state goals. However, even assuming that EPA is not prohibited from basing the stringency of state guidelines on beyond-the-unit measures, EPA's proposal to include "at-risk" nuclear generation in the state goal calculation would violate the plain language of section 111.

As EPA admits in its rate-to-mass goal conversion technical support document, "the continuing operation of existing resources under building block three (RE and at risk nuclear) is not assumed to affect historical generation levels."[40] In other words, preserving *existing* nuclear capacity that was operating in 2012 does not enable existing EGUs that were operating in 2012 to reduce their emissions below the baseline. Rather, at best, the preservation of existing nuclear capacity only allows existing EGUs to continue operating at the same levels as in the past. Therefore, "preservation" or continued operation of existing nuclear reactors cannot be considered a "system of emission *reduction*" for existing EGUs, as defined under the CAA. Consequently, EPA's proposal to incorporate supposed emission reductions from preserving existing nuclear capacity into state emission guidelines violates the plain language of the Act and should be withdrawn.

VIII. INCLUSION OF "AT-RISK" NUCLEAR GENERATION IN STATE GOALS IS ARBITRARY AND CAPRICIOUS.

In addition to violating the plain language of section 111, EPA's proposal to incorporate approximately 5.8% of each state's supposedly "at-risk" nuclear capacity in calculating state goals is also arbitrary and capricious for the following reasons. First,

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[40] EPA, Technical Support Document for Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units: Translation of the Clean Power Plan Emission Rate-Based CO_2 Goals to Mass-Based Equivalents 5 (Nov. 2014), http://www2.epa.gov/sites/production/files/2014-11/documents/20141106tsd-rate-to-mass.pdf.

the study on which EPA relies does not project that 5.8% of *Georgia's* units are at risk of retirement. Indeed, the assumption that Georgia may retire some of its existing nuclear capacity is unreasonable in light of the fact that the State's utilities are investing billions of dollars to build *additional* nuclear capacity in the State. Moreover, the costs of both new and existing nuclear generation are already included in our utilities' rate base. Consequently, temporary electricity market fluctuations—such as those that generators in competitive wholesale markets may experience—will not put Georgia's existing units at risk of retirement. Finally, none of Georgia's four existing reactors will be required to seek a license extension until at least 2034. Therefore, there is no reason to believe that any of these units are at risk of retirement in the near future. EPA should not arbitrarily apply an assumption that was developed on a national scale for nuclear facilities in different market situations to Georgia's four existing reactors—all of which are expected to continue providing power for the foreseeable future.

Furthermore, the Proposed Rule's treatment of existing nuclear capacity is also arbitrarily inconsistent with the proposal's treatment of other large, existing sources of emission-free electricity, such as hydroelectric dams or RE facilities. EPA asserts that the inclusion of 5.8% of existing nuclear capacity in calculating states' emission goals is reasonable because the EIA projects that this percentage of existing nuclear capacity will retire due to "continued economic challenges."[41] However, both hydroelectric facilities and RE facilities also face market and non-market challenges that could lead to reduced capacity or shutdown in future years. For example, a number of hydroelectric dams have been removed due to safety, economic, or environmental concerns,[42] and others are at risk of removal or de-rating due to Endangered Species Act and other concerns.[43]

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[41] Proposed Rule, 79 Fed. Reg. at 34,871.

[42] *See, e.g.*, American Rivers, Dams Removed from 1998-2012, http://www.americanrivers.org/assets/pdfs/dam-removal-docs/dams-removed-1998-to-2012.pdf?dc2518 (last visited Nov. 19, 2014); The Heinz Center, Dam Removal: Science and Decision Making (2002), *available at* http://water.epa.gov/polwaste/nps/upload/Dam_removal_full_report.pdf; Andy Selle, Dam Removal – A Primer (2010), *available at* http://www.epa.gov/osp/tribes/NatForum10/ntsf10_1m_Selle.pdf.

[43] *See, e.g.*, U.S. Department of the Interior et al., Klamath Dam Removal Overview – Report for the Secretary of Interior: An Assessment of Science and Technical Information (Oct. 2012), http://klamathrestoration.gov/sites/klamathrestoration.gov/files/2013%20Updates/Final%20SDOR%20/0.Final%20Accessible%20SDOR%2011.8.2012.pdf; Stantec, White Paper: Dam Removal Practices and Implications for Dams on the Housatonic River (Apr. 17, 2014), *available at* http://www.epa.gov/housatonic/thesite/restofriver/reports/557010.pdf.

Renewable energy facilities in California and other markets could also face economic challenges as the supply of non-dispatchable RE exceeds demand for lengthy periods[44] or as their generation technology degrades over time. The typical operating life of a solar facility is 30 years, whereas a typical wind facility is 20 years; therefore, existing RE facilities that were installed before 2010 are likely to begin retiring in large numbers during the proposed interim and final compliance periods. On the other hand, nuclear facilities typically hold operating licenses that last 40 years, with the opportunity to apply for an additional 20-year license extension (as Georgia's Hatch Units 1 and 2 have done). Consequently, it is at least as likely that existing RE and hydroelectric resources will shut down or retire during the Proposed Rule's compliance period as it is that nuclear facilities will do so. Despite this reality, EPA has not proposed to penalize states that retire existing hydroelectric or RE capacity by incorporating an assumption about "at-risk" hydroelectric or RE generation into state goals. EPA's decision to include only some "at-risk" emission free resources in state goals while excluding others is arbitrary and capricious.

Another flaw in EPA's proposal to penalize Georgia if utilities in the State fail to preserve their existing nuclear reactors is that Georgia has limited control over whether nuclear capacity in the State is preserved or retired. Although, as discussed above, the fact that all plants in the State are licensed until at least 2034, combined with the fact that nuclear generation costs are included in Georgia's customers' rate base, significantly reduces the likelihood that these power plants will need to retire, negative long-term regional or national trends that are beyond Georgia's control could still require our utilities to shut down or reduce operation at one or more of their existing reactors. Furthermore, changes to federal regulations, such as those that followed the Fukushima disaster, could also impose additional requirements on existing reactors that would lead to early retirement. Therefore, although it is highly unlikely and arbitrary for EPA to consider Georgia's four existing reactors at risk of retirement, the fact remains that Georgia cannot itself guarantee that these units will continue to generate electricity in the future. Consequently, it would be arbitrary and capricious to consider the preservation of existing nuclear capacity to be an "adequately demonstrated"

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[44] *See, e.g.,* Naureen S. Malik, *Spot Power Turns Negative in California on Solar, Wind Output*, BLOOMBERG (Mar. 12, 2014, 5:18 PM), http://www.bloomberg.com/news/2014-03-12/spot-power-turns-negative-in-california-on-solar-wind-output.html.

system of emission reduction for Georgia's power plants, because the State and its utilities have little control over whether these facilities will continue to operate in the future if economic or regulatory changes make continued operation impossible or uneconomic.

IX. CONCLUSIONS.

The State of Georgia appreciates the opportunity to provide these comments on EPA's proposal to incorporate generation from certain nuclear facilities into state emission guidelines. As we explain above, we strongly disagree with EPA's proposed approach to include nuclear in the goal computation methodology because it is illegal, unfair, and unwise. EPA's proposal to include generation from the two under-construction nuclear reactors in Georgia, in particular, is neither necessary to promote significant reductions in CO_2 emissions nor advisable in light of the almost insurmountable compliance risk that this policy would create for the State. Accordingly, and in light of our other comments on the proposed Clean Power Plan, we urge EPA to exclude both under-construction and at-risk nuclear generation from the state goal calculation procedure if and when EPA issues a final rule.

Respectfully submitted,

SAMUEL S. OLENS

Attorney General of Georgia