Kendrick C. Fentress
Associate General Counsel

Mailing Address:
NCRH 20 / P.O. Box 1551
Raleigh, NC 27602

o: 919.546.6733
f: 919.546.2694

Kendrick.Fentress@duke-energy.com

September 4, 2019

VIA ELECTRONIC FILING

Chief Clerk's Office
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4300

Re: Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Separate Findings and Conclusions for Consideration and Adoption by the Commission
Docket No. E-100, Sub 158

Dear Chief Clerk:

Enclosed for filing in the above-referenced docket are the Separate Findings and Conclusions of Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP," and together with DEC, "Duke" or the "Companies") for consideration and adoption by the Commission. Contemporaneously with this filing, the Public Staff—North Carolina Utilities Commission ("Public Staff") is filing a Joint Proposed Order which contains joint findings, evidence, and conclusions on the topics to which the Public Staff and Duke have either stipulated or where these parties do not have issues in dispute. Duke's Separate Findings and Conclusions address Duke's individual positions on the limited issues that remain unresolved between Duke and the Public Staff in this proceeding.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Kendrick C. Fentress

Kendrick C. Fentress

cc: Parties of Record

Enclosure

CERTIFICATE OF SERVICE

I certify that a copy of Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Separate Findings and Conclusions for Consideration and Adoption by the Commission, in Docket No. E-100, Sub 158 has been served on all parties of record either by electronic mail, hand delivery or by depositing a copy in the United States mail, postage prepaid.

This the 4th day of September, 2019.

Kendrick C. Fentress

Kendrick C. Fentress
Associate General Counsel
Duke Energy Corporation
P.O. Box 1551/ NCRH 20
Raleigh, North Carolina 27602
Tel: 919.546.6733
kendrick.fentress@duke-energy.com

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-100, SUB 158

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of		
Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities – 2018	)	**SEPARATE FINDINGS AND CONCLUSIONS OF DUKE ENERGY CAROLINAS, LLC AND DUKE ENERGY PROGRESS, LLC FOR PROPOSED ORDER ESTABLISHING STANDARD RATES AND CONTRACT TERMS FOR QUALIFYING FACILITIES**

SEPARATE FINDINGS OF FACT

1. DEC's, DEP's, and DENC's respective approaches to relying upon forward market prices and fundamental forecasts of future spot prices are reasonable and appropriate for use in calculating the Utilities' respective avoided energy rates approved in this proceeding.

2. The continued inclusion of a "risk premium" for avoided hedging value above DEC's and DEP's actual forecasted avoided cost of energy amounts to a subsidy for the QF that is contrary to the "but for" principle of PURPA and should be rejected.

3. It is not appropriate for the Utilities to include a transmission and distribution capacity adder within their avoided cost calculations available to standard offer QFs.

4. It is not appropriate for the Utilities to include an adder to avoided energy costs based upon generalized assumptions that the integration of uncontrolled solar QF

generating capacity, in the aggregate, suppresses or reduces prices in the wholesale power market.

5. It is appropriate for DEC and DEP to amend their standard offer PPA and Terms and Conditions to more clearly define when a "material alteration" to a QF facility that has contracted to sell to DEC or DEP under Schedule PP is required to obtain the utility's consent.

6. The material alteration definition in DEC's and DEP's Terms and Conditions expressly allows QF owners to make routine operations and maintenance repairs and to replace solar panels or other equipment with like-kind equipment that does not result in an increase to the existing capacity of the Facility or a decrease in the existing capacity by more than five percent.

7. DEC and DEP should evaluate QF proposals to undertake like-kind replacements of equipment in a commercially reasonable manner. However, it is reasonable for DEC and DEP not to accept proposed material alterations to a QF generating facility that would increase the energy delivered by the QF or increase the capacity paid to the QF under legacy avoided cost rates that exceed DEC's and DEP's current avoided cost.

8. It is appropriate for DEC and DEP to amend their standard offer PPA and Terms and Conditions to incorporate provisions requiring QFs to comply with system operator instructions, including, where applicable, an energy storage protocol that is on file with the Commission.

9. A QF that has committed itself to sell to the Utilities and subsequently proposes to materially alter its generating facility by adding a battery storage system to its existing Facility shall be required to enter into a new PPA and to sell and deliver its

modified capacity and energy output to DEC or DEP at the utility's current avoided cost rates.

10. It is appropriate for the Utilities and the Public Staff to establish a working group including QF developers and other interested parties for the purpose of discussing technical issues associated with separately metering the output from a battery storage system connected to a solar QF and to discuss what additional consideration or benefits consumers would receive if an existing committed QF were allowed to amend its PPA and to retain its existing avoided cost rates for the original QF generating facility while selling and delivering the output of the new battery storage system at current avoided cost rates.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 1

The evidence supporting this Finding of Fact is found in Duke's Joint Initial Statement ("JIS"), Duke's Joint Reply Comments, the testimony of Duke Witness Snider, the Public Staff Initial Comments, NCSEA Initial Comments, and SACE Initial Comments.

Summary of the Evidence:

In its JIS, Duke proposed relying upon forward market price data out ten years (2019-2028) as the most precise indicator of the near-term future commodity costs of natural gas for purposes of calculating the Companies' avoided energy costs. The Companies stated that they view this forward market price data as a more accurate indicator of the future commodity cost of natural gas for both IRP purposes—to plan for the Companies' next capacity resource option to meet customers' future energy needs—as well as for purposes of calculating avoided energy costs to be paid to QFs to avoid such future energy needs. Beyond ten years, the Companies assume that commodity prices begin to transition to fundamental forecast data starting in year 11. (Duke JIS, at 19-21).

As support for this methodology, Duke explained that the Companies have purchased 10-year forward gas contracts on five separate occasions since 2016 to support the Companies' recent IRPs and avoided cost filings to demonstrate forward market liquidity ten years into the future. Duke further stated that the Companies' continued experience since 2016 has confirmed the Commission's findings in the *2016 Sub 148 Order* that reliance on lagging fundamental forecast pricing has proven to be inaccurate over the past few years and has led to significant overpayment risk to QFs. In Figure 4 of the JIS, the Companies highlighted that forecasted natural gas commodity prices have continued to trend downward since 2016. In conclusion, the JIS explained that Duke's historical experience and recently-transacted forward gas purchases support that natural gas commodity prices are liquid 10 years into the future and have continued to steadily decline, substantiating Duke's continued use of ten years of forward market commodity prices for both IRP purposes and in the calculation of avoided costs as fair to QFs and prudent and reasonable for resource planning purposes. (Duke JIS, at 19-21).

The Public Staff's Initial Comments argued that while Duke has continued to purchase 10-year forward gas contracts to demonstrate forward market liquidity 10 years into the future, Duke does not provide any evidence of any other liquidity in the natural gas market extending for terms beyond five years. Moreover, the Public Staff stated that they had analyzed methodologies used by other utilities' IRPs around the country and found no utilities other than DEC and DEP that rely wholly on forward prices for terms greater than six years. The Public Staff went on to argue that Duke's proposed use of 10-year forward prices will not be representative of Duke's actual fuel prices and therefore could potentially send the wrong price signals to the market. In support of their argument, the Public Staff cited the abrupt increase in the differential as Duke switches from using forwards to its fundamental forecast, and noted that Duke's average proposed Henry Hub price over the next 10 years is approximately 28% lower than the approved natural gas prices from the 2016 Sub 148 proceeding. In conclusion, the Public Staff recommended that the Commission require Duke to use no more than five years of forward market data before appropriately transitioning to the Companies' fundamental forecast. (Public Staff Initial Comments, at 21-28).

NCSEA's Initial Comments also objected to Duke's use of 10 years of forward market prices before moving to a fundamentals forecast. They contended that Duke's forward market for 10 years of natural gas at fixed prices is not transparent, broadly traded, or liquid, and pointed to Duke's open interest in the natural gas future prices market being almost entirely in the first two years of the 10-year window as evidence of their claim. NCSEA further challenged Duke's ability to purchase small volumes of gas, alleging that such purchases are not dispositive and that the amount of natural gas purchases only displaces a small amount of solar that Duke expects to purchase in the near future. Specifically, NCSEA argued that the amount of 10-year natural gas purchases is only a very small percentage of the Companies' total gas purchases from 2014 to 2018, and that the Companies' current hedging policies do not allow the Companies to buy sufficient natural gas at 10-year fixed prices required to displace their expected solar generation. Further, NCSEA contended that while there is some evidence that short-term forward prices provide a reasonable forecast of short-term spot prices, Duke did not provide evidence that ten years of forward price data is superior to forecasts that examine the fundamentals of the supply and demand of natural gas. Therefore, NCSEA recommended that Duke apply a balanced forecast that uses forward market prices for two years with a transition in the next three years to the average of a set of recent fundamentals forecasts, which NCSEA stated should come from (1) DENC's forecast from ICF and (2) the new *2019 Annual Energy Outlook* forecast from EIA. Alternatively, NCSEA stated that they would not object to Duke's use of DENC's similar forecast methodology of 18 months of forwards transitioning to a fundamental forecast beginning at 36 months for all of the Utilities. (NCSEA Initial Comments, at 14-18).

SACE's Initial Comments first noted that the *2016 Sub 148 Order* explicitly instructs Duke to use no more than eight years of forward prices, not the ten years Duke has proposed. Second, SACE argued that reliance on long-term forward pricing is inappropriate because future markets are not good indicators of long-term market trends. SACE contended that long-term forecasts should not be based on short-term trends, instead arguing that they should be based on more stable factors such as resource base and expected production costs, factors SACE further contends are inherent to a commodity and around which markets can be expected to fluctuate. Therefore, SACE recommended that the Commission require Duke to rely on no more than two or three years of forward market price forecast, before transitioning to a blended price forecast, and then a fundamental price forecast. (SACE Initial Comments, at 6-7).

In Reply Comments, Duke stated that the Public Staff, NCSEA, and SACE once again argue for the Commission to revert to its pre-*2016 Sub 148 Order* practices limiting the use of forward market pricing data for natural gas to five years or less and relying upon an increased duration of fundamental forecast data to calculate their avoided energy rates, despite changed circumstances. Duke contended that these parties have again ignored that

Duke has consistently relied upon 10 years of forward market commodity prices in their last four IRPs filed with the Commission (2015-2018), and have continued to regularly purchase 10 years of natural gas to demonstrate market liquidity. Taking these facts into consideration, in addition to the fact that the overall future payment obligation to QFs facing customers has grown to $4.5 billion, Duke recommended that the Commission reject the parties' arguments. (Duke Reply Comments, at 12-13).

Specific to the Public Staff's comments, Duke stated first, that the Public Staff presented no evidence or argument that the natural gas market is any less liquid than it was in 2017, when the Commission allowed the Companies to rely upon eight years of forward market data. Second, Duke argued that the Public Staff's focus on other utilities' IRPs to support its argument was misplaced, explaining that Duke is the only utility employing this ten-year forward price forecast because North Carolina is the only state that requires its utilities to maintain consistency between the utility's IRP and avoided cost filing. In response to a data request from the Companies, the Public Staff did not identify any utility other than DENC that is subject to a similar mandate to maintain methodological consistency between the fuel forecasts used for integrated resource planning and those used in calculating future avoided energy costs. More importantly, for purposes of this matter, none of the utilities cited by the Public Staff have customers that are facing a $4.5 billion long-term financial obligation and a projected $2.2 billion overpayment risk as a consequence of an unprecedented number of QFs obligating the Companies to purchase their output coupled with the use of lagging and inaccurate fundamental forecasts to calculate avoided energy cost rates. (Duke Reply Comments, at 13-14).

In reply to the arguments made by other parties' concerning the liquidity of the 10-

year natural gas market, Duke stated that first and foremost, the fact that the Companies have been consistently able to make purchases of natural gas 10 years into the future evidences the fact that the market remains liquid. In addition to there being multiple sellers offering proposals in the 10-year natural gas market, the Companies noted that each seller quoted a similar price, further evidencing liquidity and a lack of price volatility in the 10-year forward natural gas market. The Companies also replied that Duke is aware of another North Carolina market participant who had purchased significant quantities of 10-year forward natural gas. (Duke Reply Comments, at 14-16).

Turning to NCSEA's argument that 99% of the open interest is in the first two years of the Henry Hub Forward Open Market, Duke first noted that this issue was previously addressed in the 2016 Sub 148 proceeding where the Companies explained that NYMEX futures contracts are not the source of market liquidity for longer term transactions but rather, market liquidity is demonstrated by readily available long-term natural gas forward contracts in bilateral markets as demonstrated by numerous transactions, even more numerous price quotes and other entities in North Carolina transacting at this duration. Concerning NCSEA's argument about hedging and the Companies' projected solar generation, Duke stated that this argument is irrelevant and fails to understand how the Companies apply the Peaker Methodology to determine the future price of energy to be avoided by QFs. Utilizing the Peaker Methodology, the Companies are not solving for the avoided cost of natural gas associated with 3,700 MW of current or expected solar capacity that either already are, or soon could be, interconnected to their systems over the 10-year standard offer PPA term; instead, the Companies calculate their avoided costs to determine the marginal cost of energy associated with the next incremental 100 MW block of generic

QF energy. (Duke Reply Comments, at 16-18).

Next, Duke disagreed with SACE's argument that natural gas markets are too subjective to short-term influences. To rebut SACE, Duke illustrated the stability of the long-term natural gas market prices over the past few years, and how fundamental gas forecasts have lagged the market and have been far more inconsistent year-over-year than the actual transactable marketplace during this period. In sum, the Companies stated that it is clear that reliance on lagging fundamental prices in this proceeding would exacerbate the significant overpayment risk that the Companies' customers are already facing. (Duke Reply Comments, at 18-19).

Duke then contended that NCSEA and the Public Staff's recommendations on fuel forecasting and fuel hedging are inconsistent and cannot be reconciled. Duke stated it appears logically inconsistent that the Public Staff supports purchasing 10 years of QF power based on high fundamental gas price forecasts and then simultaneously opposes buying 10-year natural gas at lower, actual market prices. If the Commission were to accept this inconsistent argument, it would present a structural discrepancy between QF power procurement and natural gas procurement that would violate the fundamental tenet of PURPA by requiring consumers to pay more for QF power than the incremental cost of alternative energy that consumers otherwise would have purchased from the utility. Further, Duke stated that these parties' sustained advocacy for paying QFs higher avoided costs based upon lagging fundamental forecast data has been repeatedly shown to exceed the market price at which the Companies can purchase natural gas 10 years into the future. As the Commission recognized in the *2016 Sub 148 Order*, to hold gas procurement to one standard and power procurement to another simply represents an artificial arbitrage opportunity to the detriment of consumers. (Duke Reply Comments, at 20).

Last, Duke explained that under PURPA, QFs, as opposed to the utility, or, by extension, rate paying customers, are provided the choice to delay locking in pricing to capture potential future profits or to mitigate future price risks associated with commodity market fluctuations by either fixing their avoided cost price today—"at the time the obligation is incurred"—or requiring the utility to pay for QF energy at the time of delivery. To give the QF the benefit of avoided energy rates that are effectively fixed today at levels above the Companies' actual, transacted market price of energy would be unjust and unreasonable. In conclusion, the Companies stated that requiring the Companies to increase reliance upon lagging fundamental forecast data exceeding current market prices would also increase customers' overpayment risk under the CPRE Program, and recommended the Commission accept the Companies' fuel forecast proposal. (*Id.* at 20-23).

In Reply Comments, NCSEA agreed with the Public Staff and SACE that Duke's reliance on ten-year forward pricing for natural gas forwards is inappropriate. Specifically, NCSEA agreed with the Public Staff's argument regarding other utilities' forecasting methods, and their argument that use of 10-years of forward prices would not be representative of Duke's actual fuel prices, and possibly send the wrong price signals to the market. NCSEA also agreed that Duke's purchases of natural gas in the last three years should not be determinative as to whether use of ten-year forwards is appropriate. However, NCSEA disagreed with the Public Staff's proposal to allow Duke to use up to five years of forward market data before transitioning to its fundamental forecast, arguing that the Public Staff's proposal would inadequately capture accurate price signals.

Therefore, NCSEA reiterated its proposal included in its Initial Comments to require Duke to use a two-year forwards forecast transitioning for three-years into a fundamentals forecast. (NCSEA Reply Comments, at 2-4).

In its Reply Comments, SACE agreed with the Public Staff's and NCSEA's challenges to Duke's natural gas forecast methodology, and stated that it considered either the Public Staff's or NCSEA's proposals to be more appropriate than Duke's. (SACE Reply Comments, at 1-2).

At the hearing, Duke witness Snider responded to cross-examination from NC WARN's counsel regarding the Companies' use of 10-year forward market natural gas in its calculation of avoided energy rates. Mr. Snider testified that a benefit the QF provides is that it allows the Companies to buy less natural gas, and he clarified that the natural gas prices used to calculate the QF rates in this proceeding, the indifference price, are not "prices at this moment." Rather, he explained, the natural gas prices are a 10-year forward price that is being purchased by the Companies on a systematic basis out 10-years forward, which is not the same as today's spot price. Therefore, the Companies are purchasing 10 years of natural gas out into the future at the then-prevailing forward price in the same manner as the Companies are purchasing QF power at a prevailing forward price. (Tr. Vol. 3, at 93-95).

Witness Snider further testified that the forward price is not a forecasting *model*, instead, it is the *actual* market price. He explained that interveners can bring forward a different entity that forecasts a price, but there is only a single market, which, in this case, includes the 10-year forward price. Thus, there is a single forward price, which the Companies use, and then forecasts advocated by interveners of what prices might be when, or if, there is no actual, forward market. (Tr. Vol. 3, at 94-96). Moreover, witness Snider reiterated that there has been extensive testimony in this case and prior cases illustrating that the fundamental forecasts have struggled to keep up with the market, and that the fundamental forecasts are usually done on a one-year to two-year lag as compared to the market transacting in real time. He then referenced a 10-year forward market gas transaction that Duke bought earlier in July and testified that the transaction was lower than the prices used in the development of the rates in this case and much lower than some historic fundamental forecasts. Mr. Snider also pointed out to NC WARN's counsel another North Carolina power provider other than Duke that had also purchased 10-year forward natural gas as evidence of market liquidity. He reiterated that the Companies are entering into 10-year natural gas transactions, buying gas at a certain transactable and transparent price level, and that PURPA does not require customers to buy the same power at a higher price level. (Tr. Vol. 3, at 94-98).

He then highlighted that because the Companies are purchasing $4.5 billion worth of QF must-take power at administratively determined rates, and in order to meet the indifference principle of PURPA, the Companies, in effect, are being obligated to make that same duration of 10-year forward transactions of natural gas. He concluded by pointing out that no other utility outside of North Carolina faces the unique circumstances of this state's prolific QF market that is precipitating them to buy gas 10 years into the future to ensure that the PURPA indifference principle is met. (Tr. Vol. 3, at 98-101).

<u>Discussion and Conclusions:</u>

As identified by Duke, the duration of forward market natural gas prices used in calculating avoided energy costs has been an issue of contention in both the previous 2016

Sub 148 proceeding and Phase II 2014 Sub 140 proceeding. As background, in that proceeding, the Commission first recognized the disconnect between gas prices used in Duke's previously filed IRPs and the gas prices used in the Duke's 2014 avoided cost filings. In order to maintain consistency between the two dockets, the Commission ordered the Companies to use the same natural gas price methodology in its avoided cost filing as they had used in their most recently filed IRP. *Order Establishing Standard Rates and Contract Terms for Qualifying Facilities*, at 27, Docket No. E-100, Sub 140 (Dec. 17, 2015). Since the Commission issued this directive, Duke has consistently and continuously complied with the Commission's Order by using 10-years of forward market prices in their IRPs, and correspondingly, using the same methodology of 10-year forward market prices in their subsequent avoided cost filings.

In the *2016 Sub 148 Order*, the Commission noted the changing nature of the natural gas market, but was not convinced that the market was sufficiently liquid for the Companies' use of 10 years of forward market prices, and as such, ordered the Companies to calculate the avoided energy paid to QFs by using eight years forward market natural gas prices. In doing so, the Commission noted that it would continue to observe the liquidity in the natural gas market in future avoided cost proceedings. *2016 Sub 148 Order*, at 77-78.

The evidence presented by Duke in this proceeding supports that since the *2016 Sub 148 Order*, Duke has continued to consistently purchase 10 years of forward natural gas and, additionally, obtained multiple pricing quotes that are representative of the actual transaction price of the 10-years forward market price of natural gas. Moreover, evidence has been presented suggesting that another utility within the State of North Carolina has also purchased significant quantities of natural gas 10 years forward. This evidence supports the conclusion that the 10-year forwards natural gas market is liquid.

The Commission also agrees with Duke that interveners and the Public Staff have continually scrutinized the appropriateness of the Companies' utilization of natural gas 10-year forward actual market prices in the determination of avoided cost rate setting, without considering the customer impact of requiring the Companies to rely upon forecasted prices that are above the actual forward market price of natural gas. The Commission further finds that the Public Staff's support of purchasing 10 years of QF power based on high fundamental gas price forecasts while simultaneously opposing buying 10-year natural gas at lower, actual market prices, is inconsistent with the fundamental tenet of customer indifference set forth in PURPA. Assuming the Commission were to accept the Public Staff's recommendation, customers would be required to pay more for QF power than the incremental cost of alternative energy that consumers otherwise would have purchased from the utility. In the face of a liquid and transactable market price, purchasing at higher forecasted prices would not only conflict with the PURPA indifference principle, but also represent an imprudent procurement practice in general.

Additionally, the Commission agrees with Duke that the lagging nature or "staleness" of fundamental commodity pricing forecasts over the past few years in the face of rapidly changing natural gas markets has contributed to a systematic over-statement of DEC and DEP's avoided costs that should be remedied going forward, especially in light of the current economic and regulatory circumstances discussed in this Order and the *2016 Sub 148 Order*.

The Commission fully recognizes the financial risk placed on the customers by purchasing long-term QF power, and the importance of properly pricing the value provided by QFs not only in this proceeding, but also the precedent it sets in other proceedings that rely on the avoided cost calculation methodology included in HB 589. The Commission finds Duke's reliance on transactable, forward market price data to be more consistent with PURPA's objective that customers be held indifferent between the utility purchasing QF power or generating or purchasing power from another source. 16 U.S.C. § 824a-3(b). In enacting Section 210 of PURPA, Congress directed that rates for QF purchases shall not exceed the utility's incremental cost of alternative electric energy, which is "the cost to the electric utility of the electric energy which, but for the purchase from [the QF] such utility would generate or purchase from another source." 16 U.S.C. § 824a-3(d). Duke has consistently presented evidence in the form of documented executed transactions showing that the 10-year forward natural gas market is reasonably liquid and transactable, such that Duke can derive a forward market price for natural gas that could be purchased and then used to generate alternative electricity to buying QF power.

Based upon the foregoing and all evidence in the record, the Commission finds and concludes that Duke has carried its burden to show that its methodology to calculate longer-term avoided energy rates based upon 10-year forward natural gas price data is reasonable and should be approved.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 2

The evidence supporting this Finding of Fact is found in Duke's Joint Initial Statement, Duke's Joint Reply Comments, the Public Staff Initial Comments, NCSEA Initial Comments, and SACE Initial Comments.

Summary of the Evidence:

Duke's JIS proposed to eliminate the hedging value previously included in avoided cost rates to more accurately represent the Companies' future energy costs actually to be avoided by QFs. Duke began by explaining the recent history of the Commission's directives concerning the inclusion of a fuel price hedging value of renewable energy in the 2014 Sub 140 proceeding, and how, in the most recent Sub 148 proceeding, Duke focused on more structural rate issues and simply adopted the same 0.028 cents per kWh hedging value adopted in the Sub 140 proceeding, without any further reasoning. (Duke JIS, at 21-22).

Duke's Joint Initial Statement continued by highlighting that because of the surge of PURPA solar development in the years since the *Phase I Sub 140 Order*, as well as declining natural gas prices, the solar QF community has received a hedge value from the Companies' customers and not vice versa. Duke explained that when prices are established in any avoided cost proceeding, they represent a price that QFs have an option to receive, while the Companies and their customers have an obligation to pay the QF at the QF's sole discretion. This arrangement represents the QF owning a "put option" from the Companies and their customers. The JIS explained that a "put option" gives the option owner (QFs) economic exercise rights without obligations to sell power, while the option seller (the Companies and their customers) have an economic obligation to purchase without rights to deny purchase irrespective of prevailing market value at the time of exercise. (Duke JIS, at 21-22).

Since the *Phase I Sub 140 Order*, the Companies' experience is that a multitude of QF sellers have exercised their "put option" rights under the Companies' PURPA "must purchase" obligation subjecting the Companies and their customers to incremental, additional overpayment risks. The Companies further highlighted the fact that sellers of options are normally compensated for taking on the obligation for extending the discretionary rights to the option owner. In this proceeding, however, Duke simply recommended the removal of the 0.028 cents per kWh hedging value from the calculation of avoided energy rates. (Duke JIS, at 21-23).

The Public Staff's Initial Comments disagreed with Duke's argument that PURPA provides QFs the equivalent of a "Put Option." Likewise, they disagreed that the value of this "Put Option" offsets the hedging value from the reduced fuel price volatility inherent with renewable generation. The Public Staff additionally argued that the risk of overpayment to the Companies' customers was already directly addressed in the 2016 Sub 148 proceeding, through the elimination of capacity payments when capacity is not needed, the reduction in the PAF from 1.20 to 1.05, and the reduction of the MW threshold to be eligible to receive a standard offer contract. In support of not eliminating the hedge value, the Public Staff argued that renewable generation provides additional fuel price stability that is of value, and, as such, it is reasonable to expect that Duke will be able to reduce its volume of hedged natural gas and coal fuels in part due to purchases from renewable PURPA QFs. In conclusion, the Public Staff reiterated its support for inclusion of a hedging value in prior avoided cost proceedings, and recommended that the Commission require Duke to calculate and include the fuel hedging benefits associated with purchases of renewable energy in their avoided energy cost rates using the Black-Scholes Option Pricing model or similar method. (Public Staff Initial Comments, at 28-29).

NCSEA's Initial Comments argued that renewable QFs displace the Utilities' use of natural gas and exposure to the volatility in natural gas prices to advocate for inclusion of a hedging value in the Companies' avoided costs. NCSEA further argued that if the avoided cost prices paid to a renewable QF are for a fixed PPA term, then the renewable QF provides a long-term physical hedge for the term of the PPA by displacing market-priced gas with fixed-price renewable power. To support its argument, NCSEA noted that the 3,790 MW of solar installed today or coming online in the near future in Duke's territories would displace about 143,000 Dth per day of natural gas use, and that this "solar hedge" extends far longer than current utility hedging programs. (NCSEA Initial Comments, at 20-23).

NCSEA affiant Beach also argued that renewable generation provides a means for utilities to hedge their long-term exposure to gas and power markets. He further noted that the current practice of quantifying the hedge benefit with the Black-Scholes Model fails to capture the full value of the long-term hedge value from renewable generation over a 10-year period. (NCSEA Initial Comments Attachment 2, at Exhibit 1, at 15).

NCSEA next argued that renewable generation also hedges against market dislocations or generation scarcity that can occur during an energy crisis or drought, and further, that renewable generation provides a hedge not available in financial markets that could be utilized as financial risk management. NCSEA continued its comments by contending that the Black-Scholes Model approach provides a less effective hedge than the hedge provided by renewable PPAs. NCSEA then cited two studies across the country that have valued the hedge provided by renewable generation including studies conducted in Colorado in 2013 and Maine in 2015. Using the methodologies from those studies, NCSEA calculated avoided fuel hedging costs and argued that these hedge values should be incorporated into the Utilities' avoided energy cost rates. (NCSEA Initial Comments, at 20-23).

SACE's Initial Comments argue that Duke's attempt to eliminate the fuel price hedge should be rejected, and contend that Duke has not met its burden of proof to eliminate the hedge without first attempting to quantify the value of the alleged QF Put Option. SACE continues by suggesting that removing the 0.028 cents per kWh hedging value from avoided energy rates would reduce the avoided energy costs paid to QFs by that same amount, arguing that Duke cannot circumvent its obligation to include hedging benefits by assuming that the alleged and unsupported option premium is identical to the existing hedging value. Last, SACE argues that even if Duke had put forth a calculation of the alleged Put Option, Duke is not entitled to compensation for the legal right PURPA grants QFs to sell energy and capacity to the Companies at avoided cost rates, and that if Congress or FERC had intended for utilities to receive compensation for a QF's right to sell energy and capacity, they could have included this requirement in the statute or regulations implementing PURPA. In conclusion, SACE recommended that Duke's proposal to eliminate the historic fuel hedge value be rejected, and that the Commission require Duke to continue to include a fuel hedge value in its calculation of its avoided energy rates. (SACE Initial Comments, at 8-9).

Cube Yadkin Hydro ("Cube") argued in their Initial Comments that the Companies' explanation of fuel hedging misunderstands, if not misrepresents, the purpose of fuel hedging. Cube claimed that the purpose of fuel hedging is to insulate ratepayers from fuel volatility, i.e. the possibility that prices would rise. Therefore, Cube argued that just because natural gas prices did not rise and instead fell does not mean that the hedge in fact had no value. In support of its arguments, Cube stated that QF purchases have served the purpose of reducing customers' exposure to fuel price volatility and cited to Duke Energy Florida and Duke Energy Ohio's filings and testimony in their respective jurisdictions discussing the value of hedging in an environment of declining gas prices, and why the decline in natural gas prices is unsustainable. Cube concluded by stating that the fact that, in retrospect, the hedge against fuel price volatility provided by QF power has not paid off during a period when energy prices have been declining does not mean that the hedge has no economic value and should not be compensated. Therefore, Cube recommended that the Commission disapprove the removal of the hedging value from Duke's avoided cost calculations. (Cube Initial Comments, at 4-6).

In Reply Comments, Duke reiterated that a QF does not have an obligation to sell power at the price established in this proceeding, but rather the option to sell power at the administratively-established rates approved in this proceeding. Duke explained that in normally functioning markets, the QF would have to pay an option premium to the residents, businesses and industries in North Carolina to compensate them for extending the two-year right to sell power at this predetermined price. Concerning the Public Staff's acknowledgement "…that a QF that qualifies for the Standard Offer has an option to sell power to the utility at an agreed upon price," Duke suggested that, by extension, since all QF purchase power costs are directly born by consumers, the QF has an option to sell power to the residents, businesses and industries in the Companies' service territories. Duke then cited the Public Staff's statement that "[i]t is not comparable to a typical put option because the QF does not formally purchase this option…." Citing this statement Duke contended that, as the Public Staff recognized, the QF owns the put option without actually paying for the put option, which refutes the notion of adding a "Risk Premium" to the QF rate and, additionally, could be used to support reducing future filed rates in subsequent proceedings to compensate consumers for this option that is now freely given to QFs. (Duke Reply Comments, at 24-25).

To demonstrate that PURPA provides the QF an option that represents a known and measurable cost to consumers, Duke obtained a price quote from a financial institution for a put option on a fixed ten-year natural gas transaction that does not expire for two years. Under the option, the gas seller could decide to put (or sell) that 10-year fixed price gas to the Companies any time over the next two years prior to the option expiry date in a similar manner as to how the QF has the right, but not the obligation, to sell the Companies power at the 10-year fixed rate established in this proceeding. Duke argued that the fundamental difference in the natural gas example is that customers would receive a $0.29 per MMBTU option premium, as quoted by the financial institution, for allowing natural gas to be "put" to them. In contrast, with the QF's option to put the equivalent power to consumers, consumers receive nothing. Duke then contended that just as the Public Staff and the Commission would not deem it prudent, just and reasonable for the Companies to extend a free 10-year gas put option as part of its gas procurement activities, it should likewise not deem it just and reasonable to extend a free put option to the QF. Compensating the QF for a hedge value that the utility would otherwise be receiving compensation for in an arms-length market transaction would simply represent an unsupportable subsidy in calculating the utility's avoided cost. (Duke Reply Comments, at 25).

Duke also explained that it is inappropriate to impose a one-sided "risk premium" that attempts to quantify value associated with fuel price hedging that is above the

Companies' actually-avoidable cost of energy and, additionally, represents a cost that will not actually be avoided. The Companies then stated that is important to assess whether the utility is actually avoiding any costs above its forecasted cost of energy associated with making these QF purchases. The avoided cost prices paid to QFs already reflect the Companies' fixed and avoidable cost of natural gas over a 10-year term, and thus, it is not reasonable to add a fuel risk premium on top of avoided cost prices, and even more unreasonable to impose a fuel risk premium on forecast commodity pricing that would exceed the Companies' contracted forward market price of natural gas over the term of the PPA. In regards to the Public Staff's suggestion that the Commission took other steps in the *2016 Sub 148 Order* to mitigate overpayment risk in the future, the Companies responded by explaining that imposing a cost associated with fuel price hedging was not controverted in that proceeding; and contended that the Commission should review the issue and the likelihood that inclusion of a fuel hedge in future avoided cost rates will exacerbate the overpayment risk for customers. (Duke Reply Comments, at 26-27).

Duke also responded to NCSEA's and Cube's argument that QF purchases reduce customers' exposure to fuel price volatility, which supports adding a hedging "risk premium" in calculating the avoided energy cost. Duke stated that while it is true that long-term, fixed-price energy purchases mitigate exposure to future commodity price volatility, such fixed purchases are equally as likely to increase costs as they are to decrease costs for customers. Duke noted that Cube is not bothered by this fact, and instead, argues that it is appropriate to pay QFs for the benefit of providing a hedge against fuel price volatility even during periods of declining prices when the hedge "has not paid off." (Duke Reply Comments, at 26-28).

Duke next explained that there is also no basis to support the Public Staff's expectation that QF purchases will enable the Companies to reduce their hedged volumes of natural gas and coal fuels. Duke argued that the Public Staff provides no evidence that this has actually occurred over the past five years as solar QF development has grown exponentially in North Carolina. Duke also explained that while the Companies are obligated to purchase over 3,600 MW of committed long-term renewable QF contracts, Duke can state unequivocally that adding these QF purchases have no impact on the Companies' hedged volumes of natural gas or coal. In support of this statement, Duke noted that the Public Staff also conceded in discovery that adding renewable generation will "not necessarily" impact the Companies' hedged volumes of natural gas or coal, as "the Company's volume of hedged [natural gas] is largely dependent on other factors…" (Duke Reply Comments, at 28-29).

Finally, Duke noted that including an avoided hedging cost adder in the utility's avoided cost of energy would make North Carolina an outlier compared to other states' determinations of avoided cost under PURPA. In Reply Comments, Duke identified only one other jurisdiction that has accepted hedging value as an avoidable cost and noted that other jurisdictions have rejected hedging value proposals. This one jurisdiction was Colorado, which NCSEA had noted in its comments when it recommended use the alternative methodology previously proposed by Public Service Company of Colorado ("Xcel") in a 2013 net metering docket to quantify hedging value. Duke's Reply Comments highlighted that during discovery, NCSEA explained that "[t]o NCSEA's knowledge, [Xcel] does not rely on this methodology today to calculate a hedging value as part of its avoided cost rates offered to qualifying facilities under PURPA"; nor was

NCSEA aware of any utilities or state public utility commissions adopting Xcel's 2013 hedging methodology for the purposes of calculating a utility's forecasted avoided cost rates offered to qualifying facilities under PURPA. (Duke Reply Comments, at 28-29).

In its Reply Comments, the Public Staff disagreed with NCSEA affiant Beach's recommendation that the benefit of the hedge should be calculated to approximate the hedge value over a ten-year term. Instead, the Public Staff supported the value of the hedge being calculated over a term that is comparable to the Companies' actual natural gas hedge contracts that can be avoided, as proposed by DENC. (Public Staff Reply Comments, at 8).

SACE's Reply Comments agreed with the Public Staff, NCSEA, and Cube that Duke should continue to calculate and include a fuel hedge value as part of its avoided energy calculations. SACE indicated that it was one of the parties that advocated for the application of the Black-Scholes Model during the E-100, Sub 140 proceeding, and stated that SACE considers the Black-Scholes Model to be an industry-accepted methodology for calculating fuel hedging costs. (SACE Reply Comments, at 3-5).

NCSEA in Reply Comments agreed with SACE and the Public Staff's arguments concerning inclusion of a fuel hedge to the Companies' avoided costs and recommended that the Commission disallow Duke's intended elimination of hedging benefits. (NCSEA Reply Comments, at 5-6).

Discussion and Conclusions:

The Commission's determination that an avoidable hedging value associated with purchases from QFs was first raised in Docket No. E-100, Sub 140, and, since that time, there has not been additional study of this matter. Duke explains that in the most recent

Sub 148 proceeding, Duke focused on structural rate issues, and simply applied the same 0.028 cents per kWh value adopted by the Commission as appropriate in the prior Sub 140 proceeding. As the Commission concluded in the Sub 148 proceeding, the economic and regulatory landscape has changed since the *Phase I Sub 140 Order* and the Commission finds it appropriate to consider this issue anew.

Duke repeatedly emphasized in both its JIS and Reply Comments that the utility and customers are obligated to purchase the QF's output at the time the QF commits to sell to Duke under North Carolina's implementation of PURPA, while a QF is not obligated to sell its energy and capacity to Duke. As such, the avoided cost that is developed in this proceeding to implement the "must purchase" requirements of PURPA represent a price that a QF has the option to receive. Because the Companies and their customers are obligated to pay the QF at the QF's sole discretion in the avoided cost arrangement, the Commission recognizes that the QF effectively owns a "Put Option" from Companies and their customers that provides the QF economic exercise rights without any obligations to actually sell power. In contrast, the Companies and their customers have an economic obligation to purchase the QF's power without rights to deny such purchase. Based upon this evidence presented by Duke, and the Commission's further consideration of this matter, it is clear that in this instance, the Companies and their customers bear all of the risk in the avoided cost arrangement.

Additionally, the Commission finds persuasive the fact that the Companies' customers are just as likely to be exposed to cost increases as they are to cost decreases in locking into a 10-year fixed-term PPA, in a similar manner that they are exposed to cost increases and decreases when locking into a 10-year forward natural gas price contract.

Even more persuasive is the fact that the Public Staff, through discovery, agreed that a QF does "not necessarily" provide a hedge to the Companies' coal and natural gas purchases. Last, the Commission agrees with Duke that the fact that only one other state applies a fuel hedge to calculate avoided costs for renewable QFs further suggests that renewable QFs do not provide an avoidable hedging benefit to the Utilities.

Moreover, interveners have failed to provide sufficient evidence that renewable QFs actually do in fact provide a hedge to the Companies and their customers. No party presented detailed support for their position that renewable QFs produce a hedge to the utility. Therefore, the Commission agrees with Duke that the Companies' obligation to purchase from renewable QFs does not provide a fuel hedge to the utility. Taking the above facts into consideration, the Commission agrees with Duke that it is reasonable not to include a fuel hedge above Duke's avoidable cost of energy in calculating DEC's and DEP's avoided energy rates.

Based upon the foregoing and all evidence in the record, the Commission finds and concludes that Duke has carried its burden to show that elimination of the fuel hedge from avoided cost rates is reasonable and should be approved.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 3

The evidence supporting this Finding of Fact is found in Duke's Joint Initial Statement, Duke's Joint Reply Comments, NCSEA's Initial Comments, SACE's Reply Comments, and the Public Staff's Reply Comments.

<u>Summary of the Evidence</u>:

In its JIS, Duke noted the Commission's prior Sub 140 directive to continue to study the potential impacts of integrating increasing levels of solar resources into the Companies' generation mix, and contended that the increased levels of uncontrolled solar

QF generation were resulting in increased operating costs relative to a dispatchable generation resources. While Duke continued to recognize an avoided energy line loss adjustment for distribution-interconnected QFs and supported identified integration costs associated with increasing penetrations of variable and non-dispatchable solar capacity, the JIS did not identify any avoidable transmission or distribution capacity benefits associated with QF generation in quantifying avoided cost. (Duke JIS, at 31-32).

NCSEA's Initial Comments contend that solar integration allows utilities to avoid future transmission and distribution capacity costs and asserts that these "benefits" should be considered when developing the Companies' avoided cost rates. NCSEA specifically relies upon the affidavit of Thomas Beach filed in support of NCSEA's Initial Comments to argue that small QF generation can reduce peak loads on the utilities' upstream distribution and transmission systems, thereby allowing the utilities to avoid the need to expand the entire transmission and distribution system and to avoid future load related transmission and distribution capacity costs. (NCSEA Initial Comments, at 39-43).

NCSEA affiant Mr. Beach proposes quantifying avoided transmission and distribution costs by allocating avoided transmission and distribution costs "to the hours of the year, using peak capacity allocation factors (PCAFs) based on the hours when loads on the transmission and distribution system are highest." He explains that the PCAF-based allocation of avoided distribution costs uses a sample of loads at DEC's and DEP's distribution substations and that analyzing this data is a first step toward including more locational granularity in avoided cost rates in order to quantify transmission and distribution costs that could be avoided by purchases from distribution-connected QFs. NCSEA affiant Beach's PCAF analysis was developed based upon the avoided transmission and distribution capacity costs that Duke has relied upon for purpose of quantifying the avoided transmission and distribution capacity value attributed to the Companies' demand-side management ("DSM") programs and energy efficiency ("EE") programs. (NCSEA Initial Comments, at Attachment 2, at 7, 21-26).

The Public Staff's Initial Comments highlighted the Commission's discussion in the *Sub 140 Phase I Order* that integration of solar resources into a utility's generation mix can result in both costs and benefits, but that its "inappropriate for ratepayers to shoulder such costs [as includable in avoided costs] until they become known and verifiable." The Public Staff commented that it may be appropriate for the Commission to consider evidence from other parties as to what additional costs or benefits can be sufficiently known and verifiable at this time such that they should be included in avoided cost rates. (Public Staff Initial Comments, at 32-33).

In Reply Comments, the Public Staff reintroduced Dr. Richard Brown's testimony on behalf of the Public Staff from the 2014 Sub 140 proceeding addressing the theoretical potential for QFs to avoided future transmission and distribution capacity investments. The Public Staff explained that, theoretically, a renewable energy facility can be located on an existing transmission system at a place that can reduce power flows on heavily loaded transmission lines. However, the Public Staff also noted that the ability of a facility to provide this benefit will be very site-specific. Similarly, distribution-connected renewable energy facilities could potentially help reduce future transmission capacity expenditures, if their power does not flow onto the transmission system. (Public Staff Reply Comments, at 9).

The Public Staff also recognized, however, that the significant increases in distributed generation facilities interconnecting to the distribution and transmission system in North Carolina in recent years raises additional questions regarding the proper allocation and assignment of costs associated with use of the grid. The Public Staff specifically cited to Public Staff witness Jay Lucas' recent testimony in Docket No. E-100, Sub 101 regarding the additional system costs being imposed on retail customers to integrate QF solar generators to support their argument. (Public Staff Reply Comments, at 9-10).

The Public Staff also commented that offering an avoided transmission and distribution cost adder to all QFs eligible for the standard offer would likely not incentivize such QFs to locate in places that are more likely to result in future avoided transmission and distribution investments. In support of this contention, the Public Staff stated that an avoided transmission and distribution benefit offered to all Standard Offer QFs would ignore the site- and project-specific considerations that are critical to an accurate assessment of potential avoided transmission and distribution system benefit. (Public Staff Reply Comments, at 10).

The Public Staff found that evidence was lacking to warrant an avoided distribution capacity cost adder for either distribution or transmission connected QFs. However, the Public Staff argued that it may be appropriate for the Utilities to calculate an avoided transmission cost adder to the avoided energy rate applicable to a standard offer contract, with a provision within the contract allowing the utility to remove the availability of the avoided transmission adder if (i) the QF would cause or exacerbate reverse power flow, or (ii) the projected load growth on the interconnected feeder over a 10-year time horizon was negative or negligible. The Public Staff stated that the goal of provision (i) is to ensure that a QF interconnecting to a distribution feeder that is experiencing backfeeding will not receive avoided transmission benefits, and that provision (ii) would ensure that a QF interconnecting to a feeder that is experiencing little to no load growth, and thus is not expected to make load growth-related transmission upgrades in the foreseeable future, does not receive avoided transmission benefits. (Public Staff Reply Comments, at 10). Specific to the Standard Offer, the Public Staff recommended that the Commission direct the Utilities to calculate a conditional avoided transmission capacity cost adder for standard offer contracts, which can be removed if certain conditions are met regarding backfeeding and load growth. (Public Staff Reply Comments, at 9-10, 11).

The Public Staff also supported QFs not eligible for the standard offer contract being able to quantify site and project-specific characteristics to show that the QF's operations create future avoided transmission capacity benefits and to include those avoided system costs in their negotiated contracts. Specific to negotiated QF avoided costs, the Public Staff recommended that the Utilities consider site- and project-specific characteristics during contract negotiations with QFs not eligible for the standard offer contract, and that an avoided transmission adder be included if such a project can provide real and measurable avoided transmission capacity benefits. (Public Staff Reply Comments, at 11).

In response to NCSEA's proposal, the Public Staff stated that they had concerns with the use of the avoided transmission and distribution rates from the DSM/EE proceedings as it is not clear that those rates, which were calculated based upon the availability of DSM during system peak and EE during all hours, are applicable to QFs. (Public Staff Reply Comments, at 11-12).

In its Reply Comments, SACE agreed with NCSEA that QFs should be compensated for the full range of costs that they allow the purchasing utility to avoid, including applicable transmission and distribution costs. SACE noted that FERC had previously upheld a state utility commission's authority to include an avoided cost "adder" for transmission-connected QFs located in transmission-constrained areas to reflect the savings from the deferred transmission and distribution-related costs. Therefore, SACE argued that NCSEA's proposed avoided transmission and distribution system cost analysis is consistent with FERC's precedent on the issue under PURPA. (SACE Reply Comments, at 13-14).

Duke's Reply Comments explained that PURPA's foundational "but for" premise prescribes that a utility should pay QFs its full avoided costs, but cannot be required to pay a QF more than the cost the utility would incur if the utility generated the power or purchased it from another source. Citing prior guidance from FERC evaluating what constitutes a utility's avoided costs under PURPA, Duke explained that costs which are speculative, or otherwise not measurable or quantifiable, are inappropriate in arriving at the utility's avoided costs, whereas costs actually incurred by the utility that are quantifiable and "real" are appropriately considered in arriving at a utility's avoided costs. (Duke Reply Comments, at 126-127).

In response to NCSEA, Duke argued that including an adder for future avoided transmission and distribution costs in the standard offer was unprecedented under PURPA due to the generalized and speculative nature of "potential" future transmission and distribution system costs advocated by NCSEA as avoidable. Duke clarified that FERC had only accepted "an actual determination of the expected costs of upgrades to the distribution or transmission system that [purchasing from QFs] will permit the purchasing utility to avoid," where the adder reflected the utility's avoided future cost of constrained transmission and distribution infrastructure that would be required to deliver power to a transmission-constrained area. Therefore, Duke rejected NCSEA's PCAF analysis as a generalized quantification of estimated "time varying locational values" of load reductions across DEC's and DEP's entire distribution systems, which in no way correlates to, or represents the expected cost of, upgrades to the utility's system that theoretically could be avoided by purchasing from QFs. Accordingly, Duke argued that it had properly excluded the potential that purchasing energy from standard offer QFs might avoid some level of future system transmission and distribution costs in developing the avoided cost rate calculations. (Duke Reply Comments, at 126-127).

Further, from a methodological perspective, Duke contended that recognition of future avoided transmission and distribution costs is inappropriate for calculating generic transmission and distribution costs under the Peaker Methodology. The Companies explained that Duke's consistent prior practice in applying the Peaker Methodology is that while a utility may "avoid" the need for a hypothetical new CT by purchasing power from QFs, any network transmission upgrade that would have been needed to accommodate the new CT is not avoided and will still need to be constructed. Thus, transmission and distribution upgrades are appropriately excluded under the Peaker methodology to calculate generic system-wide avoided costs. Moreover, the Companies rejected the technical premise of Mr. Beach's PCAF analysis, arguing that he introduces many broad assumptions about transmission and distribution system upgrades, planning, and QF resources to calculate a $ per kWh value for nine different rates based on season and hours of the day. (Duke Reply Comments, at 127-128).

The Companies also explained that the system impact of distribution connected QFs and DSM/EE program are not comparable. Unlike solar generation, DSM/EE measures are permanent changes in load (i.e., installing a more efficient light bulb) that do not diminish with cloud cover or other conditions that impact the availability of intermittent generation. If the DSM/EE measure fails (i.e., the more efficient light bulb burns out), this typically results in the entire load-reducing benefit from the measure being removed from the system as opposed to the increased circuit load that would be experienced when generation fails (or is not available due to intermittency of generation output). Accordingly, the Companies argued that while avoided transmission and distribution benefits can potentially be realized from customer-sited EE measures, intermittent generation does not provide the same benefit. (Duke Reply Comments, at 128-130).

Next, the Companies explained that they design their transmission and distribution systems to meet peak load on the circuit and at the substation. Due to the intermittent and daytime nature of solar generation, the Companies cannot rely upon QF solar being available to meet peak load and, therefore, cannot reasonably assume any load reduction due to QF solar that could support the downsizing of Company transmission and distribution assets. Moreover, in the real world, distribution and transmission planners do not reduce the capacity of installed facilities due to concerns that circuits will be overloaded if generation is unavailable or intermittent during peak conditions. (Duke Reply Comments, at 129-130).

The Companies then argued that, if anything, QFs have benefitted by consuming available distribution and transmission capacity up to the limits of the existing system, as exemplified by the fact that in some areas, QF generation exceeds load and exporting from the region is constrained in some hours. In conclusion, Duke reiterated that the Companies had properly concluded that there presently are no real or quantifiable costs of future avoided transmission and distribution or benefits resulting from solar installations, and, additionally, contended that it would be more reasonable for the Commission to recognize that incremental QF energy on the distribution system could actually increase future transmission and distribution costs, noting statements by the Public Staff expressing concern as to whether solar QFs were properly bearing the representative responsibility of increased grid O&M costs. Thus, Duke recommended the Commission reject NCSEA's proposal. (Duke Reply Comments, at 130-131).

Discussion and Conclusions:

The Commission has carefully considered NCSEA's proposed avoided transmission and distribution adder, as well as the testimony in opposition to NCSEA's proposal, and finds persuasive Duke and the Public Staff's arguments that NCSEA's proposal should be rejected. As stated in the Public Staff's Reply Comments, the significant increase in distributed QF generating facilities interconnecting in North Carolina in recent years has raised questions regarding the proper allocation and assignment of costs associated with the use of the grid. Moreover, the evidence in this proceeding supports the general conclusion that PURPA QFs are requiring the Utilities to incur additional costs as opposed to avoiding future transmission and distribution investments.

Specific to NCSEA's proposal, the Commission finds persuasive Duke's arguments that relying upon generic assumptions about future avoidable transmission and distribution system investments based upon Mr. Beach's PCAF analysis is inappropriate and fails to accurately quantify specific costs that would be avoided as a result of purchasing from QFs. As the Commission has previously explained, PURPA requires that costs must be quantifiable and "real" to be included in avoided costs. *Cal. Pub. Utility Comm'n.*, 132 FERC ¶ 61, 047, 61,267-68 (July 15, 2010), *clarification granted & rehearing denied*, 133 FERC ¶ 61, 059 (October 21, 2010), *rehearing denied*, 134 FERC ¶ 61,044 (Jan. 20, 2011). Similarly, the Commission's *Phase I Sub 140 Order* clarifies that the Utilities' avoided costs must be "known and measurable" finding that the Commission "should not rely on conclusions derived from limited observations or speculation to definitively establish the parameters of what should be included in avoided cost rates." *Order Setting Avoided Cost Input Parameters,* at 61, Docket No. E-100, Sub 140 (Dec. 31, 2014). The Commission agrees with Duke that witness Beach's analysis on behalf of NCSEA presents only a generalized quantification of estimated "time-varying location values" of load reductions across DEC's and DEP's entire distribution system that does not correlate to, or represent Duke's expected cost of system upgrades that could theoretically be avoided from purchasing power from specific QFs.

The Commission also notes Duke's arguments that DEC and DEP—along with every other utility in the country developing generic avoided cost rates—excluded the potential that purchasing energy from standard offer QFs might avoid some level of future transmission or distribution costs in developing the avoided cost calculation. The Commission finds persuasive that NCSEA has not pointed to other jurisdictions as including an adder to generic avoided cost rates for avoided transmission or distribution costs, even though utility systems with lower penetrations of distribution-connected generation would theoretically achieve greater benefits from these distributed energy resources in terms of avoiding the need for potential future transmission or distribution system investments.

Additionally, the Commission agrees with the Public Staff's and Duke's conclusion that the use of avoided transmission and distribution assumptions for DSM/EE resources and measures, as proposed by NCSEA, is not reasonably representative of the system impacts and capacity contribution of distribution-connected QFs. The Commission agrees with Duke that due to the intermittent and daytime nature of solar generation, the Companies cannot rely upon QF solar being available to meet peak load and, therefore, cannot reasonably assume any load reduction due to QF solar that could support the downsizing of transmission and distribution assets. The Commission also finds Duke's explanation persuasive that DSM/EE measures are permanent changes in load (i.e., installing a more efficient light bulb) that do not diminish with cloud cover or other conditions that impact the availability of intermittent generation. Intermittent QF generation does not provide the same quantifiable benefit of reducing load on the distribution system during the utility's peak periods as non-intermittent generation.

Finally, the Commission finds persuasive Duke's arguments and the Public Staff's testimony in Docket No. E-100, Sub 101 that the recent unparalleled growth of QF solar in North Carolina could potentially increase transmission and distribution costs for retail customers. As explained by Duke, under PURPA, QFs are only responsible for funding distribution system or transmission network upgrades to support interconnection; QFs are not obligated to acquire transmission capacity to deliver QF power to the utility's network, and instead rely upon the utility's transmission system. These arguments are consistent with, and provide support for, the Public Staff's contention that there is insufficient evidence to warrant avoided distribution capacity cost adders for either distribution or transmission connected QFs at this time. The Commission agrees and, therefore, rejects NCSEA's proposal.

Similarly, for purposes of this proceeding, the Commission also rejects the Public Staff's recommendation for the Utilities to calculate a conditional avoided transmission capacity cost adder for standard offer contracts, which could be removed if certain conditions are met regarding backfeeding and load growth. As stated by the Public Staff itself:

> "…offering an avoided T&D cost adder to all QFs eligible for the standard offer contract (Standard Offer QFs) would not likely incentivize direct Standard Offer QFs to locations that are more likely to result in avoided future T&D investments. An avoided T&D benefit offered to all Standard Offer QFs would ignore the site- and project-specific considerations that are critical to an accurate assessment of the avoided T&D [system] benefit." (Public Staff Reply Comments, at 10).

The Public Staff's own comments, as well as Duke's evidence detailed above explaining that intermittent QFs do not generically provide firm load reductions across the system, and therefore cannot support the downsizing of the Companies' transmission and distribution assets, support the Commission's decision to reject the Public Staff's proposal. Moreover, the Commission questions how purchasing energy and capacity from QFs under PURPA will result in avoided cost value in terms of the utility avoiding future investment in the transmission and distribution system, as contemplated by the Public Staff. QFs are obligated to fund their costs to reliably interconnect their generating facility to the utility's system, but it is the utility that is ultimately responsible for providing the transmission service required to deliver the QF's energy and capacity to load. *See e.g.*, *Pioneer Wind Park I, LLC*, 145 FERC ¶ 61,215, at P 38, (2013). Unlike the concept of "variations in line losses," which are specifically identified in 18 C.F.R. § 292.304(e) and directly affect the value of energy delivered by the QF to the utility, it is unclear whether the Public Staff is advocating that customers should be obligated to fund prospective avoided capital investments in the transmission system as a result of purchasing power from a QF. Notably, the Public Staff's Reply Comments included this proposal in a section entitled "Avoided Capacity Costs" leading the Commission to infer that the Public Staff believes that QFs may be capable of providing avoided transmission investments even though QFs are ultimately not avoiding capital costs incurred by the utility beyond their point of interconnection to the utility's system. Based upon the limited record on this issue and because the purported capacity "benefits" would theoretically occur on the utility's system beyond the QF's obligation to deliver its output to the point of interconnection, the Commission will require the Public Staff to work with the Utilities prior to the next avoided cost proceeding to more clearly determine how "avoided transmission and distribution capacity costs and benefits" affects the avoided cost value of energy and capacity delivered by a QF to the Utilities, as contemplated by G.S. § 62-156(c), and 18 C.F.R. § 292.304(e).

Based upon the foregoing and the entire record in the proceeding, the Commission finds that it is not appropriate for the Utilities to include a transmission and distribution capacity adder within their avoided cost calculations available to standard offer QFs, as recommended by NCSEA, and further finds that such the Public Staff's proposals are not satisfactorily supported at this time.

EVIDENCE AND CONCLUSIONS SUPPORTING FINDING OF FACT NO. 4

The evidence for this finding of fact is found in Duke's Reply Comments and NCSEA's Initial Comments.

Summary of the Evidence:

NCSEA advocates for the Utilities to include a market price suppression adder to their avoided energy cost calculations. NCSEA argues that integrating renewables in regional power markets causes a "reduction in demand [that] will cause a corresponding reduction in the price in these markets, which benefits the Utilities when each must buy power or natural gas in these markets." NCSEA goes on to suggest that increasing penetrations of renewables "causes the prices of energy to reduce across the country, on a whole," and therefore concludes that the Commission should "require the Utilities to account for such market changes caused by distributed energy resources." (NCSEA Reply Comments, at 34).

In Reply Comments, Duke explained that NCSEA's proposal to include a "market price suppression" adder in avoided costs was in no way based upon known and measurable costs actually avoided by the Companies' procurement of alternative energy. Duke went on to contend that even assuming NCSEA's point—that increasing renewables in regional power markets impacts electricity and natural gas prices in those markets—has some validity, NCSEA ignores numerous other factors that have significantly greater impacts on the market price of energy, including, but not limited to natural gas production costs, weather, and environmental regulations. Moreover, the market price of energy that is avoidable by the Companies is precisely that—a market price—and reflects both higher and lower cost resources (such as DEC and DEP's combined 9,100 MW (winter) of baseload, low variable cost nuclear of generation). Duke stated NCSEA's recommendation for the Companies and DENC to account for inclusion of above-market "price benefits" of integrating renewables in their avoided costs is speculative, unquantified and not reflective of costs actually avoidable by the utility. Duke concluded that accepting above-market adders in calculating the Companies' cost of energy essentially forces the Companies to pay avoided energy rates that are above the Utilities' forecasted incremental cost of procuring alternative energy, which is inappropriate under PURPA. (Duke Reply Comments, at 29-30).

Discussion and Conclusions:

The Commission agrees with Duke that NCSEA's request for the Commission to recognize "market price suppression" of wholesale power prices due to the increasing integration of renewable QFs is inappropriate in this proceeding to establish the Utilities' avoided cost rates. This briefly-discussed and speculative concept is not based upon known and measurable costs that can accurately be calculated to include in the Utilities' avoided energy costs. As explained by Duke, PURPA requires that costs be known and measurable to be included in the Utilities' avoided cost calculation. Put another way, the limited observations and speculative potential price impacts of increasing renewable generating capacity within the regional wholesale energy market, as briefly presented by Mr. Beach on behalf of NCSEA, are wholly inappropriate and unsuitable for the Commission to derive any meaningful conclusions regarding the Utilities' avoided cost rates. In fact, NCSEA itself did not even calculate an actual market price adder to include in the Utilities' avoided costs and, instead, suggested the Commission recognize this category of costs.

Based upon the foregoing and the entire record in the proceeding, the Commission finds that NCSEA's proposal should be rejected and that it is not appropriate for the Utilities to incorporate a market price suppression adder within their avoided cost calculations.

EVIDENCE AND CONCLUSIONS FOR FINDINGS OF FACT NOS. 5-7

The evidence supporting these Findings of Fact are found in Duke's Joint Initial Statement, Duke's Joint Reply Comments, the testimony of Duke witnesses Snider and Johnson, the Public Staff Initial Comments, the testimony of Public Staff witness Hinton, NCSEA Initial Comments, SACE Initial Comments, and the testimony of SACE witness Glick.

Summary of the Evidence:

As directed by the Commission's *2018 Scheduling Order*, Duke's JIS presented proposed modifications to DEC's and DEP's standard offer Purchased Power Schedule PP, the Terms and Conditions for the Purchase of Electric Power ("Terms and Conditions"), and Standard PPA available to QFs eligible for Schedule PP. The JIS highlighted Duke's most significant changes to the Standard PPA and the Terms and Conditions, which were designed to clarify Duke's current position and to avoid future disputes regarding circumstances where a QF that has entered into a Standard PPA subsequently requests to modify its generating facility to increase its AC capacity or DC (energy) output and to sell more energy to DEC or DEP. (Duke JIS, at 35-36).

The JIS explained that a QF that has entered into a standard offer PPA with the Companies and subsequently seeks to modify its generating facility is not permitted to add additional generating capacity or other equipment that would increase the "Contract Capacity" or otherwise materially modify the generating facility absent DEC's or DEP's consent. Any such action by the QF would constitute a modification to the QF "Facility" that has committed to sell power to DEC or DEP and would be an event of default, potentially resulting in termination of the PPA at the Companies' election. To make this clear for both existing and future QFs, Duke modified Section 1.4 of the Schedule PP PPA and Section 4 of the Terms and Conditions to state clearly that QFs are not permitted to add additional capacity or other equipment to the operating Facility that would increase the MW^{DC} capacity or MW^{AC} energy output of the generating facility without first obtaining the utility's consent. Examples of modifications to utility-scale solar QFs that could constitute an event of default include adding additional solar panels or replacing existing panels with panels with greater DC capacity, increasing inverter capability, or adding batteries or other technologies for the storage and later injection of energy. (Duke JIS, at 36-37).

Duke's JIS explained that proposed modifications were supported by the current economic and regulatory circumstances related to recent surging QF development in North Carolina, and, specifically highlighted the significant decline in the Companies' avoided capacity and energy cost since surging QF solar development began in the Companies' service territories in 2012. The JIS identified that there are over 1,600 MW of operational standard offer QFs and over 950 MW additional standard offer QFs with pre-existing LEOs under prior avoided cost vintages that continue to come online. Permitting these QFs to add capacity or other equipment to allow operating QFs to increase their delivered AC energy output and/or the delivered DC capacity would harm customers by exacerbating the financial obligation to the QF in excess of the Companies' current avoided cost and, therefore, would violate PURPA. (Duke JIS, at 36-37, 38).

Duke also emphasized that because the currently-effective avoided cost rates establish the most updated price signals for incremental capital investment, it would be inappropriate to compensate capital investment made today based on stale avoided cost rates that were established many years in the past and which now far exceed the currently-effective avoided cost rates. Accordingly, Duke stated that QFs should enter a new PPA with DEC or DEP at current avoided cost rates and retail customers should not be forced to buy more kWh (or to pay above-market capacity value for legacy on-peak kWh under the old Option A or Option B rates) at stale avoided cost rates that far exceed the currently-effective avoided cost rates. Duke's amendments to Section 1.4 of the Schedule PP PPA and Section 4 of the Terms and Conditions are designed to make clear that such changes will not be accepted where customers will be obligated to pay rates in excess of current avoided costs and such action by the QF would be an event of default if the QF proceeds to make the modification without the utility's consent. (Duke JIS, at 36-37, 38).

The Public Staff's Initial Comments generally agreed with Duke's concerns as well as a number of Duke's proposed modifications to the Terms and Conditions. The Public Staff identified that allowing a QF to increase its total revenue generated through the addition of energy storage or other technologies at rates above current avoided costs would be to the detriment of current utility ratepayers. The Public Staff also recognized that QF developers considering battery storage would likely seek to maximize revenue by providing 100% of its rated capacity during on-peak hours determined years ago in previous avoided cost proceedings, which may not reflect the utility's highest production cost hours today. However, the Public Staff also raised concerns that delivery of energy in excess of the QF's originally estimated annual energy production should not be grounds for termination if the operating facility exceeds its projected output. Further, while the Public Staff agreed with Duke that the utility should not be obligated to accept any increase in Contract Capacity under the rates and terms of the existing PPA, the Public Staff opposed proposed modifications to Section 4 of the Terms and Conditions that would allow the utility to deny changes to contract capacity in Duke's "sole discretion." The Public Staff also supported Duke's proposal in Section 8(e) of the Terms and Conditions to require the QF Seller to obtain written consent prior to making any changes to the facility, support equipment, or interconnection facilities. (Public Staff Initial Comments, at 78-81).

NCSEA's Initial Comments raised concerns that Duke's proposed changes to the Schedule PP PPA and Terms and Conditions were overly broad and would unreasonably limit QFs from making routine operational repairs to its Facility such as repairing storm damage. NCSEA also questioned the appropriateness of incorporating the QF's DC capacity into the definition of nameplate capacity, suggesting that this change to the Schedule PP PPA would detrimentally impact QFs by allowing the utility to terminate the PPA if the QF proposes to make any changes to a generation facility without the utility's approval. NCSEA also argued that allowing the utility to unilaterally terminate a PPA at its discretion would be discriminatory if there are insufficient safeguards to protect against discriminatory use by the Utility. Finally, NCSEA also questioned Duke's policy goals in making these proposals by suggesting that the proposed modifications were designed to introduce regulatory uncertainty for QFs and argued that Duke's objective is to decrease the aggregate amount of QF sales. (NCSEA Initial Comments at, 51-52, 53-55, 57).

SACE's Initial Comments similarly argued that Duke's proposed changes to its Terms and Conditions relating to QFs increasing AC or DC output capacity should be rejected as unnecessarily restrictive. SACE commented that the addition of behind-the-meter energy storage, or the replacement of older solar panels with newer solar panels that does not increase the AC output capacity of the facility should not be considered a material modification to the QF, and it should not require the QF to forfeit its existing standard offer contract and enter into a new PPA. Because such changes would not increase the QF's nameplate capacity beyond the threshold under which the standard offer contract was available, the QF should be permitted to make such changes under its existing PPA. (SACE Initial Comments, at 16-17).

In Reply Comments, Duke reiterated North Carolina's economic and regulatory circumstances of recent significant QF growth and declining avoided costs over the past few years that has created a distorted marketplace for QF development and now poses serious risks of artificially high costs being passed on to North Carolina ratepayers. Duke explained that DEC's and DEP's forecasted financial obligation to QFs is now approximately $4.5 billion over the next approximately 15 years, as the Companies are now obligated to purchase power from approximately 3,600 MW of QFs (approximately 500 Facilities[1]) at significantly higher and now out-of-date avoided cost rates approved in the Sub 127 (2010), Sub 136 (2012) and Sub 140 (2014) proceedings. Duke further undertook analysis to show that the addition of battery storage system at some or all of these pre-existing QFs would increase this financial obligation on customers by as much as $172 million. For these reasons, Duke reiterated that the Companies will not agree to QF developers/owners' request under the Schedule PP PPA to modify a QF Facility to increase the MW^{AC} capacity or MW^{DC} capability of the QF Facility, explaining that

[1] This figure is comprised of both standard offer small power producer QFs as well as QFs that are not eligible for the standard offer.

developers should be incented to make capital investment based on the most up-to-date and accurate price signals concerning the value of energy and capacity and it is inequitable and unreasonable to allow compensation for capital investments made today at old, stale rates. (Duke Reply Comments, at 133-136).

Duke also responded to the Public Staff's and NCSEA's concerns that the proposed changes to the Terms and Conditions would allow DEC or DEP to terminate the PPA in its sole discretion for modifications to the QF generating facility or where the existing QF produces energy in excess of its originally estimated annual energy production. To address these concerns, Duke added a defined term "Material Alteration" as new Section 3.(f) of the amended Terms and Conditions to more clearly define what constitutes a "material change" to a QF Facility that would trigger the utility's right to terminate the PPA if the utility's consent is not first obtained and to provide examples of certain modifications which would not constitute a Material Alteration. This new definition provides that Duke will evaluate any changes to the Facility "in a commercially reasonable manner," and expressly provides that repair or replacement of equipment at the Facility (including solar panels) with like-kind equipment, which does not increase Existing Capacity or decrease the Existing Capacity by more than five percent (5%) shall not be considered a Material Alteration. This language addresses NCSEA's concerns that QFs should reasonably be allowed to undertake routine operations and maintenance and replace solar panels or other equipment if the QF generating facility is impacted by storm damage. Duke also modified its proposed Section 1.(i)(4) to eliminate the contractual right to terminate the PPA should the QF exceed its originally estimated annual energy production. (Duke Reply Comments, at 138-140).

Finally, in response to NCSEA's arguments that Duke's proposed modifications to the Terms and Conditions would introduce regulatory uncertainty and decrease QF sales, Duke explained that QFs that are operating today and continuing to deliver power from their existing facilities are in no way impacted by these proposed modifications, which will be applied in a commercially reasonable manner, and that are designed to ensure that QF sales are not increased under stale rates and terms that exceed the Companies' current avoided costs. There will be no "decrease" in QF sales as operating QFs continue to have clear contractual rights under the standard offer PPA and Terms and Conditions to deliver power from their certificated QF Facilities for the remainder of their PPA term and may then elect to negotiate a new PPA at the Companies' then-current standard offer rates and terms. (Duke Reply Comments, at 138-140).

The Commission's *Order Scheduling Evidentiary Hearing* identified Duke's proposed modifications to the terms and conditions as one of the disputed issues upon which the Commission requested Duke and interested parties to file testimony.

Duke witness Glen Snider presented policy support for the Companies' proposed changes, similar to Duke's Reply Comments. Witness Snider highlighted that allowing modifications to these contracted QF generating facilities to increase their generator size (MW^{AC}) or their capability to produce energy in more hours of the day (MW^{DC}) will exacerbate the Companies' current financial obligation and increase the current and, likely, future over-payment to QFs in excess of the Companies' actual avoided cost of energy and capacity. (Tr. Vol. 2, at 88-91).

Duke witness David Johnson also testified in support of the Companies' proposed Material Alteration definition and related changes to the Terms and Conditions, as presented in Duke's Reply Comments. Witness Johnson reiterated that the purpose of the modifications was to provide clarity in response to inquiries from solar developers questioning what alterations can and cannot be made to operating QF generating facilities within the terms of their existing PPAs and highlighted that the Material Alteration definition addressed the Public Staff's and NCSEA's concerns that QF's should have the ability to repair or replace damaged facility components such as solar panels, inverters, etc. without being in default under the PPA and Terms and Conditions for making a Material Alteration to the generating facility. Witness Johnson also emphasized that Duke's proposed modifications were reasonable from a contractual perspective, testifying that for the same reasons it would be unreasonable for Duke to respond to declining avoided cost rates by unilaterally adjusting the fixed price paid to a QF, or by unilaterally reducing the amount of power purchased from the QF, it is similarly unreasonable for a QF to materially alter its generating Facility to sell more energy at now-excessive avoided cost rates or to shift its generation output into legacy on-peak hours no longer aligning with Duke's highest marginal cost hours. Witness Johnson explained that Duke's proposal is reasonable and aligns with the well-established principle that the rights and obligations of parties to a binding contract are determined at the time the contract is executed and cannot be materially modified by one party without prior consent of the other party during the term of the contract. (Tr. Vol. 2, at 262-265).

Public Staff witness Robert Hinton testified that that the Public Staff generally supported the Companies' proposed modifications to the Terms and Conditions, and that a degree of reasonableness is appropriate regarding equipment repairs and replacements made by QFs that may impact the capacity of the facilities, so long as the investments do not materially change the output profile of the QF. (Tr. Vol. 6, at 321).

No other witnesses submitted testimony addressing Duke's proposed Material Alteration definition or related modifications to the terms and conditions. During the hearing, SACE witness Devi Glick conceded that her supplemental testimony addressed Duke's proposed modifications to the Terms and Conditions presented in the JIS and did not reflect the modifications presented in Duke's Reply Comments, through which Duke had already addressed a number of intervenors' concerns. (Tr. Vol. 6, at 289-290).

Discussion and Conclusions:

The Commission approves Duke's proposed Material Alteration definition and associated modifications to DEC's and DEP's Terms and Conditions and Schedule PP PPA, as presented in Duke's Reply Comments, as just and reasonable to utility ratepayers that are obligated to pay for QF power, fair and non-discriminatory to QFs and in the public interest.

The Commission implements PURPA consistent with the requirements of FERC's implementing regulations and North Carolina's PURPA implementation scheme, as prescribed in N.C. Gen. Stat. § 62-156. FERC's regulations implementing PURPA allow QFs, at their option, to lock in to fixed long-term avoided cost rates prior to their contract term commencing. 18 C.F.R. 292.304(d)(2). As has been extensively discussed in this and prior proceedings, establishing the utility's avoided costs based upon forecasts of future costs and administratively determined assumptions is challenging and can result in significant differences between avoided cost rates paid to QFs and the utility's actual incremental cost of alternative energy at the time of delivery. While the Commission strives to meet PURPA's mandate to forecast avoided costs at levels that are just and reasonable to electric consumers, the Commission has also recognized that recent economic and regulatory circumstances of administratively-forecasted long-term avoided cost rates coupled with declining natural gas prices and surging QF development in North Carolina has resulted in a distorted market-place that has fostered artificially high costs being passed on to North Carolina consumers.

The Commission agrees with Duke and the Public Staff that it would be inconsistent with PURPA to allow a QF to materially alter its contracted-for generating facility in order to sell more power at rates that exceed the utility's most current calculation of its avoided costs. This result would disadvantage customers who, absent purchasing the QF's power, would otherwise be obligated to purchase power based upon Duke's current (and, today, significantly lower) incremental cost of either generating power from the Duke fleet or purchasing power from another source. Moreover, allowing larger QFs that have previously committed to sell their full output under longer-term 15- and 10-year contracts based upon stale and excessive avoided cost rates to now increase the energy delivered to the Companies would also be inconsistent with the General Assembly's recent policy direction in HB 589. As the Commission recently recognized in another proceeding where Duke's avoided costs were at issue, HB 589's recent amendments to the State's PURPA implementation framework are "generally understood to be an attempt to mitigate the risk of inaccuracy of long-term avoided cost rates" which the General Assembly has sought to accomplish by "introduce[ing] an element of competitive pricing into the procurement of renewable energy" and through "reduc[ing] both the availability and the maximum term of the standard offer contract under PURPA." *Order Modifying and Approving Green Source Advantage Program, Requiring Compliance Filing, and Allowing Comments*, at 45-46, fn.

21 Docket No. E-2, Sub 1170, Docket No. E-7, Sub 1169 (Feb. 1, 2019). Accordingly, allowing existing QFs to make new incremental investments to modify their generating facility in order to increase the capacity of the facility or to deliver more energy at now-stale and excessive administratively determined avoided cost rates would be inconsistent with the changes to the State's PURPA implementation framework enacted through HB 589. Therefore, based upon current economic and regulatory circumstance and the State's recent policy direction in HB 589, the Commission agrees with Duke that QF Facilities should not be able leverage their current contractual relationship to sell more MWh or shift output in ways that was never contemplated at the time the contract was entered. The parties should be required to abide by risks and obligations that existed at the time of contract and, in the same way that it would be inequitable to allow the Companies to terminate the existing PPAs due to recent declines in avoided costs or subsequent changes to the State's PURPA implementation framework, it would also be inequitable to force customers to purchase additional energy and capacity output from modified QF Facilities at rates exceeding the Companies' current avoided costs.

The Commission also recognizes the concerns raised by NCSEA and the Public Staff that QFs operating today should be able to continue to safely and reliably operate their existing facilities such that routine ongoing operations should not require the utility's consent where the QF needs to make repairs and reasonable replacement of equipment that do not increase the capacity or materially alter the energy output of the QF facility. The Commissions finds that Duke's proposed Material Alteration definition and associated provisions, as presented in Duke's Reply Comments, appropriately accommodates QFs' interests in this regard by clearly stating that QFs have the right to replace solar panels or other equipment with like-kind equipment that does not result in an increase to the existing capacity of the Facility or a decrease in the existing capacity by more than five percent without the utility's consent.

Based upon the foregoing, and the entire record herein, the Commission approves Duke's proposed material alteration definition and associated modifications to DEC's and DEP's Terms and Conditions and Schedule PP PPA.

EVIDENCE AND CONCLUSIONS FOR FINDING OF FACT NO. 8

The evidence supporting this Finding of Fact is found in Duke's Joint Initial Statement ("JIS"), Duke's Joint Reply Comments, the testimony of Duke witness Johnson, the Public Staff Initial Comments, the testimony of Public Staff witness Thomas, NCSEA Initial Comments, SACE Initial Comments, the testimony of SACE witness Glick, and the NC WARN Initial Comments.

Summary of the Evidence:

Duke's JIS proposed modifications to DEC's and DEP's Terms and Conditions relating to the operation of QFs, including QFs integrating energy storage technologies. Duke modified Section 2.(b) of the Terms and Conditions to provide that Sellers should operate their Facilities in compliance with instructions provided by Duke's system operators, including any energy storage protocols established by Duke. (Duke JIS, at Exhibit 4).

The Public Staff's Initial Comments suggested that the term system operator instruction and the storage protocols should be more clearly defined and an example of an energy storage protocol should be incorporated into the Schedule PP PPA and Terms and Conditions in order to provide additional clarity to market participants. (Public Staff Initial

Comments, at 78).

SACE's Initial Comments expressed concerns that QFs intending to develop a project that incorporates battery storage will not know the conditions under which their storage facility may be subject to operational control by Duke's system operator, which would create financial uncertainty for QF-owned storage and make financing storage projects difficult or impossible. SACE also argued that the energy storage protocols should be subject to review and comment by interested parties. (SACE Initial Comments, at 15-16).

NC WARN also expresses concern that requiring QFs to operate pursuant to an energy storage protocol would give the Companies almost total control to refuse to purchase energy from battery storage at peak times. (NC WARN Initial Comments, at 3).

NCSEA's Initial Comments similarly argued that Duke should be required to file the energy storage protocols with the Commissions to ensure their reasonableness and to ensure the protocols are not discriminatory towards QFs in violation of PURPA. Similar to SACE, NCSEA argued that the effect of this undefined provision will be to prevent QFs from financing energy storage, since there is no certainty as to how the expected revenue generation opportunity could be limited or eliminated due to these undefined restrictions. NCSEA also raised concerns that Duke's proposed addition to Section 2.(b) requiring QFs to comply with system operator instructions asserting the proposed language was vague and could allow for an increase in curtailment decision rights held on behalf of the operating utility that would violate the "nondiscriminatory" curtailment requirements under PURPA. (NCSEA Initial Comments, at 50, 52-53).

Duke's Reply Comments supported a number of modifications to the Terms and

Conditions to address concerns raised by interveners. First, Duke added a number of new definitions within Section 3 of the Terms and Conditions including System Operator Instruction, Storage Resource, Prudent Utility Practice, and Energy Storage Protocol. Duke also clarified Section 14 of the Terms and Conditions to more precisely explain the limited operational circumstances in which DEC or DEP could discontinue purchases from a QF Seller under the Schedule PP PPA. Duke also modified the Schedule PP PPA by incorporating a new Section 5 governing Energy Storage at a Schedule PP QF and providing additional clarification regarding the manner in which QFs that install battery storage shall be required to operate their facilities. As recommended by the Public Staff and other parties, Duke also submitted an Energy Storage Protocol applicable to Standard Offer QFs. (Duke Reply Comments, at Exhibit 4, Exhibit 5 and Exhibit 6).

Duke's Reply Comments explained that the more detailed System Operator Instruction definition should provide additional clarity regarding when action by a QF Seller is required. Duke also responded to interveners' concerns about creating new curtailment rights by explaining that Duke's system operator instructions for standard offer QFs are designed to effectuate the curtailment rights provided for under PURPA to respond to system emergencies, as expressly recognized in the *2016 Sub 148 Order*, not to add new rights to curtail QFs. The new system operator instruction provision memorializes the requirement that QF generators are required to take action after instruction by DEC's or DEP's system operators under the Companies' operating procedures for non-discriminatory curtailment of QFs, as filed with the Commission on January 30, 2018, in Docket No. E-100, Sub 148. Duke also explained that it was filing the Energy Storage Protocol to provide clarity to QFs that may consider co-locating storage technologies, and further agreed to file any changes to these protocols in Docket No. E-100, Sub 148 (or another docket as directed by the Commission) along with the Companies' curtailment protocols for QFs. (Duke Reply Comments, at 149-150).

Duke witness David Johnson further supported the Energy Storage Protocols in testimony, explaining that standardized operating procedures will establish how batteries co-located with QF generating Facilities are operated in parallel with the Companies' system and will help assure that QFs effectively manage the charging and discharge of stored energy in real-time such that variability and ramping characteristics of such Facilities are not materially more challenging for the System Operator than a comparable solar Facility operating without a co-located Storage Resource. Witness Johnson also explained that the Schedule PP storage protocols for smaller standard offer QFs are more streamlined and impose less rigorous technical operating requirements than the storage protocols applicable to larger generating facilities selling power under the CPRE Program or from larger QFs selling under negotiated avoided cost rates. (Tr. Vol. 2, at 265-268).

Public Staff witness Jeff Thomas testified that the Public Staff believes operational guidelines are appropriate to ensure that facilities integrating energy storage are operated in a safe, reliable and efficient manner, and testifies that Duke's proposed Energy Storage Protocols incorporate relevant factors for operation of energy storage facilities in parallel with the Duke system. Witness Thomas also states that the Public Staff defers to Duke on how to best maintain system reliability, due to the complexity of the Companies' system and the necessity to consider the aggregate effect of potentially large quantities of third-party energy storage. The Public Staff did not recommend any modifications to the Companies' standard offer Energy Storage Protocols as currently proposed, but also did not opine on their reasonableness, instead suggesting that intervenors representing solar developers may raise concerns. (Tr. Vol. 6, at 382-383).

SACE witness Glick was the only other witness to specifically comment on technical aspects of the Standard Offer storage protocols. Glick testified that PURPA does not grant the utility control over when a QF produces electricity, how much to produce, or what the production profile should look like (except in certain emergency situations). She specifically expressed concerns with Items 4, 5, and 6 of the Energy Storage Protocol, asserting that Company should be concerned with the operation of the QF, not its sub-components. Witness Glick also argued that the requirement in Item 7 to maintain output level at the highest possible output level is inappropriate and effectively favors particular system designs, rather than simply ensuring that the QF is fairly compensated for its output, regardless of its design. (Tr. Vol. 6, at 282).

Duke witnesses Johnson addressed Witness Glick's concerns with the Energy Storage Protocol in supplemental rebuttal explaining that Item 4 is intended to clarify that the entire QF facility, including the storage device, would be subject to any curtailment instruction from the system operator, while Items 5 and 6 address allowable ramp rates and appropriately apply to the Storage device versus the entire facility. Unlike the CPRE Storage protocols applicable to larger QFs where the ramp rate requirement was represented as a percentage of the Facility Nameplate rating, Duke purposefully tied the ramp rate directly to the Storage Resource to make this requirement more easily understandable for smaller QFs eligible for Schedule PP, as well as to make the ramp rate requirement more uniform for different configurations of storage size relative to the facility size. Witness Johnson further explained that the levelized output requirement in Item 7 was designed to ensure that the Storage Resource operates in a reasonably predictable way and does not exacerbate challenges with balancing the system by increasing variability relative to an uncontrolled solar only QF. Johnson explained that the intent behind requiring levelized combined solar and storage facility output was to improve predictability and reduce system ramping requirements while allowing the Seller to maximize discharge of the Storage Resource to the extent practical. He further highlighted that Duke had discussed this requirement with several QF developers, and no concerns were raised. Therefore, Witness Johnson disagreed with Witness Glick's perspective, and confirmed that these provisions of the more streamlined Schedule PP Energy Storage Protocols are reasonable. (Tr. Vol. 1, at 207-208).

<u>Discussion and Conclusions:</u>

Duke's proposed modification to Section 2.(b) of the Terms and Conditions would add a requirement that contractually obligates QFs to operate its Facility in compliance with system operator instructions issued by the utility including energy storage protocols established by Duke and now filed with the Commission. Duke explains that the system operator instruction provisions are designed to ensure the safe and reliable integration and parallel operation of QFs with the utility's system and, specifically, to effectuate the curtailment rights provided for under PURPA to respond to system emergencies, as expressly recognized in the *2016 Sub 148 Order*. The proposed addition to the Companies' Terms and Conditions effectively memorializes the requirement that QF generators are required to take action after instruction by DEC's or DEP's system operators under the Companies' operating procedures for non-discriminatory curtailment of QFs, as filed with the Commission on in Docket No. E-100, Sub 148. Duke has also characterized the energy storage protocols as a more streamlined and less rigorous protocol for smaller QFs eligible for the Standard Offer, as compared to large QFs that propose to integrate storage under a negotiated PPA or under the CPRE Program.

While the Public Staff does not opine on the reasonableness of the energy storage protocol for standard offer QFs, they did find that the proposed protocol incorporates relevant factors for operation of energy storage facilities in parallel with the Duke system. The Public Staff also states that they generally defer to Duke on how to best maintain system reliability, due to the complexity of the Companies' system and the necessity to consider the aggregate effect of potentially large quantities of third-party energy storage, while looking to solar developer-interveners in this proceeding to raise any specific concerns with the storage protocol that Duke presented in Reply Comments. Notably, while numerous solar-developer interveners and their advocates, such as NCSEA, actively participated in the proceeding, the only party to raise specific concerns with the standard offer storage protocol was SACE. Duke witness David Johnson responded to SACE's concerns through Duke's supplemental rebuttal testimony.

Based upon the foregoing, and the entire record herein, the Commission finds and concludes that Section 2.(b), the standard offer Storage Protocol, and the associated definitions and related provisions set forth in DEC's and DEP's Terms and Conditions relating to the operations of QFs are reasonable and appropriate to safely and reliably integrate QFs into the Duke utilities' systems and should be approved. The Commission finds Duke's proposed addition to Section 2.(b) of the Terms and Conditions and the proposed standard offer energy storage protocol to be reasonable and appropriate to maintain system safety and reliability as the levels of QFs solar continue to increase and as

QFs propose to integrate energy storage into their standard offer QF facilities. The Commission notes Duke's representation that the system operator instructions issued to QFs would be to effectuate the Companies' operating procedures for non-discriminatory curtailment of QFs, as filed with the Commission on January 30, 2018, in Docket No. E-100, Sub 148. Accordingly, the Commission understands that any system operator instruction issued by Duke would be reported as part of the quarterly reporting directed in the *2016 Sub 148 Order* related to curtailment of QFs. To the extent that Duke issues a system operator instruction under this provision requiring a QF to take action other than curtailment, the Commission expects and hereby orders Duke to report on the system operator instruction issued in the next quarterly report. *See 2016 Sub 148 Order*, at 83. As agreed to by Duke, the Commission shall require any future modifications to the energy storage protocols for standard offer QFs presented in this proceeding to be filed with the Commission in this docket. This Commission shall require further require Duke to serve the modified energy storage protocol on the Public Staff and each QF to which it would be applicable at least 30 days prior to the requirements of new protocol becoming operative.

EVIDENCE AND CONCLUSIONS FOR FINDINGS OF FACT NOS. 9 and 10

The evidence supporting these Findings of Fact are found in the testimony of Duke witnesses Snider, Wheeler, and Johnson, Public Staff witness Metz, NCSEA witness Norris, Ecoplexus witness Wallace, and SACE witness Glick.

Summary of the Evidence:

Duke witness Snider's supplemental direct testimony began by explaining that the purpose of his supplemental testimony was to respond to the Commission's June 14, 2019 *Order Requiring Supplemental Testimony and Allowing Responsive Testimony* requesting that the Utilities address the avoided cost rate schedule and contract terms and conditions that a QF proposing to add battery storage to its electric generating facility would receive under PURPA. The Commission's order specifically directed the Companies to identify the avoided cost rates a QF adding battery storage would receive under the following three specific scenarios: (i) where a QF has established a legally enforceable obligation ("LEO") to sell power to the Companies, (ii) where a QF has executed a power purchase agreement ("PPA") with the Companies to sell its power over a specified term, or (iii) where a QF has commenced operations and is now selling the electric output of the facility to the relevant utility pursuant to an established LEO and executed PPA. (Tr. Vol. 2, at 160-162).

Duke witness Snider first testified that a new solar QF proposing to integrate battery storage would be treated the same as any new QF; upon the QF establishing a LEO, Duke would offer to enter into a PPA to purchase the QF's full output based upon DEC's or DEP's most current avoided cost rates and terms and conditions as of the time the QF commits to sell its output to DEC or DEP. (Tr. Vol. 2, at 163).

For "committed" QFs, the Companies' position is that the QF should not be allowed to integrate battery storage without the utility's consent (if a PPA exists) and, in all cases, the QF is materially altering the Facility that committed to sell and deliver power to Duke; therefore, the QF should be required enter into a new or modified PPA at DEC's or DEP's most current and accurate avoided cost rates. Witness Snider clarified that Duke's position is the same regardless of whether the "committed" QF has only established a non-contractual LEO, has executed a PPA contractually committing to sell its output over a specific term, or has already become operational. (Tr. Vol. 2, at 163-164).

To support Duke's position, Witness Snider reemphasized arguments Duke made in the Companies' JIS and Reply Comments that it is inequitable and inconsistent with PURPA to allow QFs with CPCNs to now increase their generator size (MW^{DC}), their capability to produce energy in more hours of the day (MW^{AC}), or to shift their energy production to make additional or modified sales at pre-existing administratively determined rates that are now significantly above Duke's current avoided costs. Absent the QF entering into a modified or new PPA reflecting Duke's current avoided costs and rate design, the addition of a battery storage system to an existing QF would obligate Duke and customers to pay the QF for new and additional output in certain hours at rates exceeding the utility's now-current avoided costs, in a manner that was not contemplated by either the QF or the purchasing utility at the time the QF originally committed to sell its output. Witness Snider explained that requiring the Companies and their customers to pay QFs at stale avoided cost rates for increased or shifted energy production violates PURPA's and HB 589's requirement that rates paid to QFs not exceed the Companies' actual avoided cost rates. (Tr. Vol. 2, at 164-166).

Duke next explained that is inconsistent with PURPA for a QF to rely upon an existing LEO to make new investments that materially alter its facility and obligate customers to purchase the QF's modified output at excessive avoided cost rates. Once the QF establishes a LEO, both the QF and the utility are bound for the duration of the QF's establish LEO. Witness Snider testified that FERC explained in Order No. 69 that the formation of a LEO works to preserve the bargain entered into by the electric utility, as well as the QF, and a utility cannot be obligated to modify the terms of the LEO due to changed circumstances. Witness Snider additionally explained that North Carolina's traditional implementation of PURPA provided the QF the option to sell its output over a shorter period or to sell at avoided cost rates at the time of delivery if the QF contemplated a future investment opportunity to modify its generating facility, such as by integrating battery storage to their facilities. Thus, witness Snider testified that it would be unfair to Duke, and by extension customers, to allow QF investors to make additional investments to integrate battery storage and to potentially sell more energy in certain hours than originally contemplated in order to further leverage Duke's stale and now-excessive avoided cost rates. In conclusion, witness Snider re-emphasized that Duke is not opposed to allowing a QF to materially alter its existing facility to integrate battery storage, where the modified QF commits to enter into a new PPA to sell power at the utility's then-current avoided cost rates. (Tr. Vol. 2, at 166-172).

Public Staff witness Metz testified that the Public Staff agrees with Duke that it would be unreasonable to compensate a committed QF's "additional energy" resulting from the integration of energy storage at the QF's originally-committed avoided cost rates. Witness Metz explained that it is the Public Staff's position that the additional energy output resulting from a newly-added energy storage system should be compensated at the most current avoided cost rates approved at the time the QF commits to sell the additional energy from the battery storage to the utility. To implement this position, Public Staff witness Metz essentially proposes an administrative solution, which includes quantifying the baseline output of the QF that originally established a LEO to differentiate between the QF's original output and additional energy that would be generated once the energy storage equipment is added to the QF. Under the Public Staff's approach, however, witness Metz recommended that a QF be allowed to modify its original PPA to allow the QF to receive the Companies' previously-committed avoided cost rates for the QF's "original" output and current avoided cost rates for the QF's "additional" energy storage output. Public Staff witness Metz also candidly acknowledged the complexity of the Public Staff's proposal and the engineering challenges of metering energy storage generally, and ultimately concludes that a working group may be necessary to further discuss the implementation challenges associated with the addition of energy storage to a committed QF. (Tr. Vol. 6, at 330-347).

NCSEA witness Norris argues that Duke's position that a QF proposing to add battery storage must enter into a new PPA at Duke's most current avoided costs will wholly obstruct the addition of energy storage to all operating QFs in North Carolina. Witness Norris further argues that North Carolina ratepayers will benefit if barriers are removed to enable the addition of energy storage equipment to committed generators, and that committed QFs proposing to integrate battery storage could utilize such equipment to enhance the value of the generator to the ratepayers, such as enabling greater dispatchability and to shift production to periods when it is most valuable to Duke's customers. Witness Norris then presents NCSEA's "compromise" position, recommending that a QF should be allowed to modify its original PPA to allow the new energy storage system to be compensated at current avoided cost rates while the QF retains the pre-existing avoided cost rates for the original Facility. Under NCSEA's proposal, the modified PPA would maintain the remainder of the original PPA's terms and conditions, including the remaining PPA tenor, with the remaining tenor applicable to both the original Facility and the new energy storage system. In support of his proposal, he argues that there is nothing in the standard offer terms and conditions that prohibit the QF from making equipment changes that change the schedule of output as is the primary intent of storage equipment.

Witness Norris goes on to emphasize the importance to the QF industry of enabling the tenor of the modified PPA including the rates for the additional energy storage facility to extend for a term of 10 years, at a minimum. In conclusion, he argued that battery storage remains a nascent technology but that its addition to solar facilities is an imperative that requires "intentional regulatory support" to enable its initial market entry and scale-up. (Tr. Vol. 6, at 120-148).

In his supplemental direct testimony, Ecoplexus witness Wallace agreed with the approach suggested by the Pubic Staff to separately meter any additional energy output from the original facility and to compensate that additional output at then-current Commission approved avoided cost rates without requiring the existing facility to forfeit payments under the terms of its existing PPA. Witness Wallace contends that the Accuenergy data logger is capable of measuring DC electricity output and can be used to appropriately meter the separate battery energy storage system ("BESS") output from a solar + BESS facility installed on the Companies' system. In addition, witness Wallace suggests that the utility may connect to a cloud-based system for monitoring, sharing and displaying data or request information from the battery management system and BESS provider to connect to the utility-owned SCADA system to feasibly meter DC side electricity. However, witness Wallace recognized that currently no American National Standards Institute or IEEE standards exist for DC-meters. In conclusion, Witness Wallace recommended that a metering and communications standard, as well as commercial PPA terms, should be discussed and considered amongst the utilities and solar industry. He therefore proposed a working group be established between the Utilities and the solar industry to meet within 60 days of the Commission's order in this proceeding to develop a potentially deployable solution or to further identify specific challenges that would prevent the commercial viability of adding energy storage to existing facilities. (Tr. Vol. 5, at 346-351).

SACE witness Glick's supplemental direct testimony contends that a committed QF that does not increase its AC capacity by adding energy storage should continue receive the original PPA rates where the addition of energy storage provides increased benefits to customers. Therefore, she recommended that the Companies' proposal should: (1) pay QFs their existing rates and (2) shift the premium pricing time periods to align with current system peaks. Witness Glick further argued that shifting production to different hours in the day can actually benefit the system by enabling QF production to align with the hours of highest system need. She stated that QFs should receive higher avoided cost payments for the energy provided during premium pricing windows because those QFs, at that time, are offering higher value to the system and lowering system costs during those hours. Therefore, Ms. Glick proposed that if the existing premium pricing periods do not fully align QF generation with peak system demand when considering the addition of a battery storage system, then the utility should propose updated pricing periods for QFs that add battery storage that award the highest payments during peak hours. In conclusion, SACE witness Glick argued that Duke's proposal actively discourages the addition of battery storage, and that Duke's claim that allowing QFs to integrate battery storage would increase costs to customers is inaccurate and ignores the potential value to the system provided by storage that can both firm capacity and align QF power output with system-wide capacity needs. (Tr. Vol. 6, at 260-283).

Duke witnesses Snider, Wheeler and Johnson jointly submitted supplemental rebuttal testimony. Duke witness Snider responded to NCSEA's accusations that Duke was being obstructionist in its position, explaining that Duke's position is in no way inconsistent with North Carolina's implementation of PURPA, and that Duke supports QFs integrating battery storage where those QFs properly enter into new PPAs at current avoided cost rates to account for their change in energy production. Witness Snider then explained that the addition of energy storage equipment to operating QFs will not inherently create benefits for consumers paying for the additional energy output from the QF—at best, assuming avoided cost rates are perfectly calculated and do not continue to decline, the position as articulated by NCSEA and the Public Staff leaves customers "indifferent" between adding storage or not. In other words, even if all the complex federal and state regulatory issues, contract law issues, and technical interconnection and metering issues associated with adding storage to an existing committed solar QF are resolved, customers will, at best, only be indifferent to adding storage because it would be procured from an uncontrolled must-take QF generator being dispatched to maximize revenue and being paid at the utility's full avoided cost value rather than at competitively bid prices. (Tr. Vol. 2, at 180-183).

Witness Snider then contended that assuming the Commission is inclined to consider the so-called "compromise" position proposed by NCSEA, that the Commission should establish an expectation that any modified PPA provide additional "consideration" or benefits to customers. In support, he cited to FERC's guidance in Order No.69 that both the QF and the utility are entitled to retain the benefit of the LEO committed to by the QF which obligated the utility to purchase power from the QF. Witness Snider stated that if the Commission decides to further investigate this complex issue, Duke believes this investigation should include quantification of the appropriate benefits or consideration to customers as a result of the additional costs imposed upon them, and that Duke would be willing to discuss this with the Public Staff, QF developers and other interested representatives of the solar industry. He then pointed out that NCSEA witness Norris seemingly agrees that it is appropriate to require QFs integrating battery storage to provide additional consideration to customers, pointing to his statements that QF intends to utilize such equipment to enhance the value of the generator to the ratepayers. (*Id.* at 183-187).

Witness Snider next disagreed with NCSEA witness Norris' compromise proposal, which was to allow the avoided cost rates available to the QF's output of the storage equipment to be set, at a minimum, to the 10-year avoided cost rate (assuming at least 10 years of the QF's PPA schedule remains) for QF PPAs up to 80 MW in size. Witness Snider explained that NCSEA is effectively advocating that Duke be required to calculate and update avoided cost rates for terms that are 10 years or longer for QFs selling under both legacy standard offer and negotiated PPAs. Witness Snider argues that witness Norris' proposal cannot be squared with HB 589's express requirements regarding the tenor for avoided cost contracts entered into under North Carolina's implementation of PURPA. (*Id.* at 187-189).

Witness Snider then expressed concerns with the Public Staff's proposal to pay for "additional energy" where a QF adding energy storage could result in customers not benefitting and potentially even paying more. With respect to an existing QF, the term "additional energy" should be interpreted as any energy delivered to the system in excess of the "original QF's" output, as envisioned in the QF's FERC Form 556 certification, Interconnection Request, the CPCN issued by the Commission, and, if executed, the PPA with the utility. Witness Snider emphasized that it is of great importance that the measurement of "additional energy" must be done for each pricing period of the PPA and not simply on an annual or monthly total energy delivered basis. He noted that witness Metz's testimony is unclear on this critical point, and could be interpreted to be promoting energy arbitrage opportunities between pre-existing (and no longer accurate) off-peak and on-peak periods. Witness Snider testified that if the Commission is inclined to consider the Public Staff's proposal, developing a baseline of the original QF's energy production to ensure that all additional energy created as a result of the energy storage addition is appropriately valued at current avoided costs based upon the current avoided cost rate design would be vital to protecting customers from taking on more overpayment obligations for this power. (*Id.* at 189-191).

Duke witness Wheeler responded to Ecoplexus witness Wallace's testimony that it is technically feasible to measure energy storage system output on the DC side of the power inverter and point of interconnection with the Duke system. First, he explained that metering the DC output of an energy storage device requires that the utility's meter be installed directly within the QF's electrical distribution system, which is inconsistent with Duke's normal business practice of installing utility-owned metering exclusively on the Companies' side of the point of interconnection. Second, witness Wheeler agreed with witness Wallace that no American National Standards Institute standard currently exists to judge the accuracy of the Accuenergy data logger meter for utility billing purposes. A much simpler approach that is consistent with all other utility metering practices is to require measurement of the energy storage device output after it has been converted to AC and is delivered to the utility grid. Witness Wheeler then expressed the Companies' concern with using measurements from a battery management system or energy storage system for the energy output of an energy storage device. First, measurements from the battery management system are not revenue grade and do not account for the conversion from DC or AC that take place in the inverter before energy is delivered at the point of interconnection. Another flaw with witness Wallace's proposal is that most QFs are not connected to the utility's supervisory control and data acquisition or SCADA system, which Witness Wheeler explained presents a significant technical effort to sub-meter storage when compared with the reliability of a single revenue meter at the point of interconnection. (*Id.* at 197-201).

Next, witness Wheeler agreed with Public Staff witness Metz's recommendation that the Commission consider forming a working group to consider these complex technical issues more fully, if the Commission were to not adopt the Companies' position requiring a new or modified PPA for the materially altered QF's full output. (*Id.* at 201).

Witness Wheeler also disagreed with NCSEA witness Norris' assertion that an incremental investment to add storage is only an "equipment change" to shift energy output and does not materially alter the QF. Witness Wheeler explained that the addition of battery storage clearly results in a change in the QF's hourly production profile and increase or decrease to the total energy from the Facility, and further argued that these "incremental investments" were likely not contemplated by the legislature in the development of HB 589. Further, he disagreed with NCSEA witness Norris' assertion that Duke's tariffs do not prohibit the shifting of energy under a PPA. While the Schedule PP Terms and Conditions do not specifically and expressly address energy shifting, the Schedule PP Terms and Conditions comprehensively reflect the overarching intent that energy generation from the QF Seller that originally contracted to deliver power to Duke will remain consistent over each year of the contract term. Witness Johnson also cited Section 4.(b) of the Schedule PP Terms and Conditions, which provides that a QF Seller shall not change its contracted estimated annual kWh energy production without adequate notice to the Company, and without receiving the Company's consent. He then explained how the negotiated QF PPA also provides a very detailed description of the QF's facility include the QF's precise location, nameplate capacity rating, major equipment components, site map, layout, delivery point diagram, including delivery point, metering, and facility substation, and facility control equipment to be installed. In sum, he concluded that the description of the Facility is a material term to both the Standard offer and negotiated QF PPA, and that any material alteration to the Facility, including the addition of battery storage, would require the Companies' prior consent, or else the QF would be in default of the PPA. (*Id.* at 201-204).

During the hearing, Commissioner Clodfelter raised a number of questions regarding QFs' rights and obligations under the Schedule PP PPA and Standard Terms and Conditions to make changes to the QF's generating facility during the term of the PPA. Duke Witness Johnson emphasized that the PPA memorializes Duke's commitment to purchase power from the original QF Facility and that where a QF owner seeks to materially alter the facility in a way that modifies the facility's energy production or revenue under the PPA, Duke has a right to review the proposed change and to consent (or not) if the change would adversely impact the cost of the PPA to ratepayers. Duke witness Wheeler expanded on this point by explaining that it is Duke's position from a rate design perspective that PURPA rates are levelized based upon assumed consistent production throughout the PPA term and maintaining this consistent production is important to maintain customer indifference to the purchases from the QF. (Tr. Vol 3, at 149-153). On redirect, Duke witness Wheeler also clarified that the rules governing CPCNs require that a QF's CPCN correctly identify "[a] description of the buildings, structures, and equipment comprising the generating facility and the manner of its operation." (Tr. Vol. 4, at 33-34). He further stated that the most detailed information the Companies have regarding the QF's Facility is submitted in the interconnection agreement application, which includes the schematics of the site, exact equipment specifications, details for how it's going to be operated, and that that information is relied upon by the Companies prior to signing a PPA. Duke witness Wheeler clarified that although the Companies rely on the PPAs, which provide a summary level description of the Facility that is only two lines, the Companies also rely upon the "huge, detailed, extensive description like [] [] in the interconnection agreement" in determining what the exact Facility is under the PPA. (Tr. Vol. 4, at 39-41). In addition, Duke witness Wheeler agreed that the Commission's rules indicate that if there is a change in the information that was submitted to get a CPCN that the QF has to notify the Commission and the utility of a change in its CPCN application—which designates the particular type of Facility that the QF will operate—then it is reasonable that the Companies consider any change that would require the QF to amend its CPCN and notify the Commission to also be a material alteration to the facility that committed to sell under the PPA. (Tr. Vol. 4, at 42-45).

Later in the hearing, and in response to questions from Duke's counsel, Public Staff witness Metz identified nuances within the Public Staff's proposal. Specifically, witness Metz explained that under both the Public Staff's or NCSEA's "compromise" proposals, where a Sub 136 vintage QF adds a battery storage system whose output would receive Sub 158 rates, there is a potential for the QF to effectively be paid double for delivering the same capacity due to the capacity component of the new Sub 158 rates (proposed to be applicable to the battery storage system) being paid during winter morning hours and the original Sub 136 vintage rates (proposed to be applicable to the solar facility) primarily or completely paying for capacity value during summer afternoon hours. (Tr. Vol. 7, at 87-90).

Discussion and Conclusion

The Commission requested the Utilities and other interested parties to file testimony on this issue of what avoided cost rates and terms and conditions that a "committed QF" proposing to integrate energy storage equipment would be eligible to receive in light of the recent significant interest in the process for physical interconnection of energy storage equipment at operating generating facilities under the North Carolina Interconnection Procedures, as recently raised in the Commission's interconnection docket, Docket No. E-100, Sub 101. The Commission recognizes that market interest in energy storage technology has grown significantly in the recent past, and development of this new technology within the context of North Carolina's implementation of PURPA raises new questions in light of energy storage equipment's unique operational capabilities when integrated with solar QFs. In considering this new issue, the Commission is also cognizant of the limits of its delegated authority to implement PURPA in this state under both N.C. Gen. Stat. § 62-156, as recently amended by H.B. 589, as well as FERC's regulations prescribing the manner in which states may lawfully implement PURPA.

As an initial matter, there does not seem to be any dispute between the Utilities, Public Staff and QF industry advocates that a generating facility that integrates battery storage or other energy storage equipment is eligible to sell its output as a QF under PURPA, assuming FERC's regulatory requirements governing QF eligibility and certification are met. *See Luz Development & Finance Corporation*, 51 FERC ¶ 61,078 (Apr. 26 1990).

Duke witness Snider specifically testified that Duke's position is that a QF integrating battery storage or other energy storage equipment would be treated like any other QF; upon the QF establishing a LEO, Duke would offer to enter into a PPA to purchase the QF's full output based upon DEC's or DEP's most current avoided cost rates and terms and conditions as of the time the QF commits to sell its output to DEC or DEP. (Tr. Vol. I, at 163).

There also does not seem to be any disagreement between Duke and other parties that the avoided cost rates schedule and contract terms and conditions that a "committed QF" proposing to integrate battery storage should be eligible to receive would be the same, regardless of whether the QF has (i) established a non-contractual LEO to sell Duke in the future, (ii) executed a PPA, and/or (iii) commenced operation and sale of the electric output of the facility to the relevant utility pursuant to an established LEO and executed PPA. Duke's position is that regardless of whether a QF has established a non-contractual LEO or has formalized that LEO by executing a PPA, in all instances, the QF has obtained a CPCN to construct a new generating facility, as described in its CPCN application, and obligated itself to deliver the output of the certificated QF to the utility. No other party argued that a differing position should be adopted for QFs that have only established non-contractual LEOs under the Commission's implementation of PURPA versus having entered into PPAs. The Commission agrees with Duke that a commitment established by a non-contractual LEO under PURPA is intended to be just as binding on the both the utility and the QF as a formalized contractual commitment. *See 2016 Sub 148 Order*, at 105 (citing *J.D. Wind 1, LLC*, 129 FERC ¶ 61,148, at P 25 (2009)) ("a QF, by committing itself to sell to an electric utility, also commits the electric utility to buy from the QF; these commitments result either in contracts or in non-contractual, but binding, legally enforceable obligations").

The Commission also agrees with Duke, NCSEA, and the Public Staff that the question of whether the addition of battery storage to a committed QF generating facility materially alters the rights and obligations of the QF that committed to sell its output to the utility and the ratepayers that are ultimately obligated to pay for the QF's power is a complex issue that raises regulatory, contractual and legal issues under the State's implementation of PURPA.

First, specific to the contractual rights and obligations of Duke and QFs under the Schedule PP Standard Offer PPA and Terms and Conditions, disagreement exists as to whether the QF has the unilateral right to make an "equipment change," as characterized by NCSEA witness Norris, to integrate energy storage equipment without obtaining the utility's consent. The Commission recognizes that the terms of the Schedule PP PPA are not expressly clear on the issue of energy shifting or the integration of energy storage equipment, which, in large part, is the impetus for Duke's proposed addition of a clarifying "material alteration" definition in the Terms and Conditions. The Commission also recognizes Duke witness Johnson's testimony, however, that it has always been the understanding and intent of the parties at the time the PPA is executed that the Facility contracting to deliver power under the PPA is intended to encompass the Facility that has been certificated by FERC and the Commission and studied and authorized for interconnection by the utility. Duke witness Wheeler also points to section 4.(b) of the Standard Offer PPA, which provides that a change in the contracted annual energy production requires Duke's consent. Witness Wheeler explains that an incremental investment in energy storage to shift and increase output from the QF during periods that the solar equipment is not generating electricity would modify the contracted annual energy production of the QF. He further testifies that characterizing such a modification to the QF as a simple equipment change would be similar to allowing a QF to construct and co-locate a cogeneration facility that only produced energy at night and did not increase the AC output of the original QF PPA. (Tr. Vol 1, at 203). The Commission agrees with Duke that the integration of new battery storage equipment is not simply an equipment change, but reflects a material alteration of the Facility that has obligated itself to sell and deliver power to the utility.

The Commission's view is also consistent with the regulatory framework governing QF's rights to sell their output to utilities under North Carolina's implementation of PURPA. Under this framework, a QF must obtain certification from FERC to sell and deliver its power as a QF. 18 C.F.R. § 292.203(a)(3). After obtaining certification, an operating QF must continue to "conform with any material facts or representations presented by the [QF] in its [Form 556] submittals to the Commission," where failure to do so results in "the qualifying status of the facility [] no longer be[ing] relied upon." FERC has explained that "any change in material facts and representations triggers a recertification requirement." *Revisions to Form, Procedures, and Criteria for Certification* *of Qualifying Status for a Small Power Production or Cogeneration Facility*, Order No. 732, FERC Stats. & Regs., 130 ¶ 61,214 at P 57-58 (2010). Section 1l of FERC Form 556 specifically identifies changes "affecting plant equipment, fuel use, [or] power production capacity" as requiring recertification. Thus, under FERC's regulations, the integration of new battery storage equipment would seem to trigger recertification. Similarly, as highlighted by Duke witness Wheeler at the hearing, the Commission's regulations governing CPCNs requires the Applicant to provide information on the "equipment comprising the generating facility and the manner of its operation" The Commission's regulations further prescribe that significant changes to a QF generating facility require an amendment to the QF's CPCN, such as where the QF is changing its fuel source or making other "significant changes" to the generating facility. *See* NCUC Rule R8-64(d)(3) (identifying a change in the QF's fuel source, or in the generating capacity of the facility as "exemplary of changes that require amendment to the certificate issued for the facility"). *See also Order Issuing Certificate of Public Convenience and Necessity,* Docket No. EMP-93, Sub 0 (Oct. 11, 2017) (finding that "placement of solar panels or other equipment on property other than that identified in the application, as amended, filed and approved herein will require a further amendment of the CPCN and approval by the Commission").

In the Commission's view, a business decision by a committed QF owner to make an incremental investment in its facility that materially affects plant equipment or power production capacity, such as adding energy storage equipment, represents a significant and material change to the QF that warrants recertification with FERC and an amendment to the QF's CPCN. In recognition of such significant changes, the Commission also finds that this supports Duke's position that the utility's consent is required under the PPA to make such a change and that further evaluation of the appropriate avoided cost rates and terms and conditions that the utility and customers should be obligated to pay the materially altered QF should also be considered.

The Commission also agrees with Duke that the intent of PURPA is for customers to remain indifferent to either purchases of QF- or utility-generated power, and that simply accepting NCSEA's compromise proposal would potentially violate this fundamental principle of PURPA. 16 U.S.C. § 824a-3(d). Despite NCSEA witness Norris' advocacy for "intentional regulatory support" to promote the development of battery storage in North Carolina, the record shows that allowing QFs to materially alter their generating facility to sell and deliver increased energy under Duke's stale and now-excessive avoided cost rates would be unjust and unreasonable to customers and inconsistent with North Carolina's implementation of PURPA. Moreover, as witness Snider emphasized, the General Assembly has also recently established a competitive framework for procuring new renewable energy that is designed to provide additional benefits to the utilities and ratepayers over QF purchases at administratively-determined avoided cost rates. Any proposed modification to an existing PPA or QF commitment should provide similar benefits to the Companies and customers in consideration of the utility agreeing to modify the purchase obligation under the PPA. Likewise, the Commission agrees with Duke witness Snider that, in fixing standard offer avoided cost rates under N.C. Gen. Stat. § 62-156(b), as well as establishing the methodology for negotiated avoided cost rates under N.C. Gen. Stat. § 62-156(c), the Commission is obligated to implement PURPA in compliance with the express requirements of HB 589, including the term of fixed avoided cost rates for new QF contracts. Thus, the Commission would have concerns about Duke calculating avoided cost rates for energy storage additions above 1,000 kW^{AC} for a tenor longer than five years.

In sum, the Commission agrees with Duke that a committed QF may not integrate energy storage equipment under its existing LEO or PPA without obtaining the utility's consent, and that the utilities shall not be obligated to consent where the modified QF facility would require utilities to pay rates that exceed current avoided costs in violation of the foundational customer indifference principle underlying PURPA. However, the Commission also agrees with Public Staff witness Metz that this issue presents complex federal and state regulatory issues, contract law issues, and technical interconnection and metering issues that have not been fully evaluated in this proceeding. For example, further discussion is warranted on the Public Staff's proposal to administratively calculate or separately meter "additional energy," and the technical issues of separately metering battery storage, as raised by Ecoplexus witness Wallace and addressed by Duke witness Wheeler. Although Ecoplexus witness Wallace proposes a potential solution to separately meter battery storage, the Commission finds persuasive Duke witness Wheeler's testimony that the Accuenergy system is "behind the meter" and is not practical or sufficiently reliable for separately metering battery storage at this time. Thus, it is appropriate to require the Utilities, Public Staff and QF industry to discuss whether separately metering battery storage is technically and economically feasible.

As to the rates and terms to be offered to a committed QF that proposes to integrate battery storage, the Commission agrees with Duke witness Snider that prior to allowing a QF to modify its existing QF contract to add battery storage, a QF should be required to first demonstrate "additional benefits" to consumers to justify the Companies' agreement to consent to the QF's proposed modification of its existing commitment. The Commission agrees that Duke witness Snider's testimony that FERC's recognition that the electric utility is "entitled to retain the benefit of its contracted for, or otherwise legally enforceable, lower price for purchases from [QFs]" supports this conclusion, in addition to the foundational intent of H.B. 589, which seeks to protect customers from overpaying for QF power. The Commission also notes that both SACE and NCSEA seemingly agree that the deployment of battery storage will enhance the value of the generator to the ratepayers. The Commission specifically notes NCSEA witness Norris' testimony that integration of energy storage equipment could enhance the value of the generator to the ratepayers, such as by enabling greater dispatchability and the shifting of production to periods when it is most valuable to Duke's customers. The Commission also finds persuasive SACE witness Glick's testimony that a modified rate design proposal for existing QFs seeking to integrate battery storage that better aligns QF generation with peak system demand may allow battery storage to provide "additional benefits" to customers, and, therefore, orders the working group to consider development of a modified rate design specifically tailored to existing QFs that seek to integrate battery storage. The objective of reviewing the rate design should be to ensure that any modified PPA agreed to by the purchasing utility maintains customers' indifference between purchasing power from the modified QF versus the utility generating or purchasing power from another resource, as required by PURPA.

The Commission also specifically finds persuasive the testimony provided by Public Staff witness Metz at the hearing that under certain circumstances, an existing QF amending its PPA to add battery storage would effectively engage in price arbitrage by selling under multiple vintages of avoided cost rates that pay capacity value during different months and hours of the year. Other considerations such as compliance with the energy storage protocols, payment of the Solar Integration Services Charge and enhanced dispatchability of QFs similar to CPRE generating facilities, as raised by Duke witness Snider, should also be considered. Therefore, the Commission orders the working group to evaluate the appropriate avoided cost rates and rate design that would enable an existing QF proposing to materially alter its generating facility to integrate battery storage, while maintaining its preexisting avoided cost rates and terms, in a manner that best ensures PURPA's principle of customer indifference is maintained while also addressing the consideration or "additional benefits" that materially altered QFs will provide to the system and ratepayers.

In sum, the Commission agrees with Public Staff witness Metz, Ecoplexus witness Wallace, and Duke witnesses Snider and Wheeler that a working group is appropriate to further discuss these issues, and specifically orders that the Public Staff and the Utilities commence a working group within 30 days after issuance of the Commission's Order in order to: (1) discuss technologies or potential solutions to separately meter energy storage equipment's output when integrated with an existing QF, (2) evaluate whether a modified rate design should apply to QFs that add battery storage in order to incentivize QFs to discharge their batteries during peak hours when electricity is most needed, and (3) ensure that ratepayers are, at minimum, held indifferent between purchasing from the modified QF based upon the Utilities' most current avoided costs.

Based upon the foregoing and all evidence in the record, the Commission finds and concludes that Duke's proposal to require QFs to enter into a new PPA when proposing to add battery storage to their Facilities is the most reasonable and appropriate solution at this time and should be approved. The Commission further finds and concludes that the working group ordered by the Commission appropriately addresses the recommendations of the Public Staff and other parties.

IT IS, THEREFORE, ORDERED as follows:

1. DEP and DEC shall continue the use of 10-year forward natural gas market prices in future avoided cost filings, as long as they are consistent with the utility's most recently filed IRP.

2. The continued "risk premium" for hedging above the Companies' actual forecasted avoided cost of energy amounts to a subsidy for the QF and is contrary to the "but for" principle of PURPA; therefore, the inclusion of a hedging adder shall be discontinued.

3. DEC, DEP, Dominion, and the Public Staff shall, within 30 days of the date of this order, convene a working group that includes other interested parties to discuss technical interconnection and metering issues associated with integrating battery storage equipment at an existing, committed solar QF, as well as the additional consideration or benefits customers will receive if the Utilities and Public Staff agree to modify LEOs and/or amend existing PPAs to allow legally obligated QFs to retain their existing avoided cost rates for the original QF generating facility while selling the output of the new battery storage system at current avoided cost rates. Within 90 days of this Order, the Public Staff shall file a report with the Commission regarding any compromise proposals achieved and the consensus or non-consensus of

the working group. Other interested parties may reply to the Public Staff's report within 30 days of its filing with the Commission.