



**NORTH CAROLINA  
PUBLIC STAFF  
UTILITIES COMMISSION**

September 4, 2020

Ms. Kimberley A. Campbell, Chief Clerk  
North Carolina Utilities Commission  
4325 Mail Service Center  
Raleigh, North Carolina 27699-4300

Re: Docket No. EMP-101, Sub 0 – CPCN and Registration for 75MW  
Solar Located on North Side of US Highway 64 Alt West, East of  
Intersection with April Lane, and West of Intersection with Alston  
Lane, near Kingsboro, NC, in Edgecombe County

Dear Ms. Campbell:

In connection with the above-referenced docket, I transmit herewith for filing  
on behalf of the Public Staff the testimony and exhibit of Evan D. Lawrence, Utilities  
Engineer, Electric Section, Energy Division.

By copy of this letter, we are forwarding copies to all parties of record.

Sincerely,

s/ Reita D. Coxton  
Staff Attorney  
[reita.coxton@psncuc.nc.gov](mailto:reita.coxton@psncuc.nc.gov)

Attachment

Executive Director  
(919) 733-2435

Communications  
(919) 733-5610

Economic Research  
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Consumer Services  
(919) 733-9277

Electric  
(919) 733-2267

Natural Gas  
(919) 733-4326

Water  
(919) 733-5610

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. EMP-101, SUB 0

In the Matter of	
Application of Edgecombe Solar LLC,	)
for a Certificate of Public Convenience	)
and Necessity to Construct a 75-MW	)
Solar Facility in Edgecombe County,	)
North Carolina	)
	TESTIMONY OF
	EVAN D. LAWRENCE
	PUBLIC STAFF – NORTH
	CAROLINA UTILITIES
	COMMISSION

**BEFORE THE NORTH CAROLINA UTILITIES COMMISSION**

**DOCKET NO. EMP-101, SUB 0**

**Testimony of Evan D. Lawrence**

**On Behalf of the Public Staff**

**North Carolina Utilities Commission**

**September 4, 2020**

1    **Q.    PLEASE STATE YOUR NAME AND ADDRESS FOR THE**  
2           **RECORD.**

3    A.    My name is Evan D. Lawrence. My business address is 430 North  
4           Salisbury Street, Raleigh, North Carolina.

5    **Q.    WHAT IS YOUR POSITION WITH THE PUBLIC STAFF?**

6    A.    I am an engineer with the Energy Division of the Public Staff – North  
7           Carolina Utilities Commission.

8    **Q.    WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS**  
9           **PROCEEDING?**

10   A.    The purpose of my testimony is to make further recommendations to  
11           the Commission on the request for a certificate of public convenience  
12           and necessity (CPCN) filed by Edgecombe Solar LLC (Edgecombe  
13           or Applicant), to construct a 75-megawatt AC (MW<sub>AC</sub>) solar

1 photovoltaic (PV) electric generating facility in Edgecombe County,  
2 North Carolina (the Facility).

3 Specifically, my supplemental testimony responds to the Applicant's  
4 Supplemental Prefiled Testimony of Ryan Van Portfliet, filed on  
5 August 17, 2020, and the Commission's August 20, 2020 *Order*  
6 *Requiring Additional Testimony* (August 20 Order).

7 **Q. PLEASE PROVIDE A BRIEF HISTORY OF THE APPLICATION.**

8 A. The Applicant applied for a CPCN on October 5, 2018, and included  
9 with its application the direct testimony of its witnesses Ryan Van  
10 Portfliet and Meghan Schultz. The Facility will interconnect to the  
11 Heartsease – Mayo Dunbar DP 115 kilovolt (kV) transmission line  
12 owned by Virginia Electric and Power Company, d/b/a Dominion  
13 Energy North Carolina (DENC). Since DENC is part of PJM  
14 Interconnection (PJM), the Applicant is required to enter into an  
15 interconnection service agreement with both entities.

16 On December 31, 2018, I filed an affidavit recommending that the  
17 Commission approve the application subject to certain conditions.  
18 The Commission issued an *Order Allowing Limited Construction with*  
19 *Conditions* on December 2, 2019 (December 2 Order), which  
20 allowed the Applicant to begin certain construction activities on  
21 portions of the site that the State Clearinghouse has determined are  
22 not eligible for inclusion on the National Register of Historic Places.

1           Additionally, the Commission ordered that “The Applicant shall bear  
2           all costs and other risks of the limited construction activities, and,  
3           specifically, the risk that the Commission may deny the Applicant’s  
4           application for an amended [sic] certificate of public convenience and  
5           necessity to construct the proposed facility”.

6           On July 29, 2020 the Public Staff filed a *Motion of the Public Staff for*  
7           *an Order Requiring the Filing of Supplemental Testimony* (July 29  
8           Motion). Prior to the Commission ruling on the July 29 Motion, the  
9           Applicant filed the *Prefiled Supplemental Testimony of Ryan Van*  
10          *Portfliet* addressing the issues that the Public Staff raised.

11          The Commission then issued its August 20 Order requiring the  
12          Applicant to address the following questions:

13                   1)    Provide the Levelized Cost of  
14                   Transmission (LCOT) information for any required  
15                   transmission system upgrades or modifications.

16                   2)    Provide any interconnection study  
17                   received for the proposed facility. If you have not  
18                   received a study, provide a date by when the study is  
19                   expected to be completed.

20                   3)    Are you aware of any system other than  
21                   the studied system that is or will be affected by the  
22                   interconnection? If yes, explain the impact and basis.

23                   4)    If the Applicant proposes to sell energy  
24                   and capacity from the facility to a distribution utility  
25                   regulated by the Commission, provide a discussion of  
26                   how the facility’s output conforms to or varies from the  
27                   regulated utility’s most recent IRP.

28                   5)    If the Applicant proposes to sell energy  
29                   and capacity from the facility to a distribution utility not  
30                   regulated by the Commission but serving retail  
31                   customers in North Carolina (e.g., a co-op or muni),

1 provide a discussion of how the facility's output  
2 conforms to or varies from the purchasing distribution  
3 utility's long-range resource plan.

4 6) If the Applicant proposes to sell energy  
5 and capacity from the facility to a purchaser who is  
6 subject to a statutory or regulatory mandate with  
7 respect to its energy sourcing (e.g., a REPS  
8 requirement or Virginia's new statutory mandate for  
9 renewables), explain how, if at all, the facility will assist  
10 or enable compliance with that mandate. Provide any  
11 contracts that support that compliance.

12 7) Provide any PPA agreements, REC sale  
13 contracts, or contracts for compensation for  
14 environmental attributes for the output of the facility.

15 **Q. HAVE YOU REVIEWED THE SUPPLEMENTAL TESTIMONY AND**  
16 **ACCOMPANYING EXHIBITS FILED BY THE APPLICANT?**

17 A. Yes, I have.

18 **Q. DO YOU HAVE ANY CONCERNS WITH THE RESPONSE?**

19 A. Yes, I do. As has been a concern discussed in multiple other dockets,  
20 a transmission tie line between DENC and DEP, known as the Rocky  
21 Mount-Battleboro 115 kV line, may have constraints due to the  
22 construction of renewable energy facilities in DENC and could  
23 potentially need upgrades. Because of the nature of these potential  
24 upgrades, they would ultimately be funded by DEP customers if they  
25 were completed.

26 **Q. IS IT CERTAIN THESE UPGRADES ARE REQUIRED FOR THE**  
27 **FACILITY TO BEGIN OPERATION?**

1     A.     No. The Rocky Mount-Battleboro 115 kV line was identified in  
2           previous clusters as a potential constraint. The requirement for any  
3           upgrade ultimately depends on the amount of generation that  
4           connects to the system.

5           PJM studies interconnection requests as clusters of projects that  
6           request interconnection between certain dates. **Lawrence Exhibit 1**  
7           contains the PJM 2019 North Carolina State Infrastructure Report,  
8           which was updated in July 2020. Page 12 of this report contains a  
9           chart detailing all interconnection requests by generation source, and  
10          capacity as of December 31, 2019. This chart shows that nearly 48%  
11          of all solar capacity, and approximately 55% of all solar projects that  
12          have entered the queue have withdrawn. Additionally, only 6.5% of  
13          all requested solar capacity and 11% of all solar projects are  
14          currently in service.

15          The interconnection studies assume that all active interconnection  
16          requests will be built. The studies are updated infrequently. The  
17          feasibility study for the Facility was last revised in May of 2017, and  
18          the facilities study was completed in June of 2020, and revised in  
19          August of 2020. Because of the potential for some projects to leave  
20          the queue and the extended time between updates to the study, the  
21          lines identified as potentially having constraints may not need to be  
22          upgraded until later clusters of projects come online. However, the

1 Virginia Clean Economy Act<sup>1</sup> could lead to more renewable energy  
2 facilities in DENC above those facilities in the PJM's North Carolina  
3 queue. Many factors make northeastern North Carolina appealing to  
4 locate solar facilities, including inexpensive, flat land, and the fact  
5 that DENC is the southernmost point in PJM thus receiving the most  
6 direct sunlight. Even if the current clusters do not ultimately need all  
7 of the upgrades, future clusters may need them before the renewable  
8 energy facilities can operate.

9 **Q. WHAT IS THE CURRENT STATUS OF THE UPGRADE TO THE**  
10 **POTENTIAL AREA OF CONSTRAINT IDENTIFIED ABOVE?**

11 A. The Duke Energy Generator Interconnection Affected System Study  
12 Report for PJM Interconnection Cluster AC1 (included with the July  
13 29 Motion, and as Attachment F in Applicant Witness Ryan Van  
14 Portfliet's Supplemental Testimony) describes the work that would  
15 be required. This work includes reconductoring/rebuilding 8.5 miles  
16 of the Rocky Mount-Battleboro 115 kV line, and upgrading ancillary  
17 line equipment. The expected cost of this to DEP is \$23,204,593.  
18 Witness Van Portfliet discusses the Applicant's understanding of the  
19 status of this upgrade. In his testimony he states "It is the Applicant's

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<sup>1</sup> The Virginia Clean Economy Act, signed in to law on April 11, 2020, set clean energy and carbon emissions standards, and included numerous other requirements to encourage the adoption and construction of clean energy in Virginia. The full bill summary is at <https://lis.virginia.gov/cgi-bin/legp604.exe?201+sum+HB1526>.



1 understanding that PJM and DEP previously identified a potential  
2 overload on this DEP line in connection with the PJM AB2 cluster.  
3 The SIS states that the overload on this line was “initially caused by  
4 prior Queue positions with additional contribution to overloading by  
5 this Facility.” Additionally, he states that the Applicant does not know  
6 whether the results of the study are still valid for the AB2 cluster.  
7 According to the PJM New Services Queue web page<sup>2</sup>, of the AB2  
8 projects that have not been cancelled or suspended, only AB2-059,  
9 AB2-100, AB2-169, and AB2-174 mention the potential constraint  
10 within any of the posted studies and agreements. Further, the  
11 facilities study for AB2-059 states “A System Impact Study retool of  
12 the AB2-059 load flow in May 2018 revealed that AB2-059 no longer  
13 has cost allocation towards any of the Rocky Mount-Battleboro 115  
14 kV upgrades.” This quote only applies to the PJM/DENC side of the  
15 transmission line.

16 **Q. ARE THERE OTHER UPGRADES OR MODIFICATIONS**  
17 **NECESSARY FOR THE FACILITY TO BE INTERCONNECTED?**

18 A. Yes. However, the upgrades that are required within PJM are paid  
19 for by the interconnection customers that contribute to the need for  
20 the upgrades, which are not eligible for reimbursement from PJM or  
21 DENC. In this case, any upgrade costs that Edgecombe creates for

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<sup>2</sup> <https://www.pjm.com/planning/services-requests/interconnection-queues.aspx>

1 the PJM system is the responsibility of Edgecombe to fund. Any risk  
2 that comes with these costs is born by the Facility.

3 **Q. HOW ARE THE UPGRADES TO THE DEP SYSTEM DIFFERENT**  
4 **THAN THE UPGRADES REQUIRED WITHIN PJM?**

5 A. As I stated above, the upgrade costs in the PJM system must be paid  
6 for by the Facility and are not reimbursable. With respect to the  
7 affected systems, such as DEP, one or more of the interconnection  
8 customers will be responsible for these network upgrade costs,  
9 consistent with the Joint Open Access Transmission Tariff of Duke  
10 Energy Carolinas, LLC, Duke Energy Florida, LLC, and DEP (Duke  
11 OATT). However, pursuant to the Duke OATT, upon commercial  
12 operation, the interconnection customer(s) that paid for the network  
13 upgrades would be entitled to receive repayment from DEP of the  
14 entire balance of the network upgrades cost plus interest at the  
15 monthly interest rates posted by Federal Energy Regulatory  
16 Commission (FERC). Following repayment, DEP would seek to  
17 recover those costs from its wholesale and retail customers.

18 **Q. HAVE YOU REVIEWED THE LEVELIZED COST OF**  
19 **TRANSMISSION ANALYSIS PROVIDED BY WITNESS VAN**  
20 **PORTFLIET?**

21 A. Yes. Witness Van Portfliet provided a levelized cost of transmission  
22 (LCOT) analysis for the Rocky Mount – Battleboro 115 kV upgrade

1 identified in the DEP AC1 Report. The LCOT calculation was  
2 performed using only the energy from the Facility, and resulted in a  
3 LCOT of \$6.00/MWh. Witness Van Portfliet compared this to multiple  
4 other scenarios that had been performed in various other dockets.

5 On June 11, 2020, the Commission issued an *Order Denying*  
6 *Application for a Certificate of Public Convenience and Necessity for*  
7 *a Merchant Generating Facility* requested by Friesian Holdings, LLC  
8 (Friesian), in Docket No. EMP-105, Sub 0. In that Order, the  
9 Commission found that, “The use of the levelized cost of  
10 transmission (LCOT) provides a benchmark as to the  
11 reasonableness of the transmission network upgrade cost  
12 associated with interconnecting a proposed new generating facility.”

13 The Public Staff believes this still holds true; however, an LCOT  
14 calculation that only includes the network upgrades required by an  
15 affected system to which a generating facility is not directly  
16 interconnected would be distorted by the fact that: (1) energy flows  
17 occur that provide no direct benefit to DEP customers, (2) network  
18 upgrades on the DENC system, whose costs may be borne by the  
19 interconnection customer or DENC’s customers, may also be  
20 required, and (3) the projected need for the Facility and any network  
21 upgrades is not driven by DEP.

22 As shown in Slide 10 in **Lawrence Exhibit 1**, the North Carolina PJM  
23 queue had 4,503 MW of solar capacity as of December 31, 2019.

1           Additionally, **Lawrence Exhibit 2**<sup>3</sup> includes a list of all generation  
2           facilities currently in the PJM queue for North Carolina that has not  
3           yet begun construction with a capacity of 20 MW or greater. These  
4           facilities total to 4,883.9 MW, or roughly 5.75 times more<sup>4</sup> solar  
5           generation that is currently present on the DENC system. Even if the  
6           total capacity and energy that is ultimately constructed has a low  
7           LCOT for the utility for which the generation will be directly  
8           interconnected, it could still trigger many millions of dollars of  
9           affected system upgrades that DEP's customers would have to pay  
10          for but may not need. While the LCOT is a useful tool to evaluate  
11          costs, I do not believe the LCOT alone is an adequate analysis for  
12          evaluating the Facility in relation to the affected system upgrades it  
13          causes.

14   **Q.   HAVE CLUSTER STUDIES AFFECTED THE PUBLIC STAFF'S**  
15   **REVIEW OF CPCN APPLICATIONS?**

16   A.   Yes. On pages 13 and 14 of the direct testimony of Public Staff  
17          witness Jay Lucas filed on November 19, 2018, in Docket No. E-100,  
18          Sub 101, he discussed the use of grouping studies or cluster studies  
19          by DEP and DEC as one method to increase the efficiency of  
20          interconnecting multiple generators. PJM is currently evaluating

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<sup>3</sup> From the PJM New Services Queue webpage.

<sup>4</sup> Compared to in service solar projects greater than 20 MW in PJM New Services Queue webpage.

1 multiple cluster studies with increased complexity, which are  
2 affecting individual transmission lines that interconnect to adjoining  
3 systems not under the control of PJM.

4 Determining the total cost to the using and consuming public of  
5 multiple generator projects in multiple cluster studies is difficult  
6 because of the fluid nature of generator projects. For example,  
7 facilities can and do withdraw from a cluster, and the revised total  
8 capacity or project location may no longer trigger the need for some  
9 or all of the network upgrades identified in an affected system study.  
10 However, it is possible that the next cluster study may retrigger those  
11 costs and/or cause additional costs and additional upgrades.

12 With regard to Cluster AC1, the Pubic Staff notes that the  
13 Commission in its September 2, 2020, *Order on Reconsideration*  
14 (*Halifax Reconsideration Order*) in Docket No. EMP-107, Sub 0,  
15 affirmed its earlier June 11, 2020 order granting a CPCN to Halifax  
16 County Solar LLC, which is identified in the DEP AC1 Report as  
17 Project AC1-208, after consideration of the limited information made  
18 available for potential affected system upgrade costs identified in  
19 Cluster AC1, the costs of which may be recovered from DEP's  
20 ratepayers.

21 In addition, there are additional CPCN applications pending before  
22 the Commission that are contributing to the need for the network

1 upgrades identified in the DEP AC1 Report. The Project AC1-086  
2 identified in the DEP AC1 Report is Gaston Green Acres, LLC,  
3 (GGA), which on July 15, 2020, filed a CPCN application in Docket  
4 No. EMP-112, Sub 0, to construct a 300 MW facility in Northampton  
5 County. However, the GGA facility was studied in the DEP AC1  
6 Report as 180 MW.

7 Project No. AC1-189 in the DEP AC1 Report is Bethel NC 11 Solar,  
8 LLC, (Bethel Solar) Docket No. EMP-102, Sub 0, in Pitt County with  
9 a capacity of 80 MW. On February 8, 2019, the Commission issued  
10 an order determining that the application for the Bethel Solar facility  
11 would be deemed withdrawn if the applicant did not provide  
12 additional information on or before April 9, 2019. Bethel Solar did not  
13 provide the additional information and the Commission closed the  
14 docket.

15 On August 10, 2020, Bethel Solar submitted a new application for a  
16 CPCN for a 150-MW facility in Docket No. EMP-102, Sub 1, in the  
17 same vicinity as the Sub 0 facility.

18 The Public Staff is reviewing both EMP-112, Sub 0, and EMP-102,  
19 Sub 1, but does not have information at this time on the affected  
20 system impacts associated with the changes in capacity or timing of  
21 these facilities.

1           There is a high degree of uncertainty that both witness Van Portfliet  
2           and I discuss in our testimony. As a result of this uncertainty the  
3           Public Staff has the following concerns:

4           (1)    An affected system could build network upgrades that go  
5           unused for extended periods of time because some interconnection  
6           projects withdraw from the queue late in the review process. For  
7           example, even after signing the final agreement, 793 MW of capacity  
8           withdrew from PJM's North Carolina queue as shown in **Lawrence**  
9           **Exhibit 1**, Slide 13.

10          (2)    Network upgrades on the Rocky Mount-Battleboro 115 kV line  
11          necessitated by PJM's cluster AC1 could soon be inadequate due to  
12          the needs of future facilities in PJM's North Carolina queue. Even if  
13          DEP's customers benefited from the transmission upgrades, they  
14          could soon need to be replaced with even greater transmission  
15          capacity long before the end of its normal service life (40 to 60 years).  
16          As explained above, at least one later-queued cluster (AD1) will  
17          affect the Rocky Mount-Battleboro line. A large part of the  
18          approximately \$23 million spent to upgrade the line to accommodate  
19          the AC1 cluster, the costs of which would ultimately be borne by DEP  
20          customers, could be wasted.

1 As discussed above, I believe that it is reasonable to expect that  
2 more generation will request to interconnect to DENC's system  
3 increasing the density of solar generation in this area.

4 **Q. DOES THE CLUSTER STUDY REVIEW PERIOD AFFECT THE**  
5 **PUBLIC STAFF'S REVIEW OF CPCN APPLICATIONS?**

6 A. Yes. The development of cluster studies and accurate cost estimates  
7 for network upgrades can take years, but the CPCN application  
8 review by the Public Staff must be completed in just a few months.

9 As noted in Finding of Fact No. 11 in the Friesian Order:

10 It is appropriate for the Commission to consider the  
11 total construction costs of a facility, including the cost  
12 to interconnect and to construct any necessary  
13 transmission network upgrades, when determining the  
14 public convenience and necessity of a proposed new  
15 generating facility.

16 The Public Staff finds itself increasingly being asked to provide a  
17 recommendation to the Commission on approval of a CPCN  
18 application before the need for potential network upgrades and the  
19 associated costs are fully studied or understood by any party.

20 **Q. PLEASE SUMMARIZE THE PUBLIC STAFF'S CONCERNS WITH**  
21 **AFFECTED SYSTEM COSTS ASSOCIATED WITH MERCHANT**  
22 **GENERATION.**

23 A. The Public Staff is concerned that a utility could incur significant and  
24 recurring network upgrade costs to accommodate merchant



1 generating capacity and energy that does not provide its customers  
2 with any significant benefits.

3 In the past, the Public Staff has been able to review each CPCN  
4 application individually and make recommendations to the  
5 Commission on an individual basis. This process has become more  
6 complicated because of the interdependency and high network  
7 upgrade costs being triggered by groups of projects applying for  
8 CPCNs.

9 **Q. WHAT IS THE PUBLIC STAFF'S RECOMMENDATION ON**  
10 **EDGECOMBE SOLAR'S APPLICATION FOR A CPCN?**

11 A. After reviewing the testimony of witness Van Portfliet and other  
12 evidence in the record, the Public Staff recommends that the  
13 Commission approve the application and grant the certificate,  
14 subject to the following conditions:

- 15 1. The Applicant shall construct and operate the Facility in strict  
16 accordance with applicable laws and regulations, including  
17 any local zoning and environmental permitting requirements;
- 18 2. The CPCN shall be subject to Commission Rule  
19 R8-63(e) and all orders, rules and regulations as are now or  
20 may hereafter be lawfully made by the Commission;

1           3.     The Applicant shall file with the Commission in this docket a  
2                     progress report on the construction of the Facility on an  
3                     annual basis; and

4           4.     The Applicant shall file with the Commission in this docket any  
5                     revisions in the cost estimates for the construction of the  
6                     Facility or any network upgrades within 30 days of becoming  
7                     aware of such revisions.

8   **Q.     DOES THE PUBLIC STAFF HAVE ANY OTHER**  
9           **RECOMMENDATIONS?**

10   A.     PJM's interconnection queue for North Carolina (over 4,500 MW) is  
11             large compared to the 1,129 MW of solar capacity that has been  
12             recently reviewed by the Commission. **Lawrence Exhibit 3** provides  
13             a summary of these recent proceedings. The Public Staff expects  
14             more CPCN applications for electric merchant power facilities in  
15             DENC territory in the near future. In developing its recommendations  
16             for this application, the Pubic Staff has relied upon its prior  
17             recommendations in Docket No. EMP-107, Sub 0, Docket No.  
18             EMP-108, Sub 0, and the Commission's September 2, 2020, Halifax  
19             Reconsideration Order. In the Order for Reconsideration, the  
20             Commission granted the CPCN to Halifax while considering the  
21             limited information available for potential affected system upgrade  
22             costs to ratepayers. The Commission also stated, "this Order is

1 based on the unique facts and circumstances involved in this docket,  
2 and the Commission shall not be bound by it as precedent in any  
3 other proceeding.”

4 Due to the difficulties described above in determining the potential  
5 impact of network upgrades on affected systems and their respective  
6 retail and wholesale customers, the Public Staff recommends:

7 (1) that the Commission, as part of the interconnection reform  
8 process in Docket No. E-100, Sub 101, or other generic  
9 proceeding, require the utilities to file comments or proposals  
10 to consider appropriate changes or modifications to the  
11 affected system process to provide better cost certainty and  
12 align the assignment or recovery of costs with cost causation  
13 principles;

14 (2) that based on the unique facts and circumstances involved in  
15 this docket, the Commission shall not be bound by its decision  
16 to grant the CPCN as precedent in any other proceeding  
17 determine.

18 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

19 A. Yes, it does.



# 2019 North Carolina State Infrastructure Report

## (January 1, 2019 – December 31, 2019)

May 2020  
(updated July 2020)

This report reflects information for the portion of North Carolina within the PJM service territory.

## 1. Planning

- Generation Portfolio Analysis
- Transmission Analysis
- Load Forecast

## 2. Markets

- Market Analysis

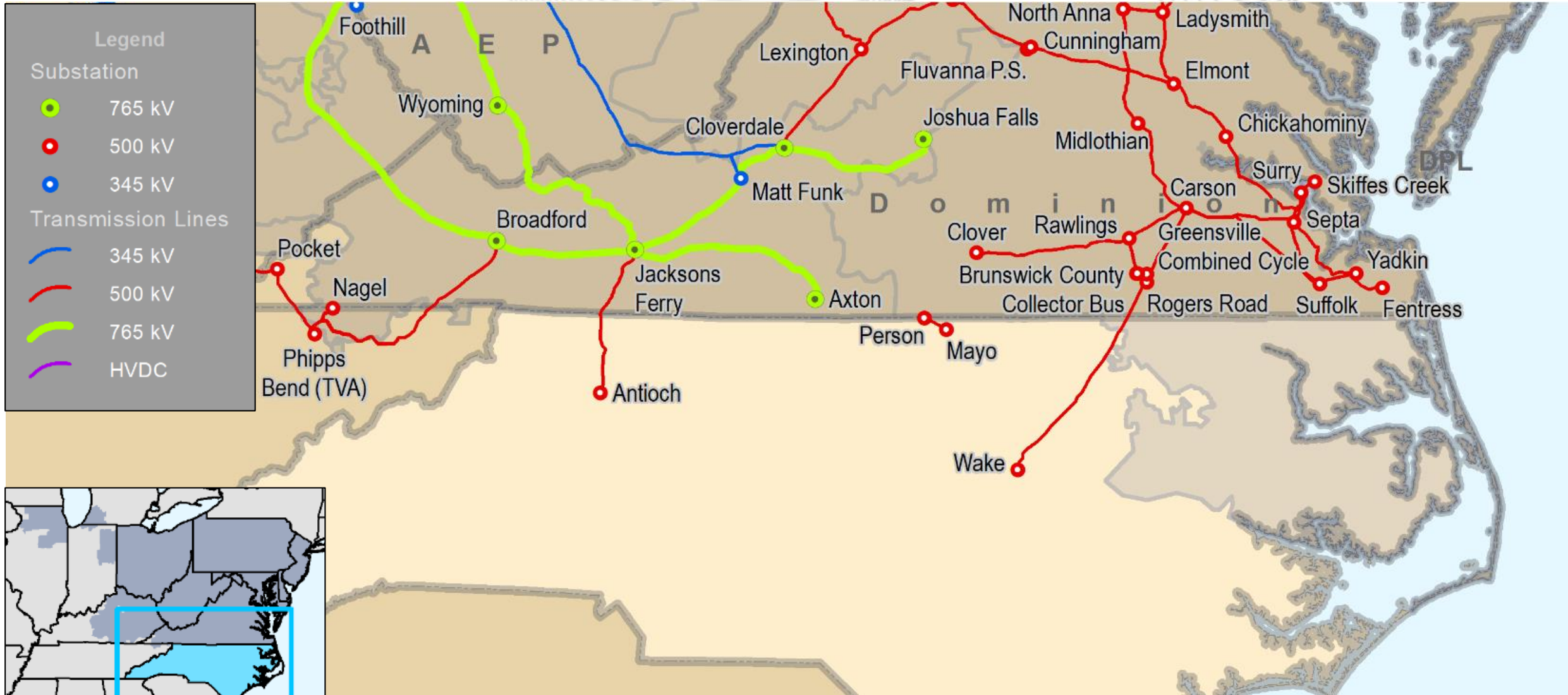
## 3. Operations

- Emissions Data

- **Existing Capacity:** Solar represents approximately 39.1 percent of the total installed capacity in the North Carolina service territory while hydro represents approximately 36.3 percent.
- **Interconnection Requests:** Solar represents 95.2 percent of new interconnection requests in North Carolina.
- **Deactivations:** No generation in North Carolina gave notification of deactivation in 2019.
- **RTEP 2019:** North Carolina's 2019 RTEP projects total approximately \$13 million in investment. This total captures only RTEP projects that cost at least \$5 million.

- **Load Forecast:** North Carolina's load within the PJM footprint is projected to grow between 1.2 and 1.4 percent annually over the next ten years. Comparatively, the overall PJM RTO projected load growth rate is 0.6 percent.
- **2022/23 Capacity Market:** No Base Residual Auction was conducted in 2019. For the most recent auction results, please see the 2018 North Carolina State Infrastructure Report.
- **1/1/19 – 12/31/19 Market Performance:** North Carolina's average hourly LMPs were slightly above PJM average hourly LMPs.



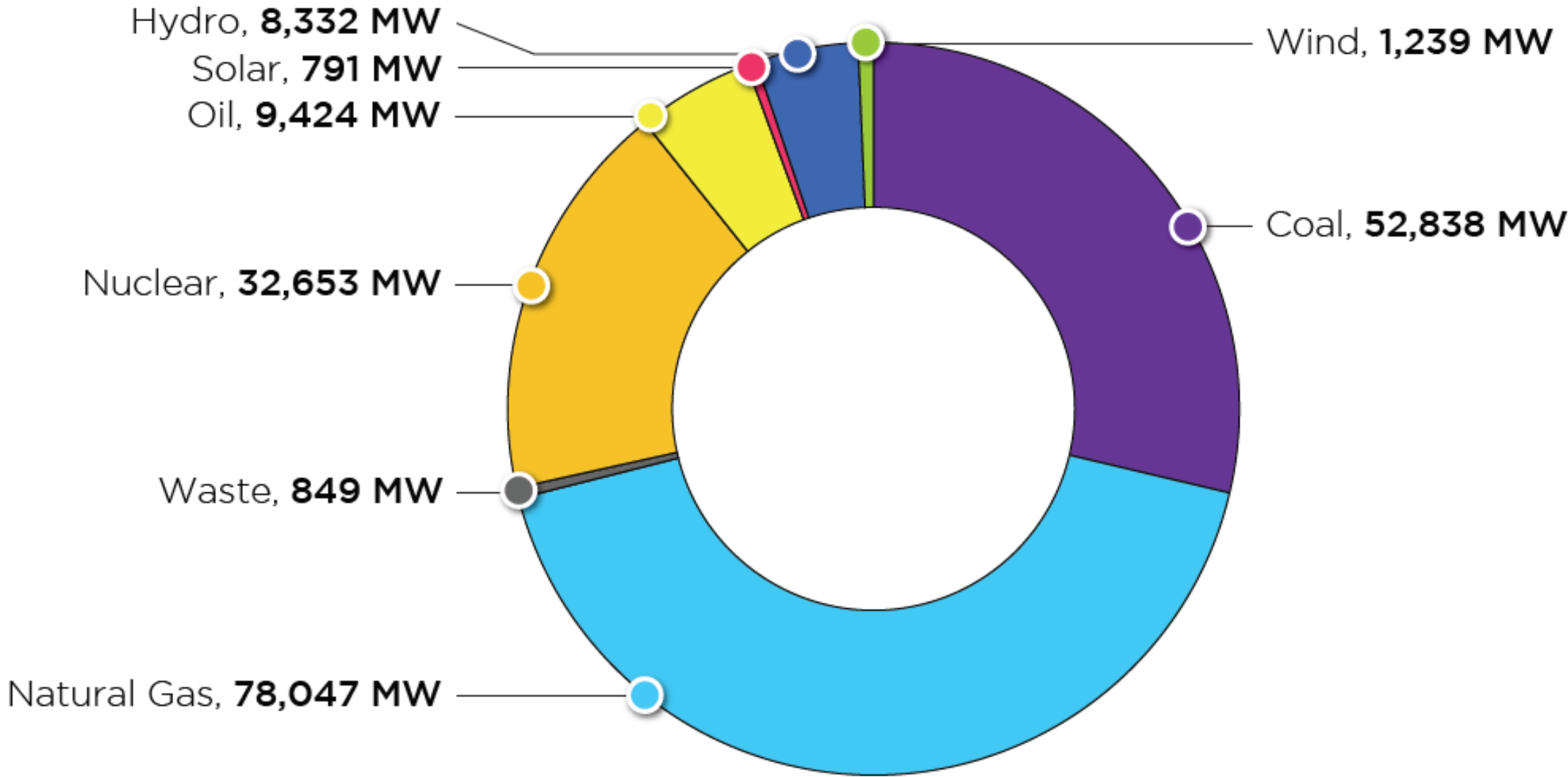


# Planning

## Generation Portfolio Analysis

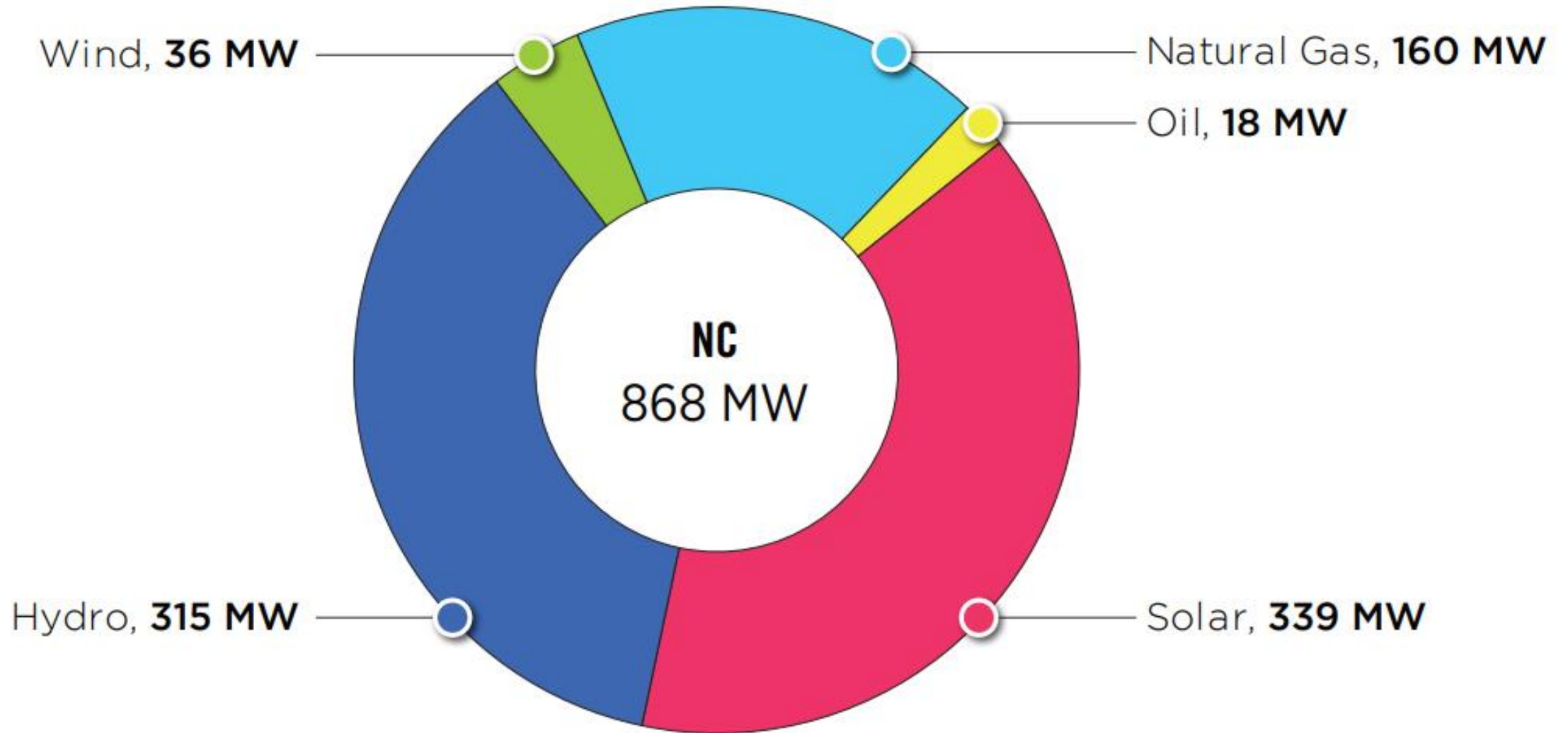
# PJM – Existing Installed Capacity

(CIRs – as of Dec. 31, 2019)



# North Carolina – Existing Installed Capacity

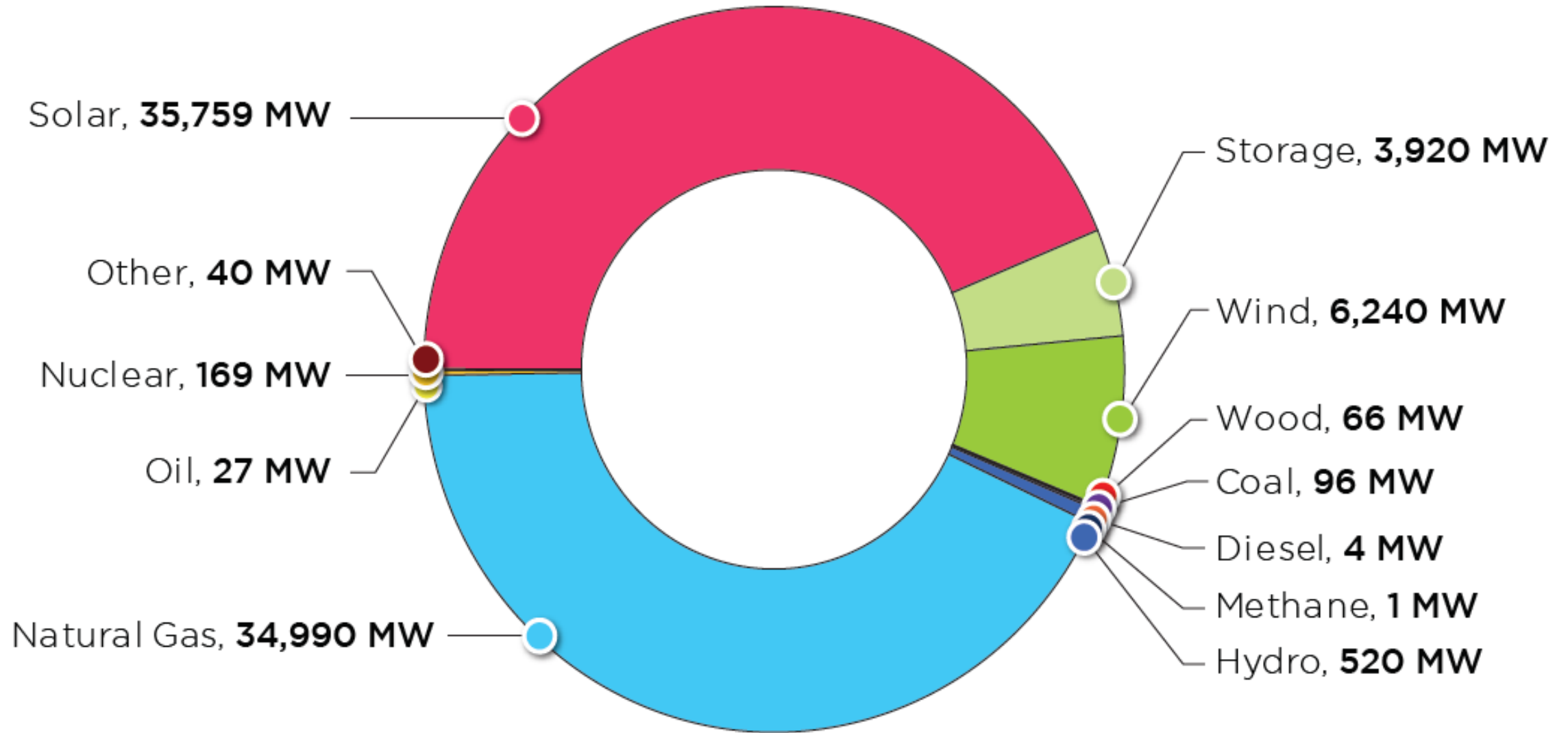
(CIRs – as of Dec. 31, 2019)





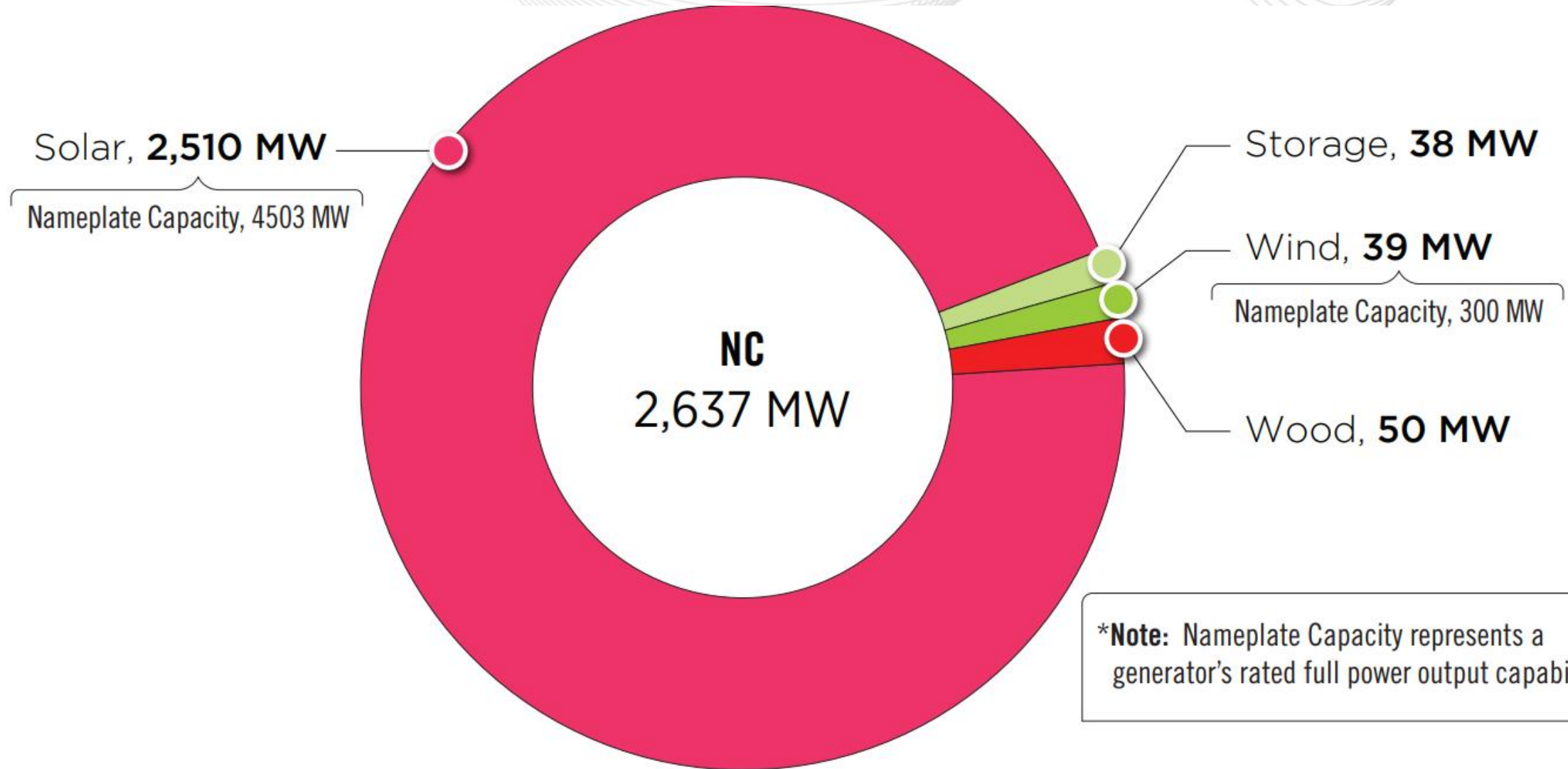
# PJM – Queued Capacity (MW) by Fuel Type

(Requested CIRs – as of Dec. 31, 2019)



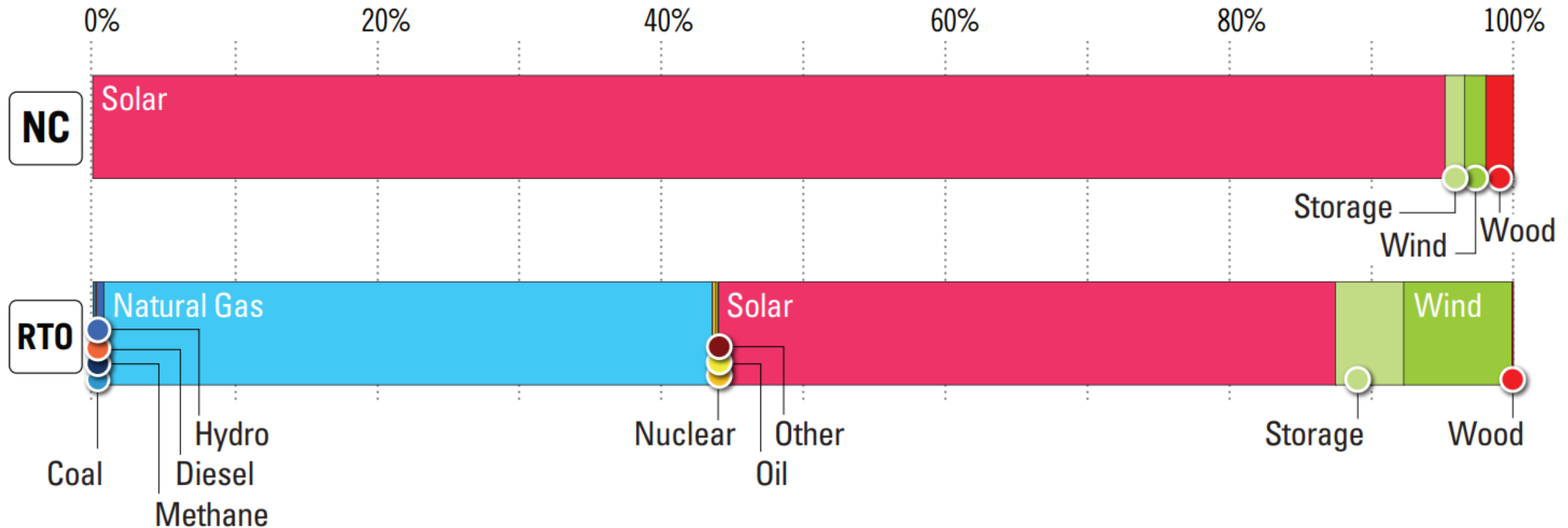
# North Carolina – Queued Capacity (MW) by Fuel Type

(Requested CIRs – as of Dec. 31, 2019)



# North Carolina – Percentage of MW in Queue by Fuel Type

(Dec. 31, 2019)



# North Carolina – Interconnection Requests

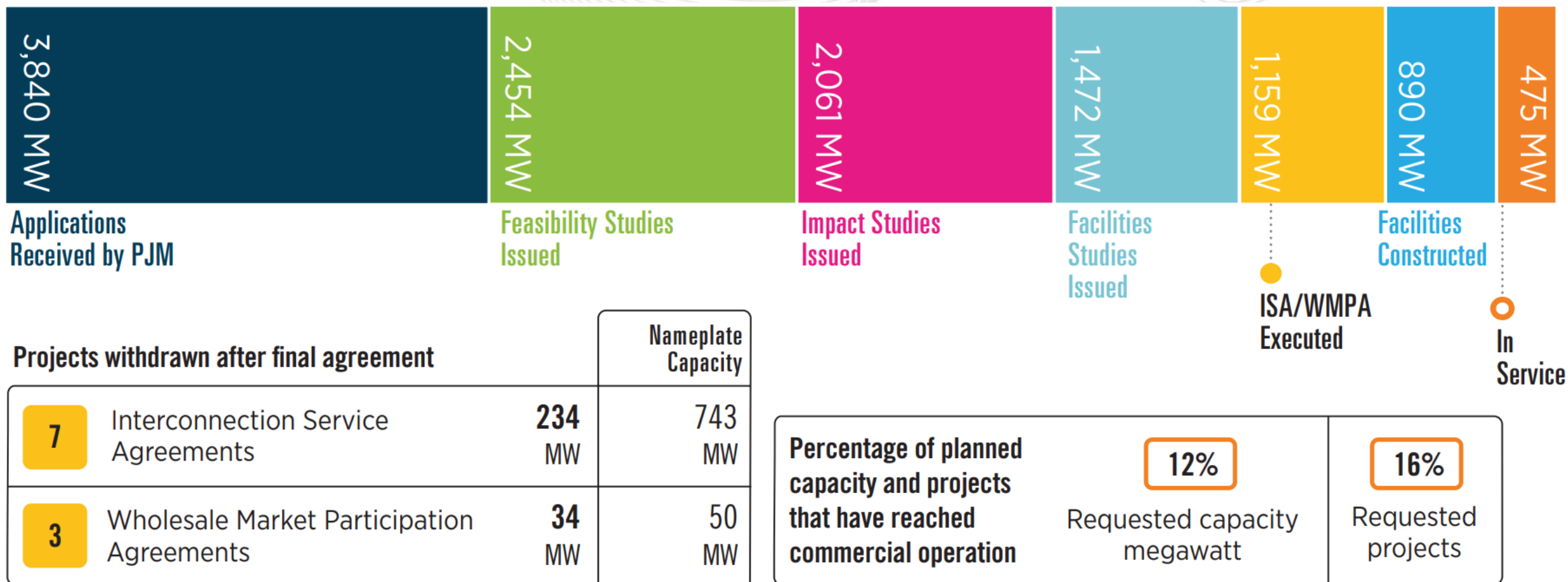
(Unforced Capacity – as of Dec. 31, 2019)

		In Queue						Complete				Grand Total	
		Active		Suspended		Under Construction		In Service		Withdrawn			
		No. of Projects	Capacity (MW)	No. of Projects	Capacity (MW)	No. of Projects	Capacity (MW)	No. of Projects	Capacity (MW)	No. of Projects	Capacity (MW)	No. of Projects	Capacity (MW)
Non-Renewable	Storage	2	38.0	0	0.0	0	0.0	0	0.0	3	50.0	5	88.0
Renewable	Methane	0	0.0	0	0.0	0	0.0	0	0.0	1	12.0	1	12.0
	Solar	32	2,094.8	1	84.0	10	331.3	14	359.1	69	2,612.1	126	5,481.3
	Wind	0	0.0	0	0.0	1	39.0	1	27.0	9	195.3	11	261.3
	Wood	0	0.0	0	0.0	1	50.0	0	0.0	1	80.0	2	130.0
	Grand Total	34	2,132.8	1	84.0	12	420.3	15	386.1	83	2,949.4	145	5,972.6

**Note:** The "Under Construction" column includes both "Engineering and Procurement" and "Under Construction" project statuses.



# North Carolina – Progression History of Interconnection Requests



*This graphic shows the final state of generation submitted in all PJM queues that reached in-service operation, began construction, or was suspended or withdrawn as of Dec. 31, 2019.*

# North Carolina – Generation Deactivation Notifications Received in 2019

North Carolina had no generation deactivation notifications in 2019.

# Planning

## Transmission Infrastructure Analysis

Please note that PJM historically used \$5 million as the threshold for listing projects in the RTEP report. Beginning in 2018, it was decided to increase this cutoff to \$10 million. All RTEP projects with costs totaling at least \$5 million are included in this state report. However, only projects that are \$10 million and above are displayed on the project maps.

For a complete list of all RTEP projects, please visit the “RTEP Upgrades & Status – Transmission Construction Status” page on [pjm.com](https://www.pjm.com).

<https://www.pjm.com/planning/rtep-upgrades-status/construct-status.aspx>

# North Carolina – RTEP Baseline Projects

(Greater than \$10 million)



Note: Baseline upgrades are those that resolve a system reliability criteria violation.



# North Carolina – RTEP Baseline Projects

(Greater than \$5 million)

Map ID	Project	Description	Projected In-Service Date	Project Cost (\$M)	TO Zone	TEAC Date
1	b3122	Rebuild Hathaway-Rocky Mount (Duke Energy Progress) 230 kV Line No. 2181 and Line No. 2058 with double-circuit steel structures using double-circuit conductor at current 230 kV standards with a minimum rating of 1047 MVA.	6/1/2019	\$13.0	Dominion	6/13/2019

# North Carolina – RTEP Network Projects

(Greater than \$5 million)

North Carolina had no network project upgrades in 2019.

Note: Network upgrades are new or upgraded facilities required primarily to eliminate reliability criteria violations caused by proposed generation, merchant transmission or long term firm transmission service requests, as well as certain direct connection facilities required to interconnect proposed generation projects.



# North Carolina – TO Supplemental Projects

(Greater than \$5 million)

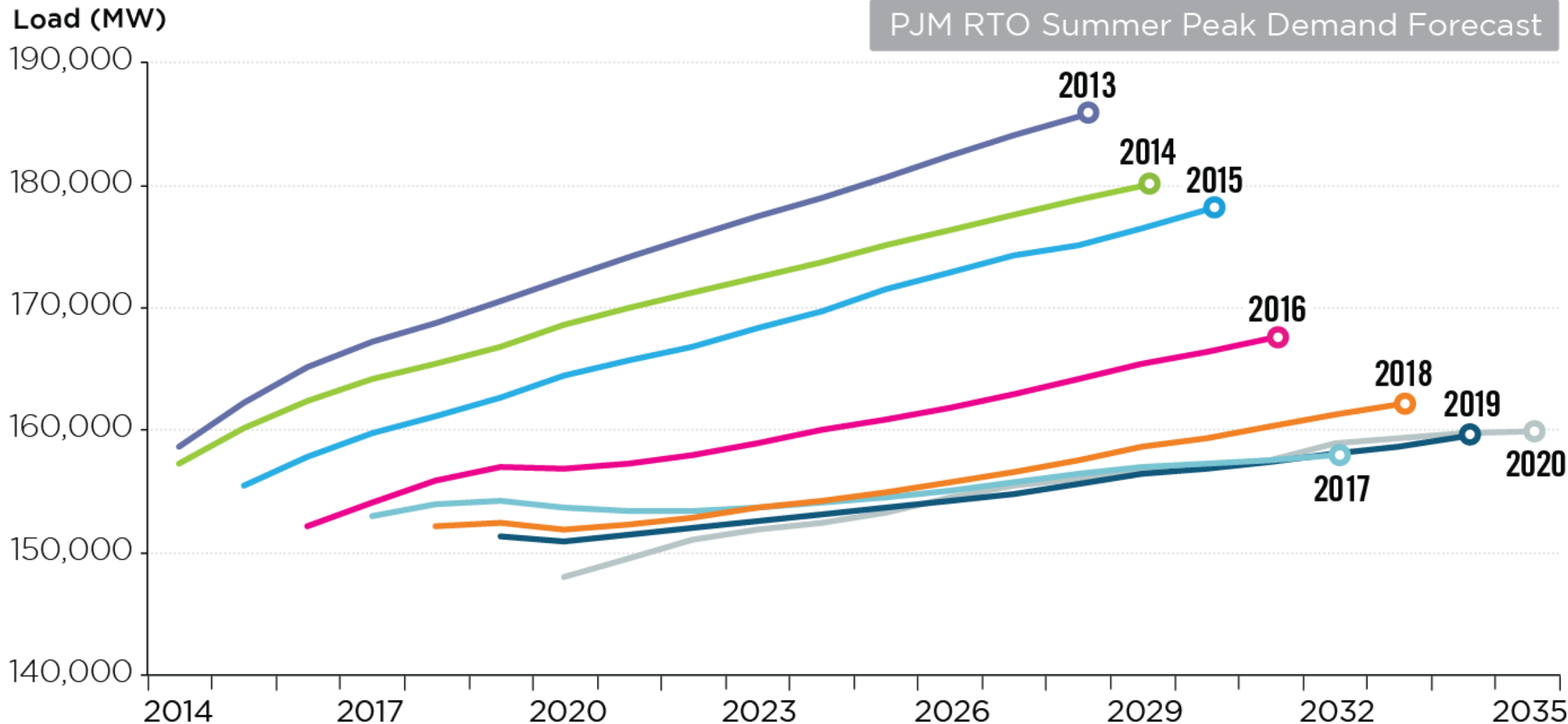
North Carolina had no supplemental project upgrades in 2019.

Note: Supplemental projects are transmission expansions or enhancements that are not required for compliance with PJM criteria and are not state public policy projects according to the PJM Operating Agreement. These projects are used as inputs to RTEP models, but are not required for reliability, economic efficiency or operational performance criteria, as determined by PJM.

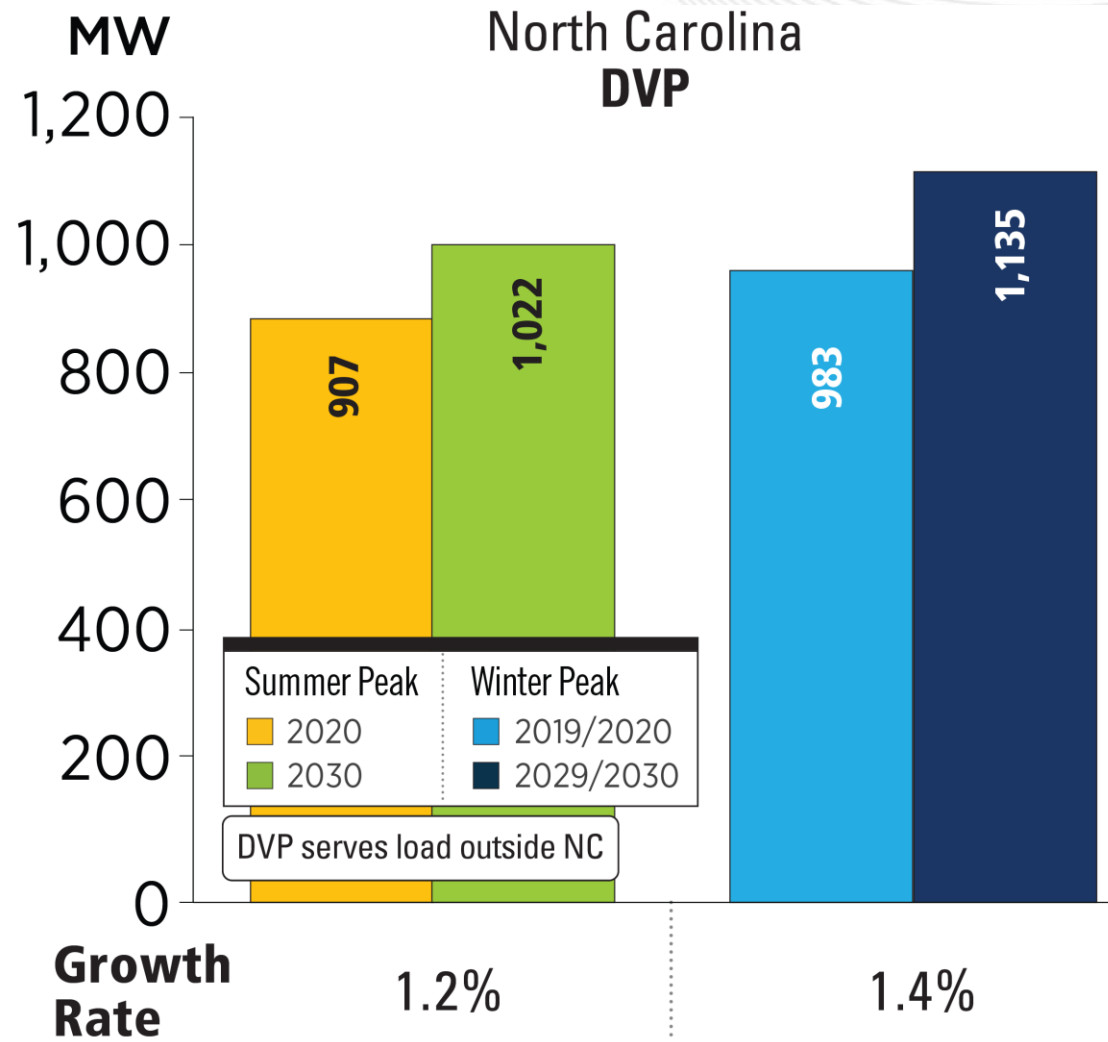


# Planning Load Forecast

## PJM RTO Summer Peak Demand Forecast



# North Carolina – 2020 Load Forecast Report



## PJM RTO Summer Peak

2020

148,092  
MW

2030

157,132  
MW

Growth Rate 0.6%

## PJM RTO Winter Peak

2019/2020

131,287  
MW

2029/2030

139,970  
MW

Growth Rate 0.6%

The summer and winter peak megawatt values reflect the estimated amount of forecasted load to be served by each transmission owner in the noted state. Estimated amounts were calculated based on the average share of each transmission owner's real-time summer and winter peak load in those areas over the past five years.

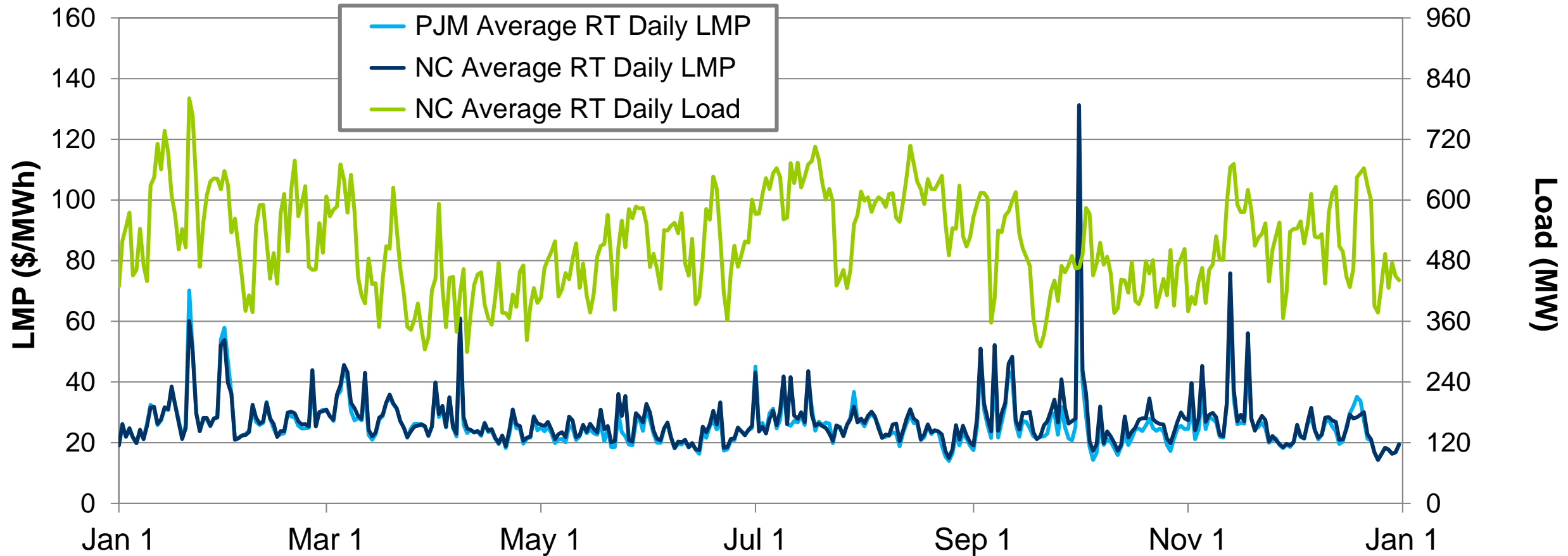
The Load Forecast was produced prior to COVID-19 and will be updated before the next Base Residual Auction to reflect changes in load patterns.

# Markets

## Market Analysis

# North Carolina – Average Daily Load and LMP

(Jan. 1, 2019 – Dec. 31, 2019)

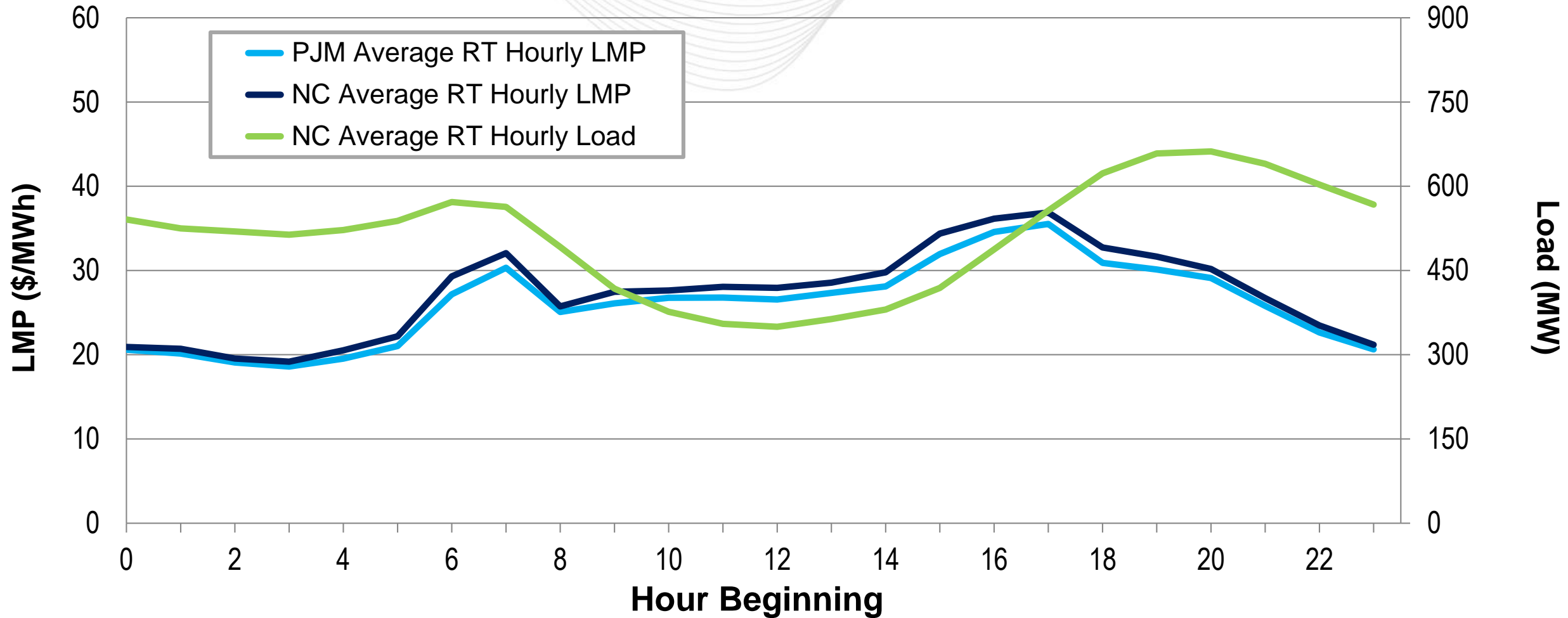


**Note:** The price spike in October reflects the Performance Assessment Interval event that occurred on October 2nd.

# North Carolina – Average Hourly Load and LMP

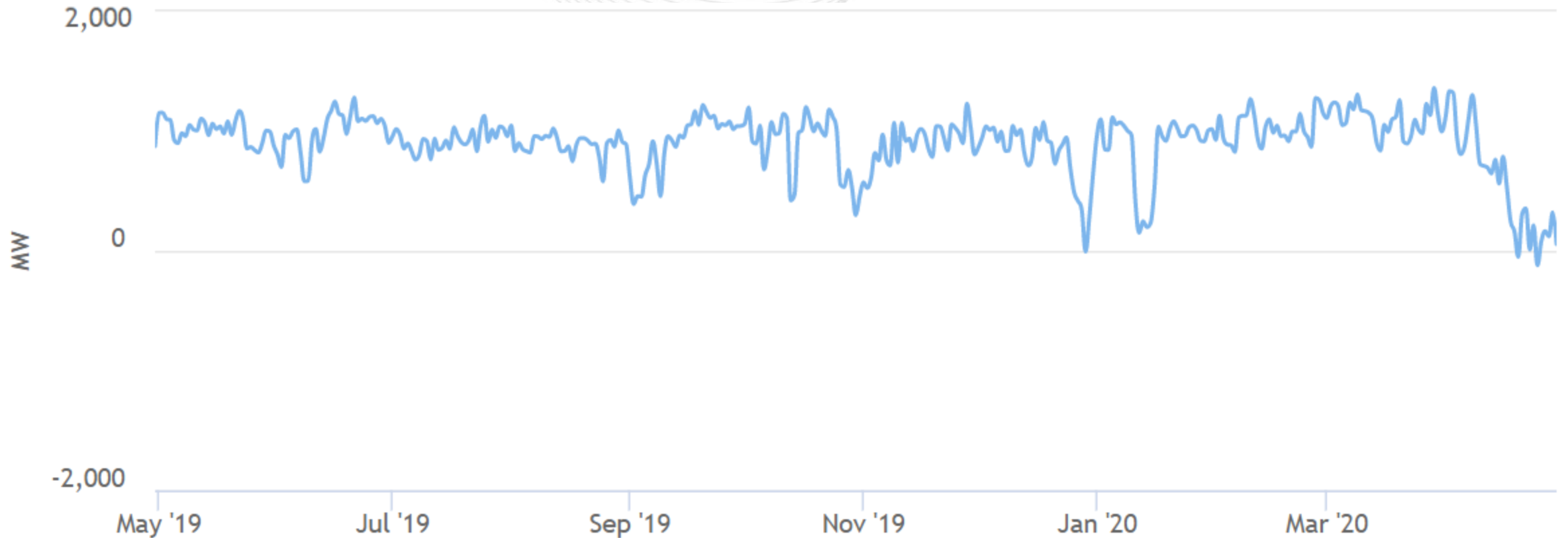
(Jan. 1, 2019 – Dec. 31, 2019)

North Carolina's average hourly LMPs were slightly above the PJM average hourly LMP.



# North Carolina – Net Energy Import/Export Trend

(May 2019 – April 2020)



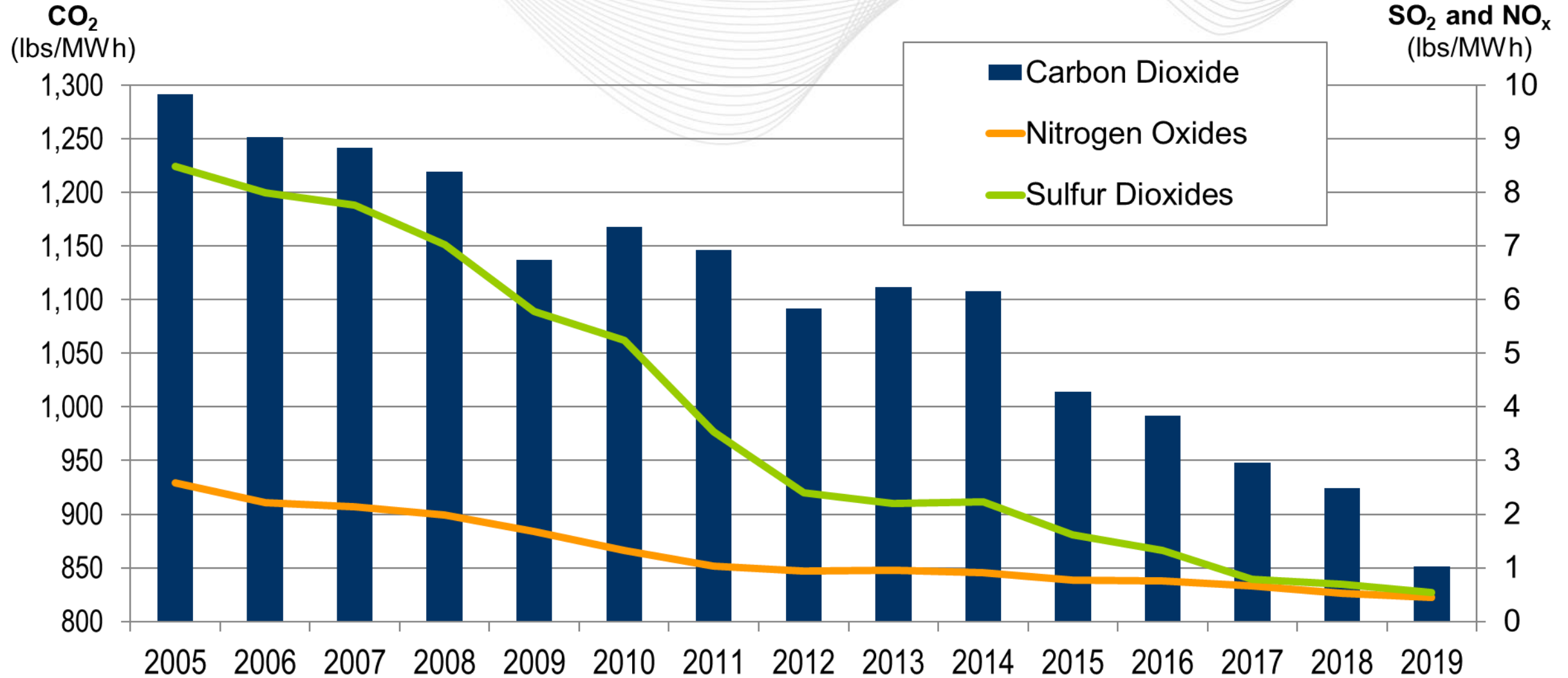
This chart reflects the portion of North Carolina that PJM operates. Positive values represent exports and negative values represent imports.

# Operations

## Emissions Data



# 2005 – 2019 PJM Average Emissions





Queue Number	County	Nameplate Capacity (MW)	Fuel
AC1-034	Edgecombe	75	Solar
AC1-086	Northhampton	300	Solar
AC1-189	Pitt	80	Solar
AC2-083	Halifax	20	Solar
AC2-084	Halifax	60	Solar
AD1-022	Bertie	80	Solar
AD1-023	Bertie	40	Solar
AD1-056	Halifax	60	Solar
AD1-057	Halifax	34	Solar
AD1-074	Washington	300	Solar
AD1-075	Washington	75	Solar
AD1-076	Washington	109	Solar
AD2-051	Hertford	74.9	Solar
AD2-160	Currituck	50	Solar
AE1-024	Bertie	80	Solar; Storage
AE1-025	Bertie	80	Solar; Storage
AE1-026	Bertie	80	Solar; Storage
AE1-072	Currituck	150	Solar
AE2-034	Washington	140	Solar
AE2-044	Edgecombe	120	Solar
AE2-147	Perquimans	150	Solar
AE2-253	Currituck	100	Solar
AF1-082	Edgecombe	93	Storage
AF1-152	Pasquotank	50	Solar
AF1-236	Tyrell	1210	Solar
AF2-046	Hertford	150	Solar
AF2-047	Washington	150	Solar
AF2-080	Pitt	150	Solar
AF2-081	Currituck	80	Solar
AF2-136	Perquimans	208	Solar
AF2-242	Beaufort	80	Solar
AF2-303	Edgecombe	190	Solar; Storage
AF2-324	Edgecombe	75	Solar
AG1-008	Hertford	150	Solar
AG1-082	Hertford	20	Solar; Storage
AG1-083	Hertford	20	Solar; Storage

Total Capacity 4883.9

Lawrence Exhibit 2

Source: <https://www.pjm.com/planning/services-requests/interconnection-queues.aspx>



Recent EMP proceedings before the Commission in PJM's queue for North Carolina						
EMP-	Sub	Applicant Name	Filing Date	Approval Date	Capacity, MW	County
101	0	Edgecombe Solar LLC	10-05-18		75	Edgecombe
103	0	Albemarle Beach Solar, LLC	09-21-15		80	Washington
104	0	Fern Solar LLC	11-27-18	03-16-20	100	Edgecombe
107	0	Halifax County Solar LLC	08-30-19		80	Halifax
108	0	American Beech Solar LLC	01-28-20		110	Halifax
109	0	Camden Solar LLC	04-01-20		20	Camden
110	0	Sumac Solar LLC	04-16-20		120	Bertie
111	0	Sweetleaf Solar LLC	06-02-20		94	Halifax
112	0	Gaston Green Acres Solar, LLC	07-15-20		300	Northampton
102	1	Bethel NC 11 Solar, LLC	08-10-20		150	Pitt
Total					1129	