Existing and Potential Corporate Off-Site Renewable Procurement in the Southeast

Jenny Heeter, Jeffrey J. Cook, and Jennifer Sauer

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
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NOTICE

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List of Acronyms

AEP	American Electric Power
C&I	commercial and industrial
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
FERC	Federal Energy Regulatory Commission
FP&L	Florida Power & Light
G&T	generation and transmission
GPSC	Georgia Public Service Commission
IOU	investor-owned utility
ISO	independent system operator
LCOE	levelized costs of energy
MBR	market-based rate
MISO	Midcontinent Independent System Operator, Inc.
MIT	Massachusetts Institute of Technology
NCUC	North Carolina Utilities Commission
NRECA	National Rural Electric Cooperative Association
NREL	National Renewable Energy Laboratory
PJM	PJM Interconnection
PPA	power purchase agreement
PURPA	Public Utility Regulatory Policies Act
PV	photovoltaic
QF	qualifying facility
RE	renewable energy
REC	renewable energy credit
REDI	Renewable Energy Development Initiative
RTO	regional transmission organization
SCE&G	South Carolina Electric & Gas Company
SLED	State and Local Energy Data
TVA	Tennessee Valley Authority
UMMEG	Upper Midwest Municipal Energy Group
WWF	World Wildlife Fund

Executive Summary

As corporations, public agencies, and other institutions make commitments to use renewable energy, they increasingly are turning to purchase renewable energy from off-site locations, in addition to on-site systems. To date, most off-site renewable energy has been purchased from the midsection of the country (in Texas and Oklahoma) where low-cost wind power is available, and enabling purchasing policies and programs exist for corporate buyers.

This analysis focuses on the Southeast, where corporate off-site renewable purchasing historically has been limited. This report uses the term "corporate" to refer to non-utility off-takers. This includes government, non-profit, higher education, and other institutions. The analysis identifies about 730 MW of renewables contracted by corporates as of the end of 2017.[i] Contracting has been done through four pathways: (1) Utility partnerships, including green tariffs and bilateral contracts; (2) community solar; (3) owning qualifying facilities under the federal Public Utility Regulatory Policies Act (PURPA); and (4) retail choice and power purchase agreements (PPAs) (Figure ES-1). Utility partnerships resulted in 55% of the capacity, at 405 MW.

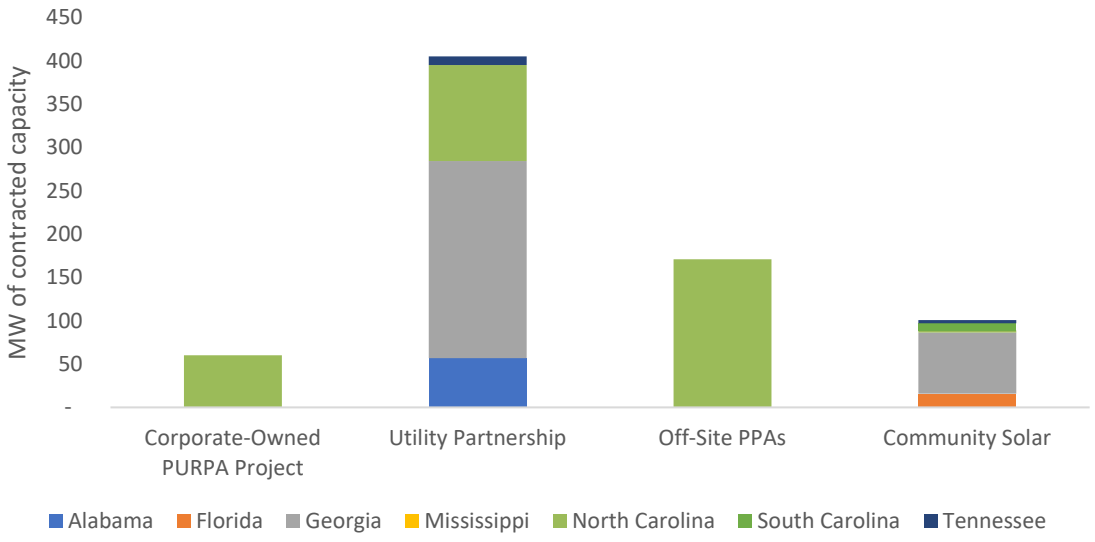

Figure ES-1. Contracted off-site corporate renewable capacity in the Southeast, by procurement option.

This contracted renewable energy (RE) capacity does not meet the renewable energy demand by corporates with electricity load in the Southeast. We gathered data from corporate-owned entities, higher education institutions, and local governments having renewable energy targets. This sample renewable energy demand is an underestimate because we were limited to data

[i] This estimate was identified by a review of a variety datasets from the Energy Information Administration, SNL Financial Inc., and Bloomberg New Energy Finance among others. The estimate was also vetted through discussions with electric service providers and corporates across the Southeast. We include Georgia Power's green tariff is "contracted" in 2017 in our figures, since that is when the program was launched, however, individual off-taker contracts were signed in 2018.

supplied directly by corporations, via Second Nature, and data drawn from the Sierra Club's Ready for 100 campaign. Current and planned capacity meet 21% of our sample's renewable energy demand in the Southeast.

In states with the greatest identified corporate renewable energy demands (North Carolina, Georgia, and Florida), contracted capacity could provide 36%, 43%, and 3%, respectively (Figure ES-2). These plans leave about 4 million MWh of unmet renewable energy demand in the Southeast; if solar were to serve that demand, it would result in more than 2,000 MW of new solar projects (assuming a 22% average capacity factor).

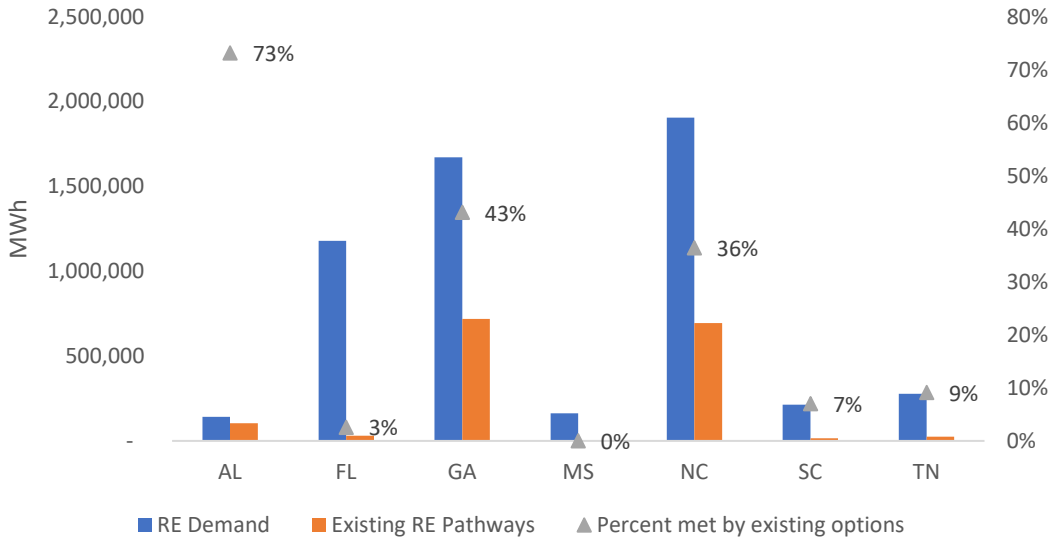

Figure ES-2. Renewable energy demand and contracted renewable energy capacity in the Southeast.

Unmet renewable energy demand could be met by expansion of existing pathways, e.g. new utilities offering a green tariff or developing bilateral contracts. The unmet renewable energy demand could also be met via emerging pathways. We identify four emerging pathways with potential in the Southeast: 1) a large-scale land lease for renewables, 2) a PURPA-based contract-for-differences, 3) market-based utility rates with a separate renewable energy contract for a project in an RTO/ISO territory, and 4) subscription solar at scale, with corporate anchor tenants.

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1 Introduction

Corporations, public agencies, and other institutions have made significant commitments to use renewable energy. To meet these commitments, and other objectives, corporates are turning to off-site renewable energy purchasing.[1] To date, most off-site renewable energy purchasing has been concentrated in the midsection of the country (in Texas and Oklahoma) where low-cost wind power is available, and supportive purchasing policies and programs exist for corporate buyers. As of July 2017, more than 8,100 MW of off-site renewables had been contracted by corporates under a power purchase agreement (PPA) structure (Heeter et al. 2017). In other regions of the country, off-site renewable energy purchasing has been more limited. In the Southeast, about 740 MW of renewables have been contracted by corporates, as of the end of 2017 (Figure 1).

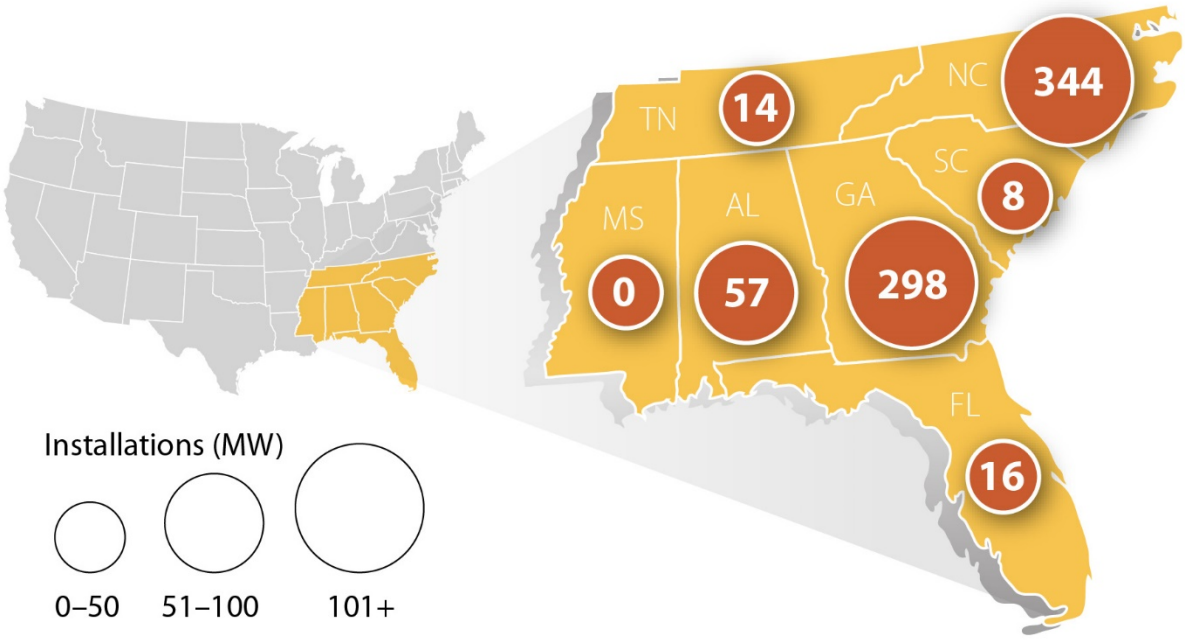

Figure 1. Off-site renewables in the Southeast.

The limited off-site corporate renewable energy purchasing in the Southeast, defined herein as the seven states highlighted in Figure 1 (Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee), is a result of policy, market, and utility context. This report explores the current status of off-site renewable corporate purchasing in the Southeast, examines corporate renewable energy market potential, and discusses new ways that corporates and utilities could facilitate market expansion. The report uses data gathered on corporate electricity consumption and goals and over 25 interviews with corporate, regulatory, and utility personnel.

The report is structured as follows.

[1] This report uses the term "corporate" to refer to non-utility off-takers, including government, non-profit, higher education, and other institutions.

- Section 2 outlines the results of the survey of corporations with renewable energy objectives and their related load in the Southeast.
- Section 3 discusses the unique barriers and challenges that corporate customers face in the Southeast.
- Section 4 describes key off-site procurement pathways that are available, or could be adopted in the Southeast, including the following.
    - *Green tariffs and bilateral contracts* that allow a corporate customer to enter into an agreement with their utility to procure renewable energy from a utility-owned or utility-managed project with an established long-term rate.
    - *Community solar* that allows organizations to purchase a share of an off-site solar array and receive bill credits based on the electricity production of their share.
    - *Qualifying facility* that allows a developer—including a corporate customer—to build a renewable energy project and be compensated for electricity generation at the utility's avoided cost rate, as allowed under the federal Public Utility Regulatory Policies Act (PURPA).
    - *Retail choice* that allows customers to choose their electricity supplier—potentially a supplier that offers a renewable energy option or the ability to facilitate a power purchase agreement. These opportunities are limited in the Southeast.
    - *Power purchase agreements* that permit a corporate customer to enter into a contract for renewable projects securing the rights to the generation and environmental attributes.
    - *Potential new models,* such as new procurement models, that are built on existing examples and might have potential in the Southeast.
- Section 5 provides a summary of Southeast procurement options by state and an assessment of the overall market outlook.
- Section 6 provides a conclusion and pathways for future work.

2 Demand for Renewable Energy in the Southeast

Renewable energy demand in the Southeast is derived from corporations, cities, and higher-education institutions. NREL gathered data directly from corporations, and estimated renewable energy demand from cities and higher-education institutions using the methods described in Text Box 1. Because these data are only a sample of institutions with renewable energy commitments, the estimated demand for renewable energy in the Southeast can be viewed as a lower-bound estimate.

Text Box 1. Gathering Data on Renewable Demand in the Southeast

We received or gathered data from 19 companies, 46 higher-education institutions, and 9 cities or counties with renewable energy commitments.

To assess the demand for renewable energy from corporations, NREL created a data questionnaire and worked with the World Wildlife Fund (WWF) to circulate it to members of their Buyers' Principles (2018), a group of about 70 corporations that are committed to pursuing renewable purchasing. NREL and WWF received responses from 19 companies that had electricity load in the study area, including from IT companies, manufacturing companies, retailers, and others.

We used data from Second Nature to estimate renewable energy demand from higher-education institutions. Higher-education institutions that are signed on to Second Nature commitments provide Second Nature with data on their electricity consumption and renewable energy purchases. This dataset includes 46 colleges or universities in our study area.

To understand demand for renewable energy from cities, NREL used city and county renewable energy commitments from the Sierra Club's Ready for 100 campaign, paired with data from the U.S. Department of Energy's (DOE) State and Local Energy Data (SLED) platform. SLED contains estimates of city electricity consumption. We estimated municipal electricity consumption at 2% of the city-wide electricity consumption.

We identified nearly 29 million MWh of load in the Southeast that is associated with a renewable energy commitment (Figure 2). By comparison, national voluntary market renewable energy sales in 2016 totaled 95 million MWh (O'Shaughnessy et al. 2017). The vast majority of our sample renewable energy demand in the Southeast is attributed to cities and counties making a 100% renewable energy commitment (23 million MWh, 79%).[2] The remaining demand is split roughly evenly between corporations (3.3 million MWh, 12%) and higher education (2.7 million MWh, 9%).

[2] While in the rest of the report we refer to all non-utility offtakers as "corporates", in this section we provide data segmented by cities and counties, higher education institutions, and corporations.

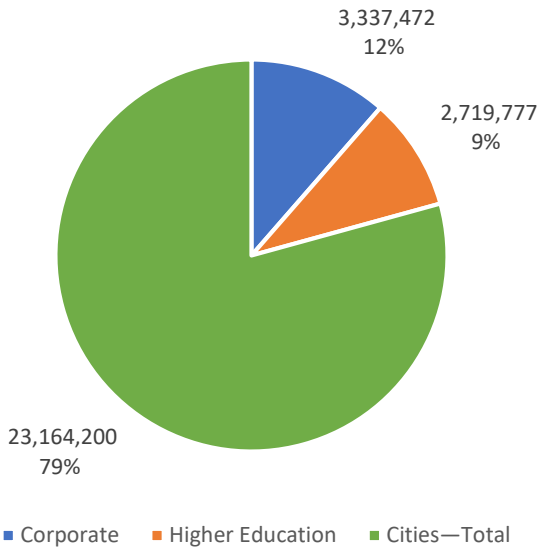

Figure 2. Renewable energy demand (MWh, percentage) in the Southeast, by end-user segment.

Florida, Georgia, and North Carolina lead the Southeast in commitments to renewable energy, with more than 7 million MWh in each state (Figure 3). Demand in these states is driven by the cities with renewable energy commitments. In Florida, this includes the cities of Orlando, St. Petersburg, and Sarasota. In Georgia, city demand is from Atlanta as well as Clarkston. Two of North Carolina's counties—Buncombe and Orange—have commitments, along with the city of Hillsborough, which is located in Orange County. We separate "community load" from "municipal load" in recognition that most cities do not control the source of electricity for their community. We estimate "municipal load" as 2% of each city's total electricity consumption.

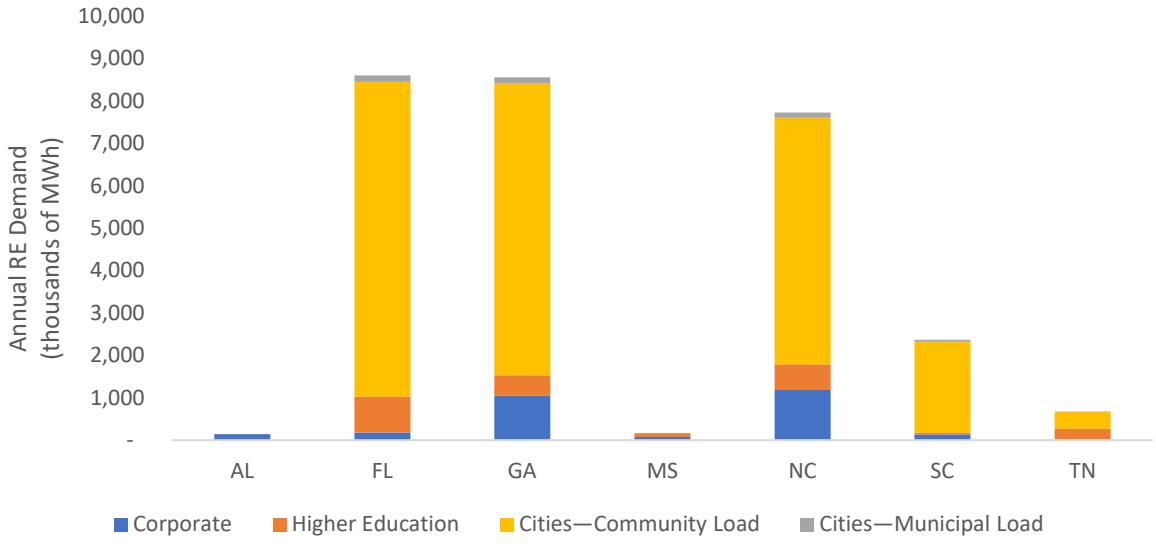

Figure 3. Renewable energy demand in the Southeast, by state and type of end user.

Although the largest volume of demand is concentrated in Florida, Georgia, and North Carolina, the states with the most sites interested in renewable procurement were Florida, North Carolina, and South Carolina (Table 1).

Table 1. Number of Sites Represented in Data Sample

	Corporate Sites	Higher Education Sites	Cities or Counties	Total Sites
AL	7	0	0	9
FL	243	7	3	261
GA	81	4	2	99
MS	9	1	0	14
NC	86	5	3	114
SC	95	2	1	105
TN	26	3	0	10
TOTAL	**547**	**22**	**9**	**612**

A big driver for renewable energy demand on a volumetric basis in the Southeast is commitments by cities and counties. Although cities and counties are making renewable energy commitments, unless the city operates a community choice aggregation or has a municipal utility, it does not have direct control over the electricity supply for its community. Other than Orlando, Florida—which has a municipal utility—none of the cities or counties in the study area have direct control over their electricity supply. Focusing only on consumption by the city's municipal facilities, instead of examining the entire community's electricity consumption, we identify 6.5 million MWh of load in the Southeast associated with a renewable energy goal (Figure 4). In this case, municipal demand is only 7% of the total (0.5 million MWh), corporate demand is more than half (51%, 3.3 million MWh), and higher-education demand is 42% (2.7 million MWh).

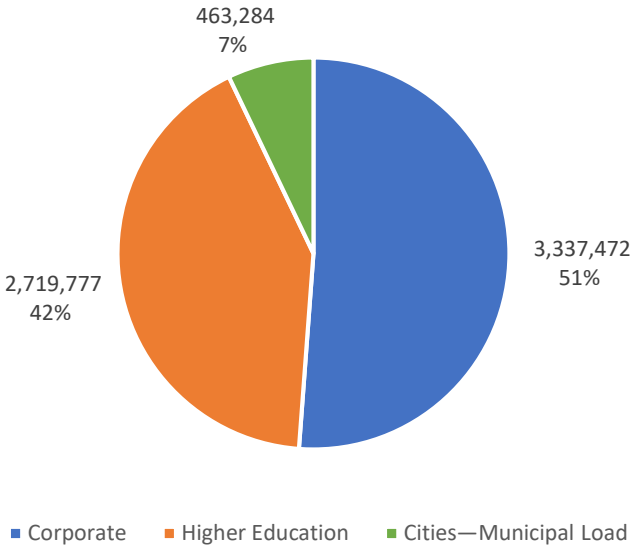

Figure 4. Renewable energy demand (MWh, percentage) in the Southeast, by end-user segment (municipal load only).

When considering only municipal load instead of the electricity consumption by the entire community, North Carolina, Georgia, and Florida still see the greatest levels of renewable energy demand (though in different order) (Figure 5). Alabama, Mississippi, South Carolina, and Tennessee have minimal demand compared to the other states.

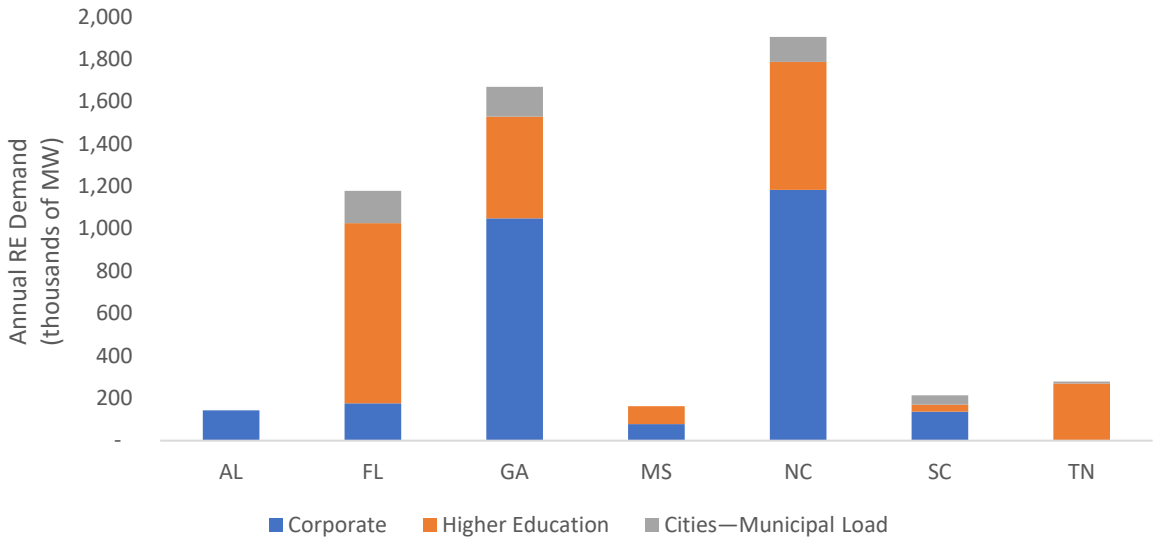

Figure 5. Renewable energy demand in the Southeast, by state and end-user segment (municipal load only).

3 Barriers to Procuring Off-Site Renewables in the Southeast

Although significant renewable energy demand exists in the Southeast, renewable energy pricing and procurement options can create barriers to procuring off-site renewables there. This section reviews two barriers to off-site corporate renewable purchasing in the Southeast: pricing and existing procurement options.

3.1 Renewable Energy Pricing

Historically, compared to the standard utility mix, the cost to corporates to purchase exclusively wind and solar has been greater in the Southeast than in other parts of the country. This is driven by two factors: (1) the comparatively low retail electricity rates in the Southeast, and (2) the less-favorable technical potential for some renewable resources, particularly for on-shore wind.

Average commercial retail prices in the Southeast, although trending upward generally, remain for the most part below the U.S. commercial average (Figure 6). The highest rates in the region are in Alabama, which tracks at or slightly more than the U.S. average. Rates in North Carolina consistently have been the lowest in the region.

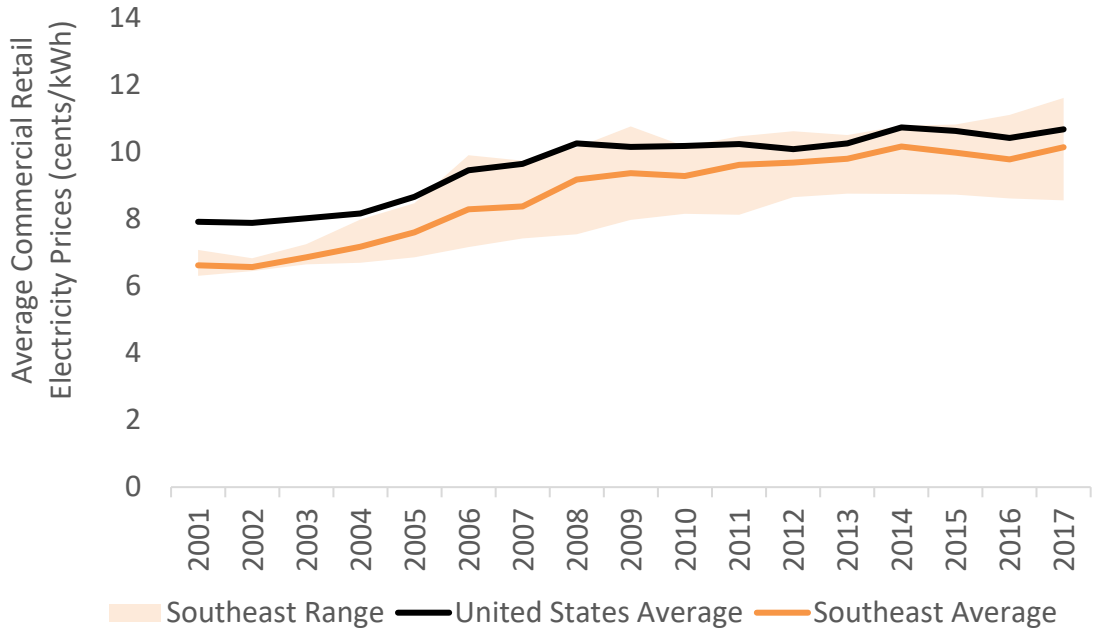

Figure 6. Average commercial retail prices by state, 2008–2017.
Source: Energy Information Administration 2018a

If retail rates are low, then—to provide a cost-effective purchase—the cost of renewable energy also must be low. Although some organizations, such as those with large amounts of available capital, may be willing to spend more than business-as-usual prices on a renewable energy purchase, most want some cost savings or cost parity compared to what they currently pay, at least over the term of the renewable energy contract. Even though renewable energy costs are declining nationally, the Southeast remains one of the highest-cost regions, according to Lazard's

solar and wind levelized costs of energy (LCOE) estimates (Lazard 2018). Cost in the Southeast ranges from $59/MWh to $228/MWh. (These regional variations are based only on the capacity factor in the region and do not consider other variables—such as transmission constraints—that could increase costs.) For wind, the Southeast is the highest LCOE region, at $47/MWh to $75/MWh.

3.2 Off-Site Renewable Procurement Options

Although some policies and practices enable off-site renewables in the Southeast, the support varies by state and utility (Table 2). In general, policy support is less common than it is in other regions of the country (see Heeter et al. 2017 for a review of policies on the national level)

Because customers in the Southeast, by and large, do not have competitive market access, they rely on their utility to facilitate off-site renewable options. The Southeast is dominated by large, investor-owned monopoly utilities (IOUs), with the exception of Tennessee—where the Tennessee Valley Authority is the dominant utility (categorized as "municipal") (Figure 7). In other southeast states, IOUs serve more than half of retail sales, cooperatives serve less than 20%, and municipals serve the remaining portion.

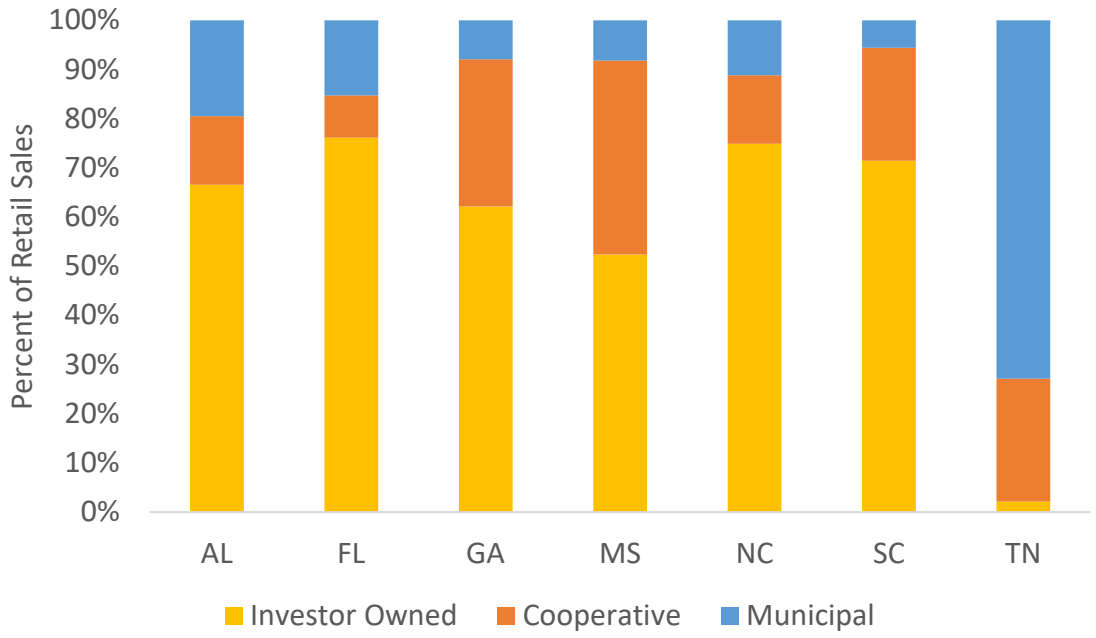

Figure 7. Retail sales to all customers, by utility type and state (2016).
Source: Energy Information Administration 2017

Some utilities in the Southeast are beginning to offer options for off-site procurement. The program driving the most off-site corporate procurement in the Southeast is the utility partnership, either via bilateral contracts or green tariff development. In theory, these programs could be developed in any of the Southeastern states. Four of the seven states in the study region have utilities that have either implemented a bilateral contract or developed a green tariff. Although the structure of these partnerships heavily influences whether corporates use the program, each of the four states with activity has seen renewable deployment under this pathway.

Community solar programs are the next most common, though typically are not at the scale needed by corporates or even large institutions such as colleges and local governments. North Carolina is the only state to have mandated community solar (for some utilities). Utilities, however, have voluntarily offered programs in Florida, Georgia, South Carolina, and Tennessee. Some of the programs developed have a relatively low maximum subscription size (e.g., 1 MW), and the value proposition (the subscription price minus the compensation for the subscription's production received) might not result in a net savings to the subscriber, making these programs less favorable to corporates and large institutions (assuming these entities are eligible).

Under PURPA, which allows a developer—including a corporate customer—to build a renewable energy project and be compensated for electricity generation at the utility's avoided cost rate, most states (aside from North Carolina) provide policies that only support short-term contracts and pay low avoided cost rates. In some cases, pricing is variable year to year, adding uncertainty to project financing (Table 2)

Finally, most states in the Southeast do not provide any competitive market access, thus preventing use of the most favorable option for large corporates—the off-site PPA. Georgia offers retail choice for new electricity customers with loads equal to or greater than 900 kW, but Georgia requires the customers to remain with the service provider. No competitive suppliers were supplying load in Georgia in 2016, perhaps due to this limitation.

Table 2. Summary of Policies to Support Off-Site Corporate Procurement in the Southeast

State	Utility Partnerships	Community Solar	PURPA	Competitive Market Access
Alabama	Yes	No supportive policies or utility projects	Policy in place; short contracts only	No
Mississippi	Possible, but none yet	No supportive policies or utility projects	Unknown/negotiated with utility	No*
Tennessee	Yes	No supportive policies but utility projects	Policy in place; 5-year contracts with rates set monthly	No*
South Carolina	Possible, but none yet	Supportive policy (municipalities, churches, and schools only) and utility projects	Policy in place; low avoided cost rates	No
Georgia	Yes	No supportive policies but utility projects	Policy in place; low avoided cost rates; term not specified	Yes
Florida	Possible, but none yet	No supportive policies but utility projects	Policy in place; contract term not specified	No
North Carolina	Yes	Enabling policy and utility projects	Supportive policy	No*

* Projects located in PJM Interconnection (PJM) territory located in North Carolina or Tennessee could sell into PJM and facilitate a financial power purchase agreement. Projects located in Midcontinent Independent System Operator, Inc. (MISO) territory in Mississippi could sell into MISO and facilitate a financial power purchase agreement.

4 Procurement Pathways

This section reviews pathways for corporate procurement of off-site renewables in the Southeast. The pathways considered are: utility partnerships (bilateral contracts and green tariffs), community solar, competitive market access (including off-site PPAs), and the development of qualifying facilities under PURPA. Each subsection includes a definition of the pathway, benefits and challenges of the pathway, its market status, a case study, and the market outlook. At the end of this section are examples of new or emerging pathways for corporate procurement of off-site renewables in the Southeast.

4.1 Utility Partnerships: Renewable Contracts

In the Southeast, corporate customers have had the most success leveraging utility partnerships (bilateral contracts and green tariffs) to support their renewable energy objectives. This section describes these utility partnerships benefits and challenges (Text Box 2) and their market status. Also included is a case study of Georgia Power's green tariff program and a discussion of the outlook for this pathway.

Text Box 2. Benefits and Challenges of Utility Partnerships

In states with fully regulated electricity markets, like those in the Southeast, corporate customers can pursue partnerships with their utility to procure additional renewable energy on the customer's behalf. Some utilities in the Southeast have received regulatory approval to procure utility-scale renewable energy projects for corporate customers in the form of green tariff programs or bilateral contracts. The key benefits and challenges to this approach are summarized in Table 3.

Table 3. Key Benefits and Challenges of Utility Partnerships

Benefits	Challenges
• Reduced project development and operation requirements • Flexible contract terms • Potentially lower electricity costs, if the cost of the RE is less than existing rates over the contract term • Opportunity for energy price hedge	• Limited availability in the southeast • Potentially high renewable product cost • Contract length and building lease terms may vary, which can limit corporate interest

4.1.1 Market Status

Utilities in Alabama, Georgia, North Carolina, and Tennessee have partnered with corporate customers to procure renewable energy. These partnerships have resulted in more than 405 MW of renewable capacity in the Southeast.[3] Georgia has the most capacity, followed by North Carolina, Alabama, and Tennessee (Figure 8). Of the 405 MW, green tariff programs have supported the most renewable deployment in the Southeast.

[3] At least four other contracts have been announced, but the capacity under those contracts has not been disclosed publicly. This includes two TVA contracts with Google, one Walton EMC contract with Facebook, and one Georgia Power contract with Switch (Judge 2015; Trubey 2017; Underwood 2018; Walton EMC 2018).

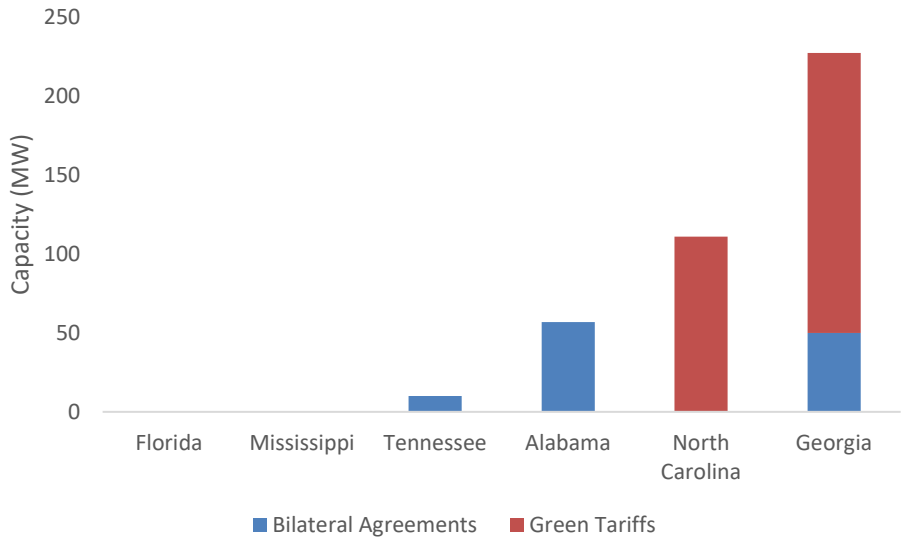

Figure 8. Contracted renewable energy capacity by state and utility partnership type.
Sources: Heeter et al. 2017, World Resources Institute 2018

Two utilities in the Southeast have adopted green tariff programs: Duke Energy in North Carolina and Georgia Power. Duke Energy has the most experience; these programs received approval for Duke's North Carolina Green Source Rider program in 2013 (NCUC 2013). The program closed in 2016 and resulted in 111 MW of photovoltaic (PV) procurement on behalf of Google and two other anonymous corporate customers (Tawney, Barua, and Bonugli 2018). In 2017, North Carolina passed HB 589, a bill that required Duke Energy to develop a successor program titled "Green Source Advantage."[4] Duke Energy has proposed the program, but it has not yet been approved by North Carolina regulators.

Georgia Power's program was launched in 2017 and the utility announced 177.5 MW of contracted PV capacity in 2018.[5] Google has procured 78.8 MW of this capacity (Demasi 2018), and the remaining capacity is divided between three off-takers (Johnson & Johnson, Target, and Walmart) (Georgia Power 2018a).

After these two programs, Alabama Power's bilateral contract with Walmart for 56.8 MW of PV accounts for the most capacity. Georgia Power's 50 MW biomass contract with Procter & Gamble and Volkswagen's 10 MW PV project with the Tennessee Valley Authority (TVA) round out contracted capacity. In summary, Google accounts for about one-third of contracted capacity across the Southeast (Figure 9).

[4] For bill language see: https://www.ncleg.net/Sessions/2017/Bills/House/PDF/H589v6.pdf (accessed August 18, 2018).
[5] We include Georgia Power's green tariff is "contracted" in 2017 in our figures, since that is when the program was launched, however, individual off-taker contracts were signed in 2018.

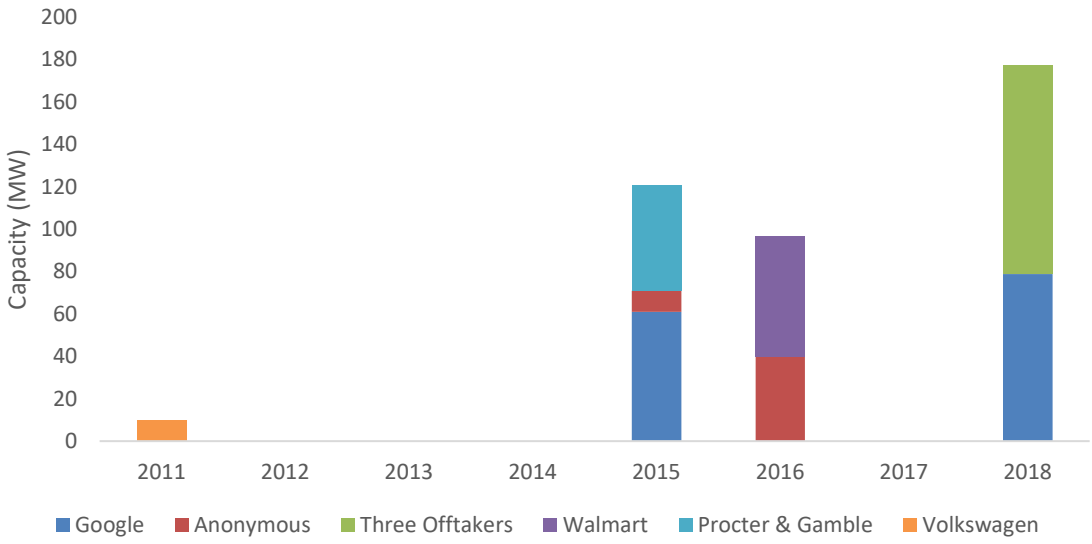

Figure 9. Annual utility partnership contracted capacity by company in the Southeast.
Source: Heeter et al. (2017) and World Resources Institute (2018)

Alabama Power, Duke Energy, and Georgia Power's programs have supported the most deployment, and each varies on several key program elements (Table 4). Though these programs differ in many respects, we focus on three key elements: Eligible participants, contract length, and program capacity limits.

- **Eligibility requirements** can limit which types of corporate customers can participate. Alabama Power allows any corporate customer to participate. Georgia Power limits access to those customers exceeding 3 MW of aggregate peak demand. Duke Energy's program, per statute, carves out capacity for certain customers including the University of North Carolina, and the remaining unreserved capacity is available to corporate customers that exceed 1 MW of demand or an aggregate of 5 MW across facilities.
- Each utility also offers different **contract lengths**. Alabama Power negotiates contract lengths on a case-by-case basis, and Duke Energy and Georgia Power offer a range of contract durations—from as few as 2 years to as many as 30 years.
- Each utility has differing **program capacity caps and expiration dates**. Alabama Power's program will close in 2021 with no more than 500 MW of contracted capacity. Georgia Power's program already has closed. If Duke Energy's program is approved, it would expire after either five years or after 600 MW of capacity has been contracted.

Table 4. Comparison of Southeastern Utility Partnerships

	Alabama Power	Duke Energy (Expired in 2016)	Duke Energy (As proposed in 2018)	Georgia Power
State	Alabama	North Carolina	North Carolina	Georgia
Program	Renewable Generation Certificate	Green Source Rider	Green Source Advantage	C&I Renewable Energy Development Initiative Program
Eligible Participants	Any interested corporate customer	Certain classes of large customers with new load since 2012	Universities, military installations, and other certain nonresidential customers	Annual Peak demand ≥ 3 MW
Potential Cost Savings	Each project must provide benefit to all ratepayers, potentially including financial contribution from customer	Credit capped at renewable energy cost, so no cost savings potential	Depends on long-term market rates	Depends on long-term market rates
Length of Contract	Negotiated	5 to 10 years	Negotiated depending on contract selected, standard offer is 20 years	At least 10 years
REC Treatment[a]	Negotiated	RECs owned by customer	RECs owned by customer	RECs owned by customer
Enrollment Period and Program Limits	Biennial RFP or unsolicited bid, capped at 500 MW through 2021, individual projects are limited to 80 MW	Three-year enrollment period from 2013 to 2016, capped at 1,000,000 MWh	Enrollment period expected to begin in 2019, capped at 600 MW, with carve-outs by customer type	Interested companies must have participated in Notice of Intent Process in 2017, capped at 200 MW
Early Exit Fees	Negotiated	Equal to the net present value of remaining PPA cost	Early termination fee included	Customer may not re-subscribe after early termination
Contracted Capacity	56.8 MW	111 MW	Enrollment to begin in 2019	177.5 MW

[a] REC treatment addresses which party owns the RECs from the contracted electricity supply. Renewable energy credit ownership is required to make a renewable energy claim; if an entity does not own the RECs, it cannot say—in marketing claims, greenhouse gas disclosures, or elsewhere—that it is using renewable energy.

4.1.2 Case Study: Georgia Power's Green Tariff

Georgia Power's green tariff is the newest in the region and has also supported the most contracted capacity. This case study details the history and structure of this program.

The green tariff took more than a year from the time it was ordered to be considered and when it was approved. On August 2, 2016, the Georgia Public Service Commission (GPSC) issued an order approving Georgia Power's 2016 Integrated Resource Plan (GPSC 2016).[6] In the order, the GPSC required Georgia Power to consider the development of a commercial and industrial (C&I) renewable energy program. The program was not to exceed 200 MW and required approval by the GPSC prior to implementation (Georgia Power 2017a). In the months following the order, Georgia Power worked with its corporate customers to understand their renewable energy objectives and to develop a program in line with the GPSC's requirements. Georgia Power filed the C&I Renewable Energy Development Initiative (REDI) Program for approval July 20, 2017. The GPSC approved the program August 9, 2017 (GSPC 2017).

Corporate customers were required to indicate their intention to participate, then the utility offered pricing for the corporate customer to evaluate prior to signing the contract. Eligible corporate customers (those with annual aggregate load exceeding 3 MW) were required to participate in a Notice of Intent process. The corporate customer had to pay a $5,000 participation fee, and identify its proposed subscription level in MW, contract length (from 10 to 30 years), and any other requirements related to its interest (Georgia Power 2017a).

After expressing interest, companies then were offered a price based on the costliest contract accepted in Georgia Power's REDI procurement for 510 MW of utility-supplied renewables. Though the exact price offered is confidential, GPSC staff have disclosed that the average cost of the REDI projects was approximately $0.036 per kilowatt-hour, and that all procured projects were below Georgia Power's avoided cost (Barber and Kaduk 2018). The two projects selected for the C&I REDI program included the 120-MW Dougherty County Solar Facility and the 57.5-MW Tanglewood Solar Facility. Prospective corporate customers could make a final decision on participation prior to signing the renewable contract. The signed contracts then were reviewed and approved by the GPSC (Georgia Power 2018b; GPSC 2018).

Google, Johnson & Johnson, Target, and Walmart have subscribed to the available capacity in the C&I REDI Program. Google is the only company to disclose its 78.8 MW share and praise the program suggesting that it "shows that providing a cost-competitive, fixed-price clean power option is not only good for the environment, it also makes business sense" (Demasi 2018).

Corporate interest in this program likely was associated with the low cost of the renewable product. Interviewees suggested that the low average cost allowed the utility to both justify the program under the stipulations of the GSPC and provide corporate customers a cheaper product. Interviewees noted that one reason why Georgia Power was able to minimize program costs was by bundling the C&I REDI procurement process with the already planned REDI procurement

[6] Georgia does not have a renewable portfolio standard. Renewable energy planning is conducted via the integrated resource planning process.

process. This allowed the utility to maximize resources already invested and which are associated with bid review and interconnection analysis, among other tasks.

If Georgia Power expands the green tariff from its 200 MW cap, it might benefit from coupling the tariff with future supply-driven procurement processes. This expansion would require additional GPSC approvals and Georgia Power has suggested that it might consider a new program but it has not offered a timeline or additional details (Georgia Power 2018c).

4.1.3 Outlook

Utility partnerships have resulted in about 471 MW of renewable procurement on behalf of corporate customers. This procurement pathway might be of interest to corporate customers, given that the structure of energy markets in the Southeast could require utility involvement in any corporate utility-scale procurement.

There is significant capacity still to be developed under existing program structures. Alabama Power (426 MW) and Duke Energy (600 MW) have about 1 GW of available capacity within their programs. In addition to these utilities, cooperatives in the Southeast also are exploring options with corporate customers (NRECA 2018b). This represents a significant opportunity for companies located in these utility service territories.

Corporates looking for a program outside of Alabama Power and Duke Energy's territory will need to develop one with their utility. This presents challenges, as not all utilities will be interested in partnering. Some utilities in the Southeast do not have experience with this type of corporate procurement, which could add delay and costs that a corporate customer would have to absorb. If utilities are interested in developing a green tariff, they might consider a similar program to that of Georgia Power which has supported the most deployment across the Southeast.

Text Box 3. Military Partnerships

Some utilities across the Southeast have partnered with the U.S. Department of Defense (DOD) to expand renewable energy procurement. These projects differ from green tariffs and bilateral contracts in that the DOD site is providing land for a renewable generator but not contracting for the renewable energy. These projects allow DOD sites to receive other benefits—such as enhanced grid resiliency—and provide a location for utilities to site new renewable energy projects. A variation of this pathway might be of interest for corporate customers with significant land availability.

Through 2017, 421 MW of renewable capacity has been deployed at military installations across the Southeast all from utility-scale PV.[7] Most of this capacity was contracted in 2014 and 2015 and has begun to taper off in recent years (*see* Figure 10). Overall, Georgia (176 MW) has the most capacity, followed by Florida (147 MW), and Tennessee (53 MW).

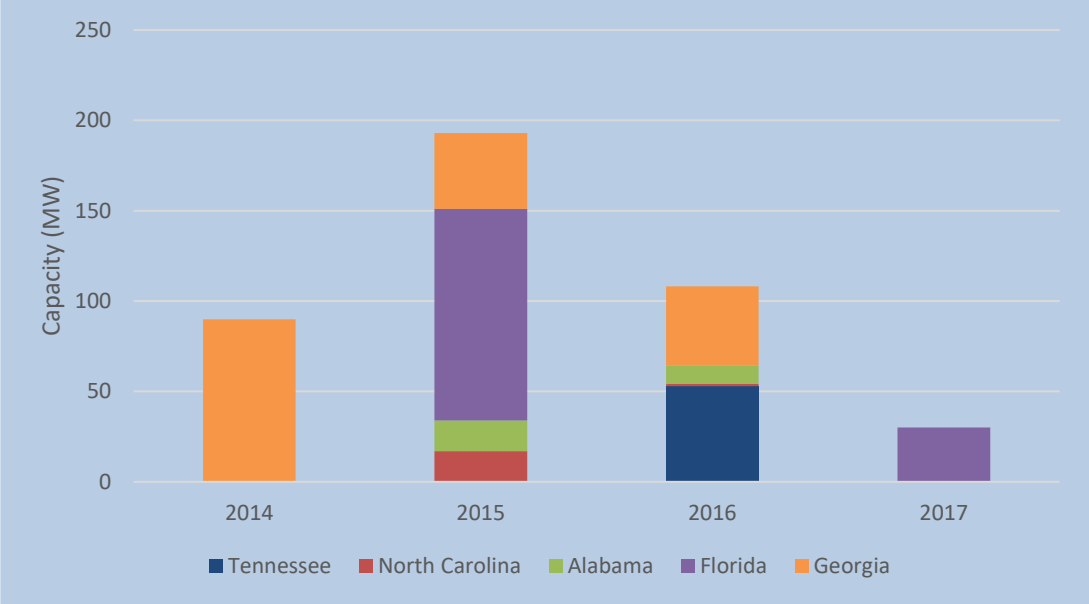

Figure 10. Contracted renewable capacity at Southeast military installations by state.

Though the U.S. Army and the U.S. Navy both have six solar projects located on government land, the navy's capacity nearly doubles that of the Army—273 MW of capacity versus 120 MW (*see* Table 5). The U.S. Air Force trails with 30 MW of capacity sited at the Eglin Air Force Base. This capacity is all from PV projects, and the U.S. Army Redstone Arsenal and the U.S. Army Sunny Point projects also incorporate battery storage.

Table 5. Military Partnerships by State, Project Host, and Year

State	Project Host	Utility	Project Location	Capacity and Technology	Estimated Contract Year
Alabama	U.S. Army	TVA (Behind-the-meter project)	Redstone Arsenal	10 MW PV and 1 MW / 2MWh battery storage	2016
Alabama	U.S. Army	Alabama Power	Anniston Army Depot	7 MW PV	2015
Alabama	U.S. Army	Alabama Power	Fort Rucker	10 MW PV	2015

Florida	U.S. Air Force	Gulf Power	Eglin Air Force Base	30 MW PV	2015
Florida	U.S. Navy	Gulf Power	Pensacola Saufley Field	65 MW PV	2015
Florida	U.S. Navy	Gulf Power	Whiting Field	52 MW PV	2015
Georgia	U.S. Army	Georgia Power	Fort Benning	30 MW PV	2014
Georgia	U.S. Army	Georgia Power	Fort Gordon	30 MW PV	2014
Georgia	U.S. Army	Georgia Power	Fort Stewart	30 MW PV	2014
Georgia	U.S. Navy	Georgia Power	Albany	44 MW PV	2016
Georgia	U.S. Navy	Georgia Power	Kings Bay	42 MW PV	2015
North Carolina	U.S. Army	Brunswick EMC	Sunny Point	1.2 MW PV and 840 kWh battery storage	2016
North Carolina	U.S. Navy	Duke Energy (Progress)	Camp Lejeune	17 MW PV	2015
Tennessee	U.S. Navy	TVA	Mid-South	53 MW PV	2016

Sources: Griffin (2015); Ahlen et al. (2018); TVA (2016); U.S. Air Force (2017); and U.S. Army (2018a)

Though these projects are located on military-owned land, in all but one of the cases (Redstone Arsenal), the power is transmitted back to the grid.[8] Each military base typically does not own the RECs associated with that power generation. Rather, the power is used to serve all utility customers and the utility retains the RECs. Utilities can keep the RECs and use them to make renewable energy claims, sell the RECs to specific customers, or sell the RECs to third parties for the benefit of all ratepayers. In exchange for siting these projects on military land, the military receives increased local resiliency in the event of a broader grid outage.

Other corporate customers might consider a similar partnership with a utility. These customers could pursue a deal where the corporate customer receives a similar reliability option as is done for the military customers, or the customer might consider leasing the land in exchange for a portion of the RECs from the project. This approach might not be for all corporate customers, given the significant land-holding requirements.

4.2 Community Solar

This section describes community solar benefits and challenges to corporate participation (*see* Text Box 4), and overall deployment in the Southeast. Nearly 60% of community solar deployment in the Southeast has been completed by cooperative utilities. This section includes a

[7] Florida Power & Light also has sited a 10-MW facility at the U.S. National Aeronautics and Space Administration's Kennedy Space Center facility (Beutel and Anderson 2010).
[8] The Redstone Arsenal project is behind the meter (U.S. Army 2018b; SunPower 2018).

profile of the cooperative utility community solar market, and concludes with the market outlook for this pathway.

Text Box 4. Benefits and Challenges of Community Solar

Community solar programs allow eligible utility customers to subscribe to the generation of a solar project (typically < 1 to 5 MW). Eligible ratepayers, typically businesses and residential customers, can enter into a contract with their utility or a third-party developer to subscribe to a share of the solar project. The key benefits and challenges of this approach are summarized in Table 6.

Table 6. Key Benefits and Challenges of Community Solar

Benefits	Challenges
• Projects can be located off-site, but close to the point of consumption • Project branding and community involvement opportunities may exist • Projects may provide access to more capacity than might be available on-site • Projects may offer long-term electricity price certainty	• Corporate subscription and capacity caps may apply, potentially requiring a corporate customer to participate in many projects to achieve renewable goals • REC ownership is not offered in all community solar projects, without RECs the subscription cannot be applied to renewable goals • Potentially higher renewable product costs than alternatives

4.2.1 Market Status

Through 2017, five of the seven Southeastern states have operating community solar programs (Cook and Shah 2018). Only one state—North Carolina—mandates the provision of community solar for certain utilities; in the other five states utilities are offering programs voluntarily. There are 57 community solar projects located in the Southeast with a cumulative capacity of 101 MW. Georgia has the most community solar capacity, followed by Florida and South Carolina (Figure 11) and community solar deployment saw significant growth in 2016 and 2017.

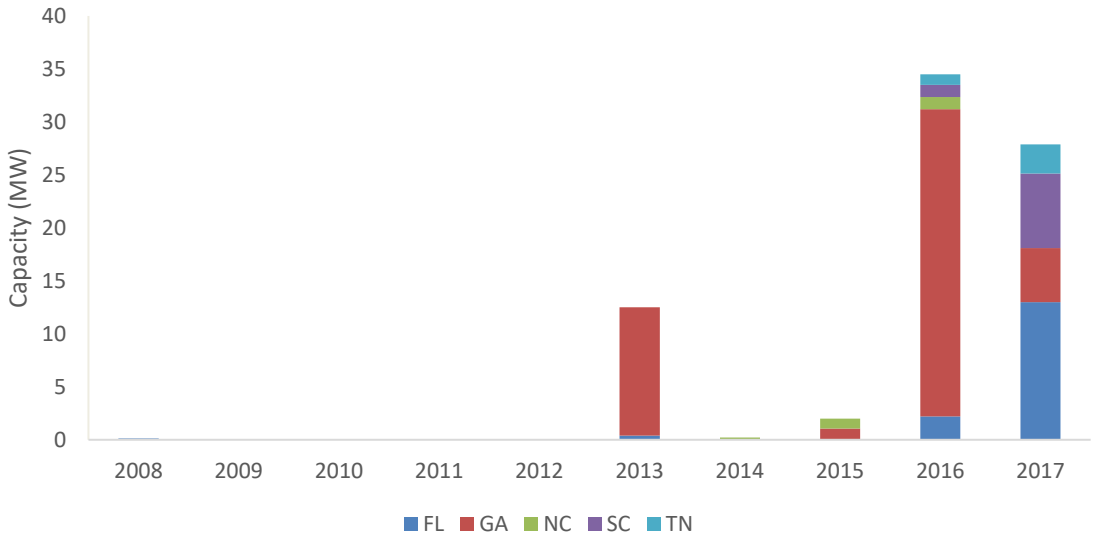

Figure 11. Community solar capacity installed by year and state.
Source: O'Shaughnessy et al. (2017) and NRECA (2018a)

Note: There are an additional 23 MW of community solar in various cooperative utilities in Georgia; data on when these projects were installed was not available.

It is unclear how many corporates participate in community solar programs, and some programs prohibit or limit the share or size of corporate subscriptions. Table 7 summarizes a set of community solar programs across the Southeast to illustrate the variation in program design and corporate access. Community solar programs developed by electric cooperatives also are highlighted in section 4.3.2. We identified three key factors important for corporate participation in community solar: access, cost, and REC treatment.

Table 7. Comparison of Selected Community Solar Programs Across the Southeast

Utility (State)	Duke Energy (NC)	Georgia Power	City of Tallahassee (FL)	SCE&G	TVA (AL, GA, MS, NC, and TN)
Year	2019[a]	2017	2017	2017	2015[b]
Program Cap	40 MW[c]	3 MW	No specified cap[d]	16 MW	10 MW[e]
Subscribed Capacity	In development	Not disclosed	20 MW	16 MW	Varies by project [f]
Project Size Cap	5 MW	≤ 2 MW	No specified cap	Minimum size of 1 MW; maximum of 10 MW	Minimum size of 50 kW; maximum size of 2 MW
Corporate Eligibility	Yes	No	Yes [g]	Municipalities, churches, and schools	Can vary by project
Maximum Subscription Size	≤ 2 MW	≤ 10 kW	Up to 100% of demand	≤ 1 MW	Can vary by project
Subscriber Compensa-tion	Estimated $500 fee, with bill credit of $0.05/kWh for 20-year contract	$24.99/kW per month and bill credit of $0.03/kWh in 2018, and escalating thereafter[h]	Subscriber pays $0.05/kWh for life of 20-year contract[i]	Monthly fee of $0.20/kW and bill credit of $0.01/kWh[j]	Can vary by project
REC Treatment	RECs owned by customer	RECs owned by customer	REC treatment is unclear	Utility retains ownership of RECs	Can vary by project

[a] This is the proposed effective date of Duke's proposed program that has not yet been approved by the NCUC.

[b] TVA launched a pilot community solar program in 2014. In 2016 and 2017, TVA offered its Distributed Solar Solutions program, for which community solar projects were eligible. These projects must compete against other

eligible distributed solar projects. The information listed here is in reference to the Distributed Solar Solutions program offered in 2017.

[c] The 40-MW cap is spread equally across Duke Energy Carolinas and Progress.

[d] The city has not set a cap, but currently plans to build another 40-MW project that will be available for individual subscriptions (Faris 2018).

[e] Community solar projects must compete with other projects under this 10-MW cap.

[f] TVA has allocated all 10 MW to 7 projects, but subscribed capacity within each project varies.

[g] Small- and medium-sized commercial electric utility customers are eligible, large industrial customers might be ineligible.

[h] For more information on rates see Georgia Power 2017b.

[i] City of Tallahassee customers currently pay $0.035/kWh (City of Tallahassee 2018).

[j] Up-front fee is $2.25/watt and bill credit is for first 20 years of contract; for subsequent 15 years, subscriber can receive credit for avoided cost of generation at that time.

The structure of North Carolina's program, including the high program and project cap, might offer eligible corporate customers the most access to community solar subscriptions. If fully built out, Duke (Carolinas and Progress) could construct 40 MW of community solar projects. Individual, eligible corporate customers can subscribe to 2 MW of a project, assuming the project is the maximum size of 5 MW (*see* Table 7).[9] Corporate eligibility varies considerably among programs in other states. In the South Carolina Electric & Gas Company (SCE&G) program, only certain customer types can participate, such as municipal governments. The City of Tallahassee determines corporate eligibility by customer size (small and mid-scale commercial customers are eligible). For TVA, corporate eligibility varies based on the distribution utility's program rules, and corporate customers are prohibited from participating in Georgia Power's program.

Access to the program is not sufficient to drive corporate subscriptions in community solar; the cost of participation is another key factor (Cook and Shah 2018). Most of the programs surveyed apply monthly fees and credit PV generation at the avoided cost of electricity as opposed to the retail rate. Compensation at the retail rate coupled with low monthly fees offers more subscription value than the avoided cost rate, which might be more attractive to interested corporate subscribers.

Similarly, REC treatment can influence corporate interest. Many corporations want to own the RECs associated with their subscriptions to meet their corporate renewable energy goals. In most programs in the Southeast, the subscriber owns the RECs. In some cases, the utility retains the RECs (e.g., SCE&G) or ownership is unclear (e.g., TVA and City of Tallahassee). In the case of TVA and for City of Tallahassee, corporate customers must pursue other options to achieve their renewable energy goals.

[9] North Carolina's program was mandated in HB 589, see the bill language here: https://www.ncleg.net/Sessions/2017/Bills/House/PDF/H589v6.pdf. The program has not yet been approved by the NCUC. For more information on this regulatory proceeding, see Docket E-7, Sub 1168 here: http://starw1.ncuc.net/NCUC/page/docket-docs/PSC/DocketDetails.aspx?DocketId=f14c8254-25b7-4feb-a2f5-24e6f8264b2a.

4.2.2 Case Study: Corporate Access to Cooperative Utility Community Solar Programs

Though investor-owned utilities have adopted community solar programs in recent years, cooperative utilities accounted for about two-thirds of Southeast community solar capacity through 2017. This section tracks the history of this market and examines cooperative utility community solar programs and corporate access.

Nationwide, the National Rural Electric Cooperative Association (NRECA) tracks 132 MW of community solar projects across electric cooperatives and nearly half of this capacity (59 MW) is in the Southeast (NRECA 2018a).[10] The capacity by cooperatives in the Southeast is distributed across 57 projects located in 5 states, with Georgia leading at 50 MW (Figure 12).

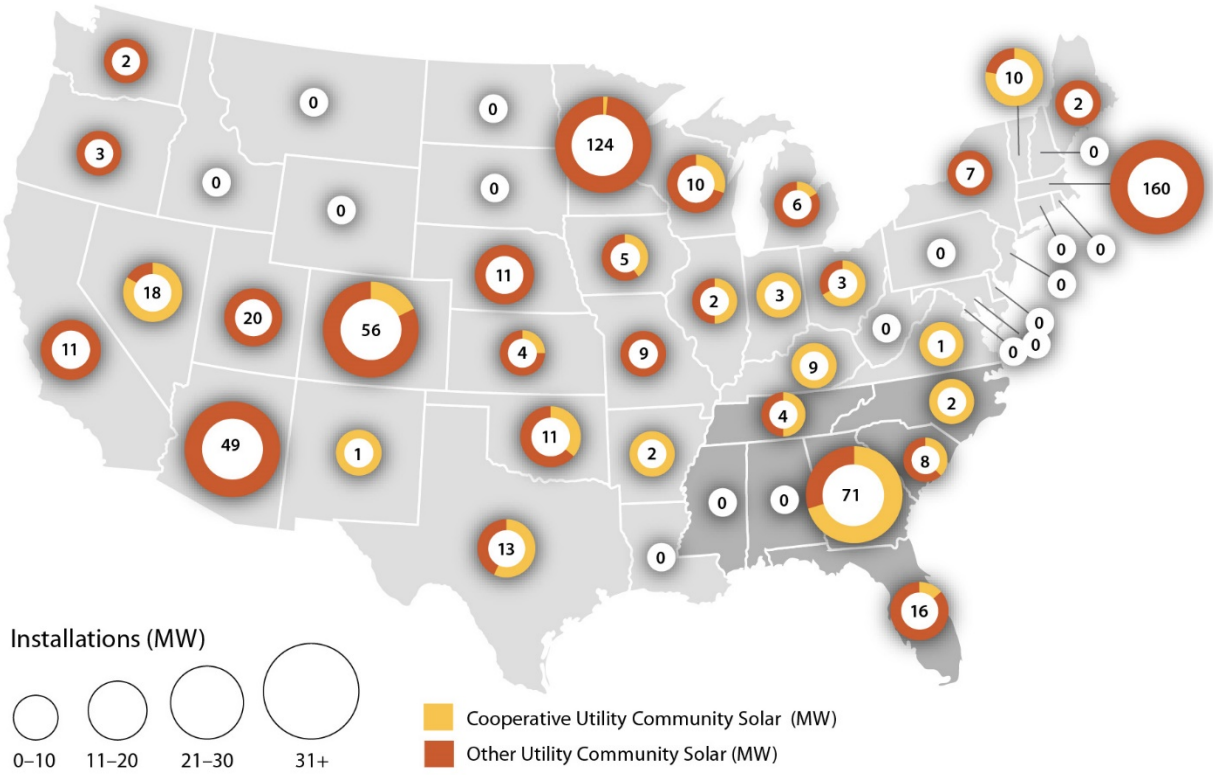

Figure 12. Cooperative utility community solar deployment as compared to other utilities in the Southeast. *Source: O'Shaughnessy et al. (2017) and NRECA (2018a)*

Interviewees suggested that the main reason cooperative utilities have launched community solar programs is the requests from members for more renewable energy options. For example, Cobb Electric Membership Corporation's 7.7 MW Azalea community solar project is one of the largest

[10] The focus here is on subscription-based community solar. Cooperative electricity consumers are member-owners of the cooperative, thus any solar project constructed on behalf of all customers could be considered a form of shared solar. Excluding subscription-based projects, southeastern cooperatives have deployed 313 MW of "cooperative shared solar," with most of the deployment in Georgia (192 MW) and Mississippi (59 MW).

cooperative projects across the Southeast and was constructed to diversify the cooperative's energy mix and provide members more direct access to renewable energy (Cobb EMC 2018).

Not all cooperative customers can participate in community solar projects, particularly corporate members. In many cases only residential customers are eligible, and in some cases all members—including corporate customers—are eligible to participate. In the Southeast, corporate customers are ineligible for 50% of cooperative utility community solar projects, as compared to 31% that allow any member to participate, and 19% for which eligibility rules are unclear (*see* Figure 13).

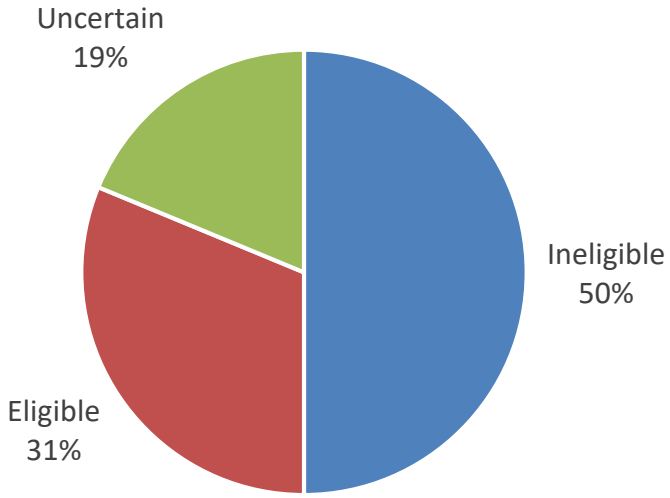

Figure 13. Corporate customer eligibility in cooperative utility community solar projects in the Southeast.

Though certain corporate customers can participate in cooperative utility community solar projects, subscriptions can be limited to very small shares. The average project size for this subset of community solar projects is 420 kW, and most utilities limit subscriptions to 5 kW or less. For about half of these projects the incumbent utility also owns the RECs; in the remaining cases the ownership is unclear.

As all utility types—including cooperatives—gain experience with community solar programs, interviewees suggested that they could expand their offerings. This could include allowing corporate eligibility, increasing subscription sizes, and building larger projects. Southeastern utilities also could consider innovative solar partnerships with corporate customers like those adopted in other regions of the country. Organic Valley, for example, partnered with municipal utilities in Iowa, Minnesota, and Wisconsin to support the development of 29 MW of new community-scale PV projects (Guevara-Stone 2017). Organic Valley agreed to purchase the RECs associated with 12 MW of the projects for the 25-year life of the contract. In turn, the member utilities purchase the electricity to serve all their members, including Organic Valley (Organic Valley 2017; Guevara-Stone 2017). Organic Valley's role in the project—including its REC payments—reduced the overall cost of the contract, resulting in lower-cost electricity for all ratepayers. Utility interest in this and other innovative approaches varies based on member

interest and other local considerations—which will shape this segment of the community solar market going forward.

4.2.3 Outlook

Community solar programs have expanded in recent years and corporate customers can participate in at least some of these programs. North Carolina might represent the largest community solar market with 40 MW of mandated community solar, but corporate interest in this and other state markets will be contingent upon program structure and other factors, such as price and REC treatment.

Corporate customers also will have to weigh this option in relation to other potentially lower-cost procurement options, such as utility partnerships. For smaller corporate customers, community solar subscription sizes might be sufficient to achieve renewable targets, but this is not the case for many mid- and large-size customers. In the Southeast, for example, a few large corporate customers have procured about 400 MW of renewable energy via green tariffs, and the entire community solar market in the Southeast is about 100 MW. As a result, community solar could be a component of corporate renewable procurement strategy, but it is unlikely that a large corporate customer can achieve its goals through this pathway alone.

4.3 Competitive Market Access

In some states, corporations can participate in competitive markets to procure renewable energy by joining retail choice programs or pursuing an off-site PPA. Both options can help corporations meet their renewable objectives, but these approaches, especially retail choice, rarely are available across the Southeast. This section summarizes each distinct approach along with the benefits and challenges of the more prevalent off-site PPA (Text Box 5). This discussion is followed with an assessment of the off-site PPA market status. It concludes with a case study of the Conetoe II Solar project in North Carolina, and an outlook for competitive market access in the Southeast.

Text Box 5. Considerations for Retail Choice and Benefits and Challenges of Off-Site Renewable PPAs

Retail choice programs allow customers to select their energy supplier—either a competitive supplier or the incumbent electric utility. By selecting a competitive energy supplier, customers might be able to negotiate the terms of the electricity contract including renewable energy content.

Georgia is the only state in the Southeast where retail choice is available.[11] In contrast to some other states that offer retail choice to all customer classes (i.e., residential and business customers), Georgia's program is limited to new large corporate customers with loads that equal or exceed 900 kW (GPSC n.d.). These new facilities have a one-time opportunity to pursue retail choice. Once the facility selects a supplier, it no longer can pursue other service providers. This structure imposes risk on the corporation related to electricity rate volatility, which could help explain why no Georgia load was served by competitive suppliers in 2016 (EIA 2017). Should these programs become more available in the Southeast, corporate customers might wish to review the benefits and challenges associated with this pathway as articulated by Heeter et al. (2017).

Off-site renewable PPAs allow a corporate purchaser to contract with a project developer to procure renewable generation. A PPA can be either physical or financial. In a physical PPA, the corporate purchaser contracts with a developer to deliver power to a facility. In a financial—or virtual—PPA, the company buys rights to the power, but it is not delivered. Rather, the power is resold on the wholesale market. Financial PPAs are the most common, given that this structure offers flexibility to the corporate purchaser in siting projects.

Given retail choice is limited in the southeast, only the key benefits and challenges of off-site PPAs are summarized in Table 8.

Table 8. Key Benefits and Challenges of Off-site PPAs

Benefits	Challenges
• Reduced project development and operation requirements • Potential long-term financial return as compared to market rates • Opportunity for energy price hedge	• Uncertain and volatile electricity rates can influence the long-term financial value of the investment • Higher risk of imperfect energy price hedge, given facilities may be sited far from load. • Typical 20-year, or longer, contract terms may not align with building lease terms or facility long-term plans, which can limit corporate interest

4.3.1 Market Status

Any corporate customer in the Southeast could pursue a PPA with a project sited in a regional transmission organization (RTO) or independent system operator (ISO) footprint. A key benefit of PPAs is electricity price hedging, however, and the risk of an imperfect hedge is significant when a project is located far from load and in a different market (Heeter et al. 2017). For the Southeast, only portions of North Carolina, Mississippi, and Tennessee are served by RTOs. For example, Entergy Mississippi participates in the Midcontinent Independent System Operator (MISO) market, and Dominion Energy's territory in North Carolina and American Electric Power's territory in Tennessee participate in PJM Interconnection, Inc. (PJM). These utility service territories cover about 25% of C&I load in Mississippi, 4% of load in North Carolina,

[11] In comparison, 20 states outside the Southeast offer at least some form of retail choice (Heeter, Cook, and Bird 2017).

and 2% of load in Tennessee.[12] Companies located in these service territories could be best positioned to pursue an off-site PPA, provided their rate structure is aligned with wholesale rates. Facilities in other states or utility service territories might consider this option, but price hedging risks might be significant.

To date, corporations have procured approximately 171 MW of off-site PPA capacity located in the Southeast, all derived from PV projects in North Carolina (Figure 14). In most cases, an individual company contracted with a developer for the project. One project, however, is an aggregate PPA: The Massachusetts Institute of Technology (MIT) project is unique, given the university partnered with the Boston Medical Center Corporation and the Post Office Square Redevelopment Corporation to aggregate its load for one larger project (Heeter et al. 2017).

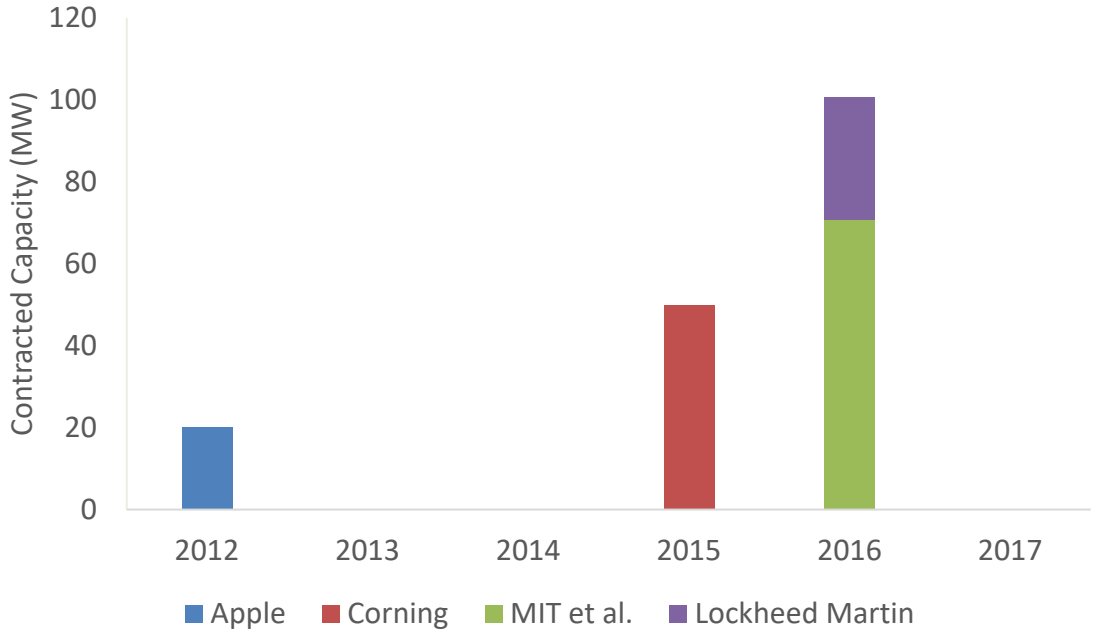

Figure 14. Offsite financial PPAs contracted in North Carolina by year and off-taker.
Source: Heeter et al. 2017

Although corporations have procured renewable generation in North Carolina, about half of the capacity serves out-of-state load, including the MIT project.[13] Half of Lockheed Martin's project also is applied to load in the PJM footprint, although it is unclear what facilities are associated with the remaining capacity (Labrador 2016). Corning Inc. also has not specified the facilities it associates with its contract, though it does have operations in North Carolina (Corning Inc.

[12] These estimates are based on EIA (2017) data for North Carolina, Mississippi, and Tennessee. There are a variety of other utilities that participate in RTOs that serve comparatively less C&I load. In both North Carolina and Tennessee, the impact on C&I load is negligible. In the case of Mississippi, incorporating these other utility service territories increases the percentage of C&I load served by RTOs to 38%. A full listing of these utilities can be found in EIA (2017).

[13] The 208-MW Amazon Wind Farm U.S. East project also is located in North Carolina, but it was procured via Dominion Energy's Green tariff program offered in Virginia for load in that state. For more information on this project see Bird et al. 2017.

2015). Lastly, Apple's contract is used for its data center near Maiden, North Carolina. In summary, 50% of PPA capacity located in North Carolina is applied to out-of-state load, 38% is unclear, and 12% is applied to in-state facilities.

4.3.2 Case Study: Conetoe II Solar Project

The Conetoe II Solar Project (Conetoe II) has two separate PPAs, one with Lockheed Martin and one with Corning Inc. Both companies have load dispersed across the United States, and Lockheed Martin applies its financial PPA to multiple locations in different utility-service territories. This approach might be of interest to companies seeking to pursue the benefits of a PPA for facilities that are in the Southeast. This case study outlines the reasons that these two corporations pursued their PPAs and the structure of those deals, with an emphasis on Lockheed Martin's approach.

Corning Inc. and Lockheed Martin both noted their interest in a renewable PPA on environmental and economic grounds. Both Lockheed Martin and Corning Inc. have commitments to improve their environmental stewardship and this project helps them achieve that objective. These companies also were interested in the long-term energy-price hedge value offered by their PPA (Labrador 2016; Corning Inc. 2015).

Though they had these common goals the companies pursued their deals separately, both utilizing a renewable energy procurement consultant, CustomerFirst Renewables. In December 2015, Corning Inc. signed a 25-year fixed-price PPA with Duke Energy Renewables for 50 MW of the 80 MW facility. In February 2016, Lockheed Martin signed a 17-year fixed-price contract with Duke Energy Renewables for the remaining 30 MW (Labrador 2016). The power is sold into the PJM Interconnection market and the corporations then are compensated whenever the price received for the PV generation exceeds the fixed PPA price over the life of the contract, thereby allowing the project to hedge against long-term electricity rate volatility. Environmental attributes were also important to both corporations. Corning receives RECs from the project and Lockheed Martin receives replacement RECs (RECs sourced from another renewable energy project).

Lockheed Martin's contract is unique, stemming from the company's internal approval process along with the participation of load outside PJM. Lockheed Martin has a decentralized structure, requiring the company to seek approval from its internal business organizations and specific locations before making energy-procurement decisions on their behalf (Labrador 2016). This could increase the time and resources needed to secure a PPA than would be the case in a more top-down structure. Half of Lockheed Martin's contracted capacity also is associated with locations outside PJM (Labrador 2016). This approach increases the complexity of the long-term price-hedging analysis, because the company must estimate future prices across multiple markets.

Lockheed Martin retained the ability to internally allocate the project's generation to different business units or facilities without impacting the contract. This allows Lockheed Martin to maximize its price-hedging opportunity as market rates evolve. Ultimately, other companies

located in the Southeast might consider a similar PPA structure to that of Lockheed Martin to achieve their own renewable objectives and to manage associated risk.[14]

4.3.3 Outlook

The lack of corporate participation in the two competitive market pathways (retail choice and off-site PPAs) is a function of the limited access Southeastern companies have to these options. Retail choice only is available to some large, new corporate customers in Georgia. In comparison, companies have more direct access to wholesale markets in parts of three states—Mississippi, North Carolina, and Tennessee.

Expanding corporate access to retail choice would require new legislation to introduce competition into electricity markets[15]—or a utility could seek approval to join these markets voluntarily. Entergy Mississippi joined MISO in 2013 and could serve as a model for other Southeastern utilities interested in taking this approach (RTO Insider 2013). Even so, no state or utility is actively considering these options, suggesting that the Southeast policy environment is likely to remain stable in the near-term. Without policy change, corporate access to these pathways will remain limited. In this environment, the approach taken by Lockheed Martin could be of interest to other companies with Southeastern load. This approach, however, introduces the significant risk associated with locating projects far from load.

4.4 Public Utility Regulatory Policies Act Qualifying Facilities

A few corporate customers in the Southeast have used PURPA to support their renewable procurement objectives. This section describes the benefits and challenges of developing PURPA qualifying facilities to achieve corporate renewable objectives (*see* Text Box 6) and overall deployment in the Southeast. North Carolina represents the largest PURPA market across the region. This section profiles North Carolina's market before concluding with the outlook for following the PURPA pathway.

[14] First Third Bank's virtual PPA for an 80-MW solar project in North Carolina also might be of interest to corporations with load in both regulated and wholesale markets (Fifth Third Bank 2018).
[15] Nevada is actively considering reforms to its electricity market, which might be of interest to Southeastern states (Associated Press 2016).

Text Box 6. Benefits and Challenges of PURPA Qualifying Facilities

The Public Utility Regulatory Policy Act of 1978 (PURPA) requires electric utilities to purchase power from certain projects termed, "qualifying facilities."[16] There are two general types of qualifying facilities: Small power producers and cogeneration facilities. To qualify as a small power producer, a project must be 80 MW or less and must generate electricity from renewable energy (such as PV). To qualify as a cogeneration facility, the project must generate electricity in tandem with another form of energy—typically thermal. The key benefits and challenges of developing a renewable PURPA qualifying facility are listed in Table 9.

Table 9. Key Benefits and Challenges of PURPA Qualifying Facilities

Benefits	Challenges
• This option is widely available in the Southeast • A corporation can serve as either the project developer or contract with a third-party to develop and operate the project	• Corporations may lack the relevant expertise to develop a renewable project and contracting with a third-party can add costs and complexity • There is limited transparency into how PURPA rates are determined, which makes it difficult to understand potential benefits of this approach as compared to others • Many PURPA programs in the southeast do not offer fixed long-term rates for qualifying facilities, subjecting the developer to long-term financial risk • Developing a PURPA project can require extensive negotiations with the utility that a corporation may not be willing to pursue absent certainty on associated rates

4.4.1 Market Status

Through 2017, there were 4.4 GW of PURPA capacity operating across 624 facilities in the Southeast (Figure 16). Only about 60 MW of that capacity, however, is owned by the corporations themselves.

Of total PURPA capacity in the Southeast, PV accounts for 70% of this capacity, followed by biomass, and landfill gas. The majority of Southeast PURPA capacity is located in North Carolina (59%) followed by Florida and Georgia. Of PURPA PV projects, after North Carolina, Georgia has the most PV capacity deployed and it is spread over far fewer projects. In North Carolina, PV facilities have an average capacity of 5.7 MW; in Georgia the average size is 23 MW. Outside of these two states, PV deployment has been comparatively low, particularly in Alabama and Florida. In addition to this existing capacity, 1.2 GW of PV—virtually all in North Carolina—is in various stages of development (Figure 15).[17]

[16] For bill language see https://www.gpo.gov/fdsys/pkg/STATUTE-92/pdf/STATUTE-92-Pg3117.pdf (accessed August 20, 2018).

[17] Figure 16 relies on the final release of 2016 data from Form EIA 860. The PURPA projects in this list that might have come online after release of this dataset were cross referenced with data from SNL Financial Inc to confirm operating status in 2017. This dataset might not include all the PURPA projects that are planned or have come online through 2017.

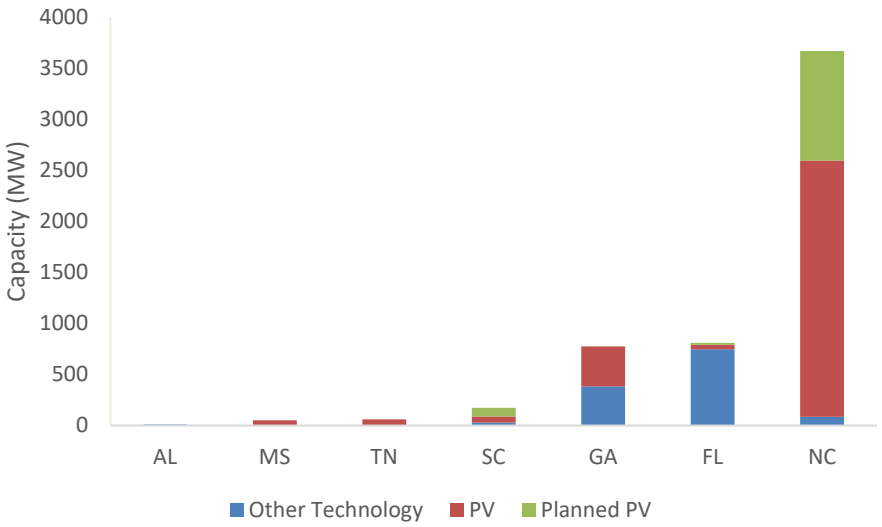

Figure 15. Small power-producer qualifying facility capacity by state and technology through 2016. *Source: Energy Information Administration (2018b) and SNL Financial Inc. (2018)*

Corporations directly own 7 of the 624 PURPA facilities, which are all located in North Carolina. Apple leads all other corporate owners in terms of capacity (46.5 MW), followed by Shoe Show and United Therapeutics (Figure 16). Of Apple's three PURPA facilities, two are utility-scale PV projects (20 MW and 21 MW) near and adjacent to its Maiden, North Carolina, data center (Elmer-Dewitt 2012). In comparison, Shoe Show and United Therapeutics have built 5 MW and 4 MW rooftop systems at their corporate headquarters respectively (Schneider Electric 2014; DFR Construction 2009). QVC has constructed a 3.5-MW ground-mounted system at its Rocky Mount Distribution Center and Bernhardt Furniture Company has installed a 1-MW rooftop PV project at one of its production facilities (Russell 2016; QVC Inc. 2013).

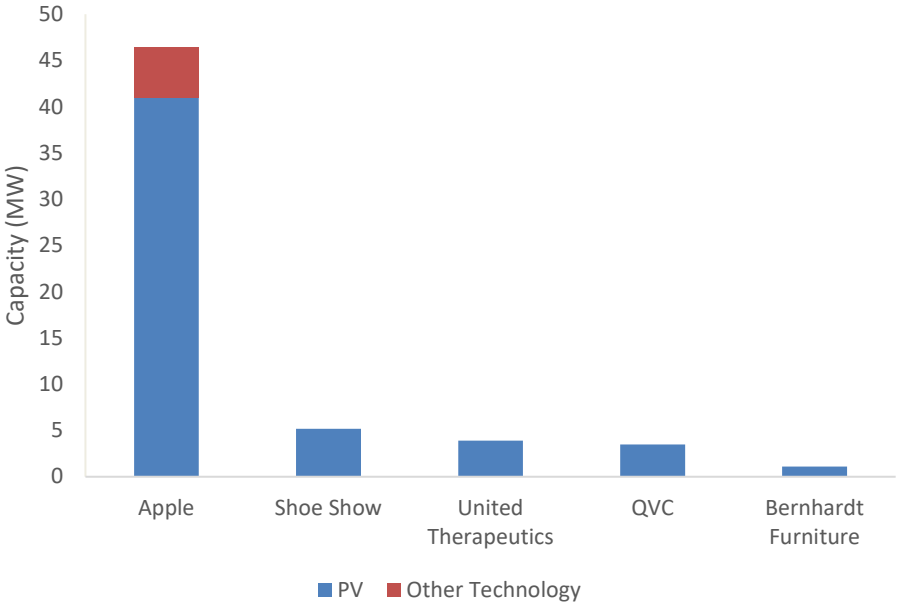

Figure 16. Corporate renewable PURPA capacity by technology type in the Southeast. *Source: Energy Information Administration (2018b) and SNL Financial Inc. (2018)*

Interviewees suggested that the most important considerations for pursuing a PURPA contract are the length of the contract and the avoided cost rate. States have discretion to establish the method for determining the avoided cost rate paid to qualifying facilities. The approach taken can impact the rate, and thus be more or less favorable to qualifying facilities. Some of the more common avoided-cost methodologies are defined as follows.

- The **proxy method** assumes that a qualifying facility delays or displaces the next planned generating unit, typically a combined-cycle natural gas plant. The proxy unit's fixed costs establish the capacity payment, and the variable costs set the avoided energy rate.
- The **peaker method** is somewhat common across the Southeast. In this methodology, the qualifying facility is assumed to displace the most expensive peaking resource on the utility's system, typically a natural gas–combustion turbine. The avoided energy cost rate is based on the capacity value offered by the displaced peaking resource and its marginal production costs.
- The **differential revenue requirement method** quantifies the cost of generation for the utility with and without a certain amount of qualifying facility capacity with certain characteristics. The avoided cost rate is the difference between a scenario with and without a specified block of power.
- The **market-based method** typically is used in jurisdictions with access to wholesale markets. In this arrangement, qualifying facilities participate in day-ahead or hourly markets and receive compensation based on market clearing prices.
- The **competitive bidding method** establishes qualifying facility avoided cost rates based on solicitations for capacity. The highest-cost winning bid serves as the avoided cost rate for other qualifying facilities that did not win but might wish to sell electricity to the utility.

Table 6 displays key elements of PURPA programs for utility-scale projects at some of the largest electric service providers in each state, along with the Tennessee Valley Authority (TVA).

Of the utilities listed in Table 10, Duke Energy Carolinas and South Carolina Electric & Gas Company are the only utilities that offer long-term contracts with fixed rates to PURPA projects. In both cases, these utilities also provide a capacity value for years when a capacity need is identified. Interviewees suggested that this program structure is preferable for utility-scale PV projects because it provides long-term price certainty.

The other utilities, such as Alabama Power and Florida Power & Light (FP&L), instead pay PURPA facilities the actual avoided costs incurred when the facility is operating, often under short-term contracts. In some cases, these facilities receive the system-wide avoided costs—as is the case in Alabama Power's territory—and FP&L establishes avoided-cost rates for specific geographic regions. Regardless, qualifying facilities in these utility territories are subject to market-price volatility and the associated challenges of financing projects given that volatility. Additionally, Entergy Mississippi is a member of MISO and has received approval to limit its

PURPA program to projects ≤ 20 MW.[18] Projects larger than that would participate in MISO wholesale markets.

Table 10. Comparison of Select PURPA Rates by Largest Electric Retailer in Each State

Utility (State[s])	Rate Schedule	Eligible Capacity	Contract Length	Cost Method	Cost Schedule	Estimated or Fixed Rates	Capacity Value
Alabama Power (AL)	CPE	≤ 80 MW	1 year with evergreen (automatic) renewal	System dispatch modelling	Fixed rate, updated annually	Summer Peak: $0.04/kWh Non-Summer Peak: $0.03/kWh Non-Summer off-peak: $0.02/kWh	Capacity payment might be available when capacity need is identified
Duke Energy Carolinas (NC)	Negotiated	≤ 80 MW	5 years	Peaker method, CT	Fixed rate for life of contract, set every 2 years	Negotiated	Included in years that capacity need is identified
Duke Energy Carolinas (NC)	Schedule PP	≤ 1 MW	10 years	Peaker method, CT	Fixed rate for life of contract, set every 2 years	On-peak: $0.04/kWh Off-peak: $0.03/kWh	On-peak Summer: $0.01/kWh On-peak non-summer: $0.02/kWh
Entergy Mississippi (MS)	Negotiated	≤ 20 MW	Negotiated	Negotiated	Negotiated	Negotiated	Negotiated
Florida Power & Light (FL)	COG-1	≤ 80 MW	Not specified	Peaker method by geographic area, gas turbine	Real-time hourly	Estimate offered by written request	Could negotiate to include when capacity need occurs
Georgia Power (GA)	Negotiated	≤ 80 MW	Not specified	Peaker method, CT	Real-time hourly	Average all hours (2017–2027): $0.04/kWh	Included when capacity need occurs
Mississippi Power	Negotiated	≤ 80 MW	Negotiated	Production cost modeling	Fixed rates set when	Negotiated	Might include when

[18] The Federal Energy Regulatory Commission has the authority to exempt certain utilities from the provisions of PURPA, if the utility can show that a prospective qualifying facility has nondiscriminatory access to a competitive market such as MISO and PJM.

Utility (State[s])	Rate Schedule	Eligible Capacity	Contract Length	Cost Method	Cost Schedule	Estimated or Fixed Rates	Capacity Value
					contract signed		capacity need occurs
South Carolina Electric & Gas Company (SC)	PR-2	100 kW ≤ X ≤ 80 MW	Up to 15 years	Differential revenue require-ment, (100 MW of capacity)	Fixed rate for life of contract, rates set biannually	Average monthly payment of $0.03/kWh (2018–2032)	No capacity payment is available in most recent rate structure
Tennessee Valley Authority (AL, GA, MS, NC, and TN)	DPP	≤ 80 MW	5 years	Peaker method, marginal unit	Rates set monthly	Not published	No capacity payment

4.4.2 Case Study: The Evolution of North Carolina PURPA Policies

The robust growth in PURPA capacity across the Southeast has spurred policy discussions regarding the goal and design of PURPA programs (Warren 2017). States are grappling with the intent of PURPA to allow renewable power generators access to markets, and managing risk associated with avoided-cost rate imbalances. With 483 qualifying facilities statewide, North Carolina has seen the most PURPA deployment across the Southeast. The state recently also has adopted policy changes emblematic of policy discussions elsewhere in the Southeast, including Georgia and South Carolina. This case study examines North Carolina's PURPA program to understand what historical factors have driven deployment and how policy changes can influence this pathway.

Most of North Carolina's PUPRA facilities came online between 2012 and 2016, when the state saw on average 59% annual growth in qualified facilities (*see* Figure 17). As noted, PV dominates these PURPA projects, capturing 91% of all the PURPA capacity in 2016 as compared to 23% of all projects (a total of 13) in 2008.

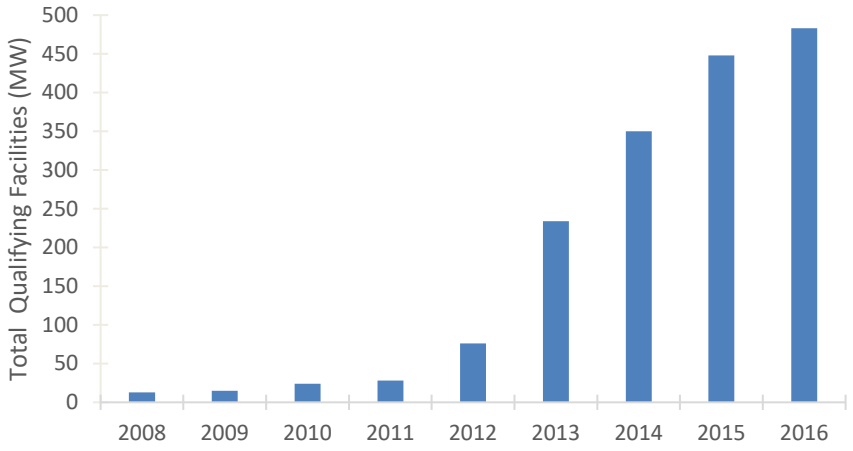

Figure 17. Total qualifying facilities by year in the state of North Carolina.
Source: Energy Information Administration (2018b) and SNL Financial Inc. (2018)

For large-scale PV projects (those exceeding 1 MW), historically there were two key PURPA pathways in North Carolina—the standard offer and negotiated rates. For the standard offer, the state required obligated utilities (Duke Energy [Carolinas and Progress] and Dominion) to establish fixed-rate contracts for facilities with capacity of 5 MW or less. These fixed rates were determined based on the utility's projected avoided cost over the life of the contract. Developers could then select 5- , 10- , or 15-year contracts with locked-in long-term rates. Rates for new contracts were established on a biennial basis. Any facility that had a capacity greater than 5 MW—or that was not interested in the standard offer—had to pursue negotiations with the utility to establish fixed long-term rates under a 10-year contract.

The structure of the standard-offer program was attractive to solar developers and might help explain why average PURPA facility capacity averages about 5 MW across North Carolina. The biennial avoided cost rate structure can offer developers more certainty regarding project value during the planning and construction phase, because the price that qualifying facilities (QFs) will receive for their long-term contract is known during that entire biennial term. Additionally, these fixed rates allow the developer to avoid the risks associated with energy market price volatility present in other utility PURPA programs. The 5-MW capacity threshold, which was unique in the Southeast, allows the developer to leverage some economies of scale by spreading fixed costs over more generation. The 15-year contract structure is favorable, given that financiers are more willing to invest in these longer-term projects. The availability of the off-the-shelf rate structure alleviated the need to conduct uncertain negotiations with the utility.

In addition to this developer-friendly program, North Carolina also offered a renewable energy tax credit that provided a maximum incentive of $2.5 million to offset project equipment and installation expenditures (including PV) that were used for a business purpose.[19] Before expiring at the end of 2015, this tax credit could be paired with the federal investment tax credit to significantly reduce the overall cost of PV projects.[20] These PV projects then could apply as PURPA facilities and receive fixed rates for their generation. In summary, favorable program structure and tax incentives could explain why developers pursued 5-MW PV projects in large numbers.

In 2017, the North Carolina legislature enacted House Bill 589, which revised the state's PURPA program to phaseout the existing standard-offer program and alter the negotiated-rate program for obligated utilities. For the standard-offer program, the law reduced eligibility from 5 MW to 1 MW and reduced the contract length from 15 years to 10 years. [21] Once an obligated utility's cumulative capacity under this program structure reaches 100 MW, the project eligibility threshold is further reduced to 100 kW. The law also made changes to the negotiated-rate program. Most importantly, utilities were no longer obligated to sign 10-year contracts with qualified facilities, instead utilities can sign 5-year contracts. The project developer then must renegotiate for subsequent contracts, which could be at lower rates. HB 589 also developed a

[19] The allowable tax credit also could not exceed 50% of the taxpayer's state tax liability for the year. For information on the North Carolina tax credit, see "Renewable Energy Tax Credit (Personal)," http://programs.dsireusa.org/system/program/detail/541.
[20] For more information on the ITC, see "Business Energy Investment Tax Credit (ITC)," https://energy.gov/savings/business-energy-investment-tax-credit-itc.
[21] For bill language, see https://www.ncleg.net/Sessions/2017/Bills/House/PDF/H589v6.pdf.

new competitive procurement process for large renewable energy projects. Duke Energy is required to procure 2,660 MW of renewable energy over a term of 45 months. The law requires Duke to issue a series of request for proposals to procure renewable energy projects to meet this goal. At maximum, 30% of the capacity can be sourced from utility-owned projects. Prospective qualifying facility developers can submit bids to serve this utility capacity. The lowest cost bids would then be selected and serve as the basis for setting the avoided-cost rates for other projects that are not selected but wish to negotiate a subsequent PURPA contract.

Though it is unclear how these programmatic changes will influence PURPA interest, interviewees offered some perspectives at this early stage. As noted, there is 1.2 GW of PURPA-related capacity already in the pipeline. Going forward, some interviewees argued that the new solicitation structure will increase competition, foster innovation, and reduce utility PURPA-compliance costs. Other participants had a somewhat different perspective. These individuals were generally supportive of the mandated renewable procurement but were concerned about the lower PURPA rates that projects might receive, the future of the market once Duke meets its procurement goal, and the costs associated with preparing a bid in an uncertain market. Clarifying the full impacts of these changes will not be possible until the full implementation of the competitive solicitations in 2021.

4.4.3 Outlook

Although some companies—such as Apple—own PURPA facilities, this approach is not widespread. Recent changes in PURPA programs could further limit interest in this approach. North Carolina supports the most PURPA deployment across the Southeast and changes in its standard offer contract pricing and length can reduce developer and corporate interest in pursuing PURPA projects.

Aside from North Carolina, South Carolina is the only state that offers fixed rates for long-term projects and has the second largest PURPA pipeline. Given changes in North Carolina's program, PURPA-related deployment might be concentrated in South Carolina. For example, a corporate PURPA partnership between Solvay S.A. and Dominion Energy brought a 71-MW PV project to the state in late 2017 (Andorka 2018; Solvay S.A. 2017).[22] Interest in subsequent PURPA projects will be impacted by utility-rate structures that have seen downward pressure on fixed energy rates and capacity value in the state. Therefore, the overall PURPA market could decline in future years, limiting the potential for corporations to pursue these options.

The emergence of competitive renewable project solicitations by utilities also might impact corporate interest. This is because developers might submit the least-cost renewable energy projects for utility procurement, and corporate customers then would have to pursue potentially higher-cost projects that did not win the competitive solicitation. At the same time, utilities across the Southeast are beginning to provide corporate customers other options to pursue renewables that might prove more attractive to achieve corporate objectives.

[22] In this project, Solvay pays for the RECs and Dominion sells the power to SCE&G. When the project was brought online, it was the largest PV project in South Carolina (Andorka 2018; Solvay S.A. 2017).

4.5 Emerging Pathways

This section provides additional models for off-site procurement that could work in the Southeast context. The section highlights the model structure, requirements, and benefits to the utility and corporate purchaser.

4.5.1 Model 1. Large-Scale Land Lease for Renewables

In this model (*see* Figure 18), a corporation with a large amount of land could lease part of the land to a project developer (either a utility or a third party). The electricity produced would be used by the local utility. In exchange, the corporate could receive land-use payments or the RECs from the project. The corporate could also negotiate other requirements, such as having the renewable system serve the corporate campus during grid outages.

Similar models have been used by the U.S. military in the Southeast, though military facilities have not negotiated RECs from the systems. This model would work well for corporates with large amounts of available land, such as the military, industrial facilities, and state agencies. Under this model, the utility would benefit by getting land from a host customer and being able to easily site a new renewable project. The utility also would get all the generation produced by the renewable generator. The customer would benefit by receiving the services it negotiated—land-use payments, RECs, grid services, and other services.

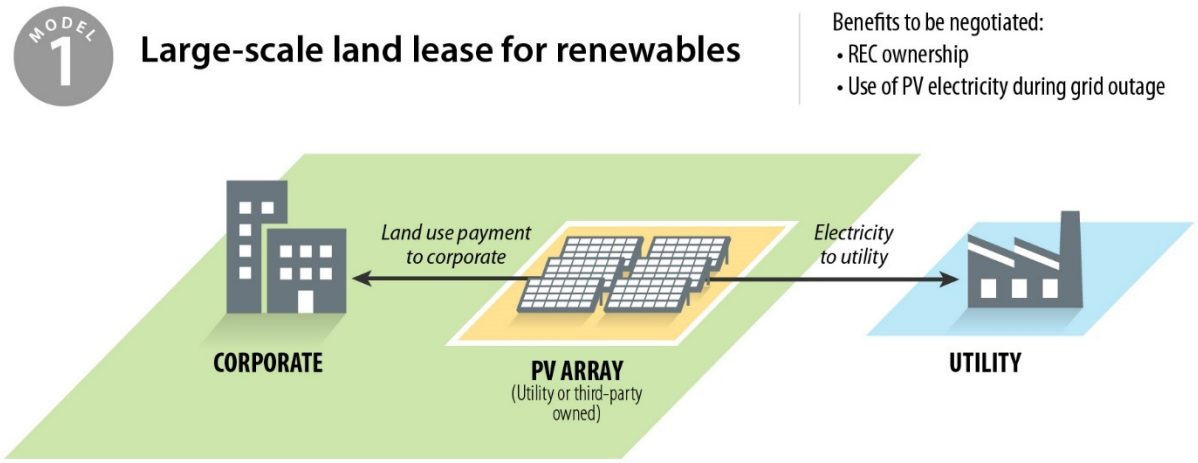

Figure 18. Large-scale land lease for renewables.

4.5.2 Model 2. PURPA-Based Contract-for-Differences Model

Existing PURPA rates and contract terms in most of the Southeast make renewable project development challenging. In this model (*see* Figure 20), a corporate would agree to a fixed price for the renewable generation. If the generator received more than this via its PURPA contract, then the net would go to the corporate. If the generator received less than the fixed price, then the corporate would pay the net difference to the generator. This structure mimics a financial PPA with a project selling into the wholesale market, but instead of the project receiving the market-based wholesale price, the project would receive the PURPA avoided-cost rate (*see* Figure 19). If

the state's PURPA provisions only provide a short-term contract, then the structure might need to be modified. The fixed price could also include payment for the project's RECs.

A similar model was used by Organic Valley to support 12 MW of solar projects in the Upper Midwest Municipal Energy Group (UMMEG). Organic Valley signed a 25-year REC contract and the solar projects are compensated by the local municipal utility for the energy produced and for their capacity. All of the electricity produced by the solar projects is used by the utility—similar to a PURPA contract—but, for this deal, the customer and customer's agent (One Energy Renewables) viewed a utility contract as more favorable than a PURPA contract. The contract also was viewed as a faster process than that of negotiating a green tariff, which would have required approval by the state's public utility commission. The utility expects that retail rates will decline because of these projects, which provide a benefit to the utility and its ratepayers (including Organic Valley).

Under this model, the utility could save money if the cost of the solar project is less than higher-priced wholesale power contracts. The utility also keeps its relationship with the customer, avoiding or mitigating behind-the-meter solar installations. The customer benefits by being able to support a new renewable energy project, potentially at lower cost than that of their present REC purchases. Depending on the negotiated price, however, the customer might be paying more than if they previously were using purely grid-supplied electricity.

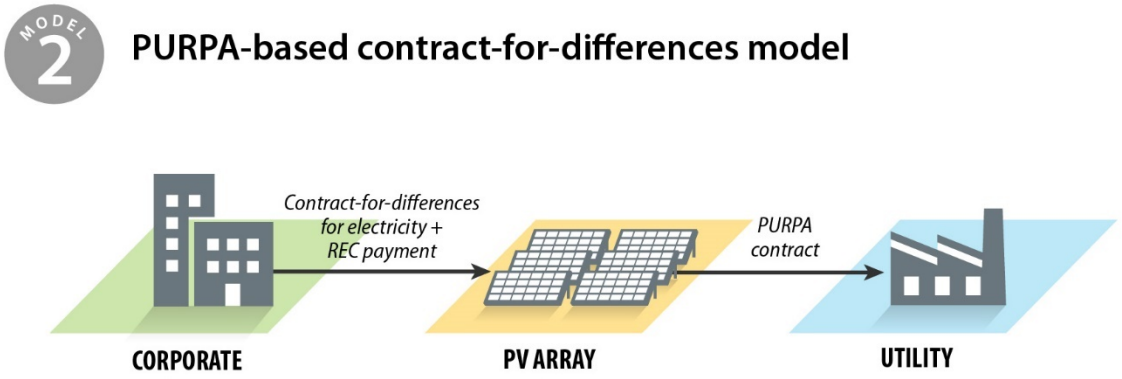

Figure 19. PURPA-based contract for differences.

4.5.3 Model 3. Market-Based Rates and Separate Contract with an Off-Site Project in RTO/ISO Territory

There are a few small pockets in the Southeast that are covered by an RTO/ISO. These include Dominion's territory in North Carolina (PJM), American Electric Power's territory in Tennessee (PJM), and Entergy's territory in Mississippi (MISO). Corporates could sign a financial PPA with a generator located in one of these regions, and pair that contract with a market-based rate from their utility (*see* Figure 20). Currently, most electricity rates do not fluctuate with the same frequency as wholesale market rates. If a utility adopted a "market-based rate," which passed on the variability of wholesale rates to their customers, then customers would have a better option to

match a financial PPA (contract-for-differences) with the renewable generator. For example, if the generator and customer are in PJM and PJM prices go up, then the solar provider will receive higher prices for its generation, which can offset the higher prices paid by the customer.

This model is in place in Dominion Energy Virginia's territory, with its market-based rate (MBR). The MBR is a rate schedule that mimics PJM wholesale-market pricing and fees. Amazon Web Services uses this rate and has signed separate contracts for solar energy in Virginia (100 MW and 80 MW, both in 2016). As a variation on this, corporates also could sign a PPA in the Electric Reliability Council of Texas (ERCOT) territory or some other region and apply the RECs from its procurement to load it has in the Southeast. Corporates might be hesitant to do so—or to do so at scale—however, because of the associated greater risk.

Under this model, the utility should ensure that it can fully recover its costs. It might need to include additional fees to ensure that no other customers are harmed by offering this new rate, which would require regulatory approval. This model enables the utility to keep its customers, as customers continue to use the utility for 100% of their electricity needs. Customers would benefit by being able to better match the rates they pay for electricity with the rates a renewable generator would receive.

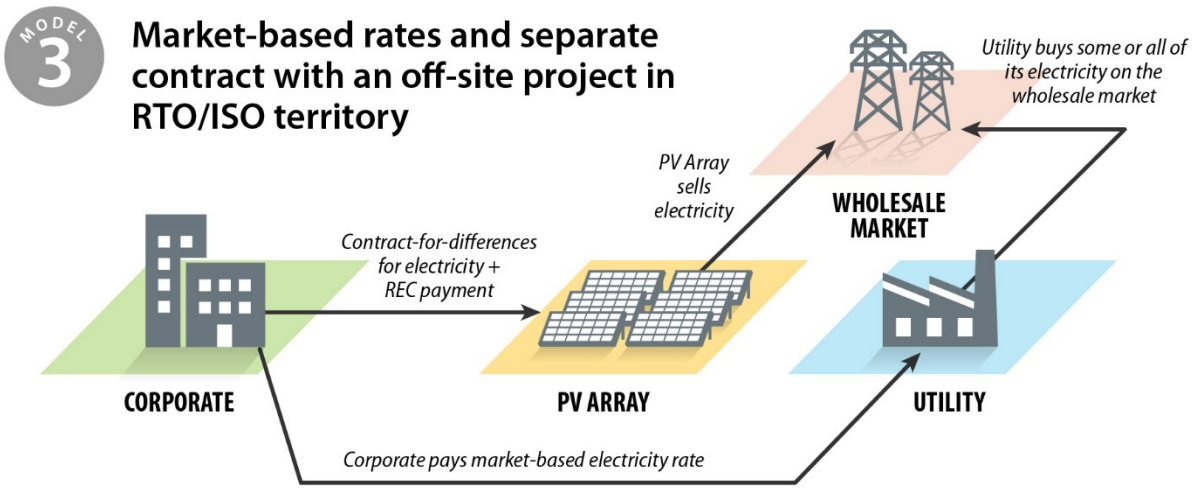

Figure 20. Market-based rates and separate contract-for-differences with an off-site project in RTO/ISO territory.

4.5.4 Model 4. Subscription Solar at Scale, with Corporate Anchor Tenants

To date, much of the community solar market in the Southeast allows for limited participation by large corporate entities. Under a new approach, what are now smaller-sized community solar projects could be dramatically scaled in size, for example to tens of megawatts (*see* Figure 21).[23] As utility-scale solar costs decline, this option could be more attractive to utilities than smaller community solar projects. Corporate entities could serve as anchor tenants for much of the load,

[23] This model would vary from what most consider "community solar" in that it might not be installed on the distribution system.

reserving the remaining subscriptions for residential and small commercial customers. This option has the potential to drive down subscription costs by reducing the cost of the PV array on a per-watt basis, as well as potentially reducing customer acquisition and other costs. To lessen customer acquisition cost, corporate anchor tenants also could offer subscriptions to their employees and could sign a flexible anchor tenant agreement; this would allow their subscription to size within a given range (e.g., between 50% and 60% of the project's output).

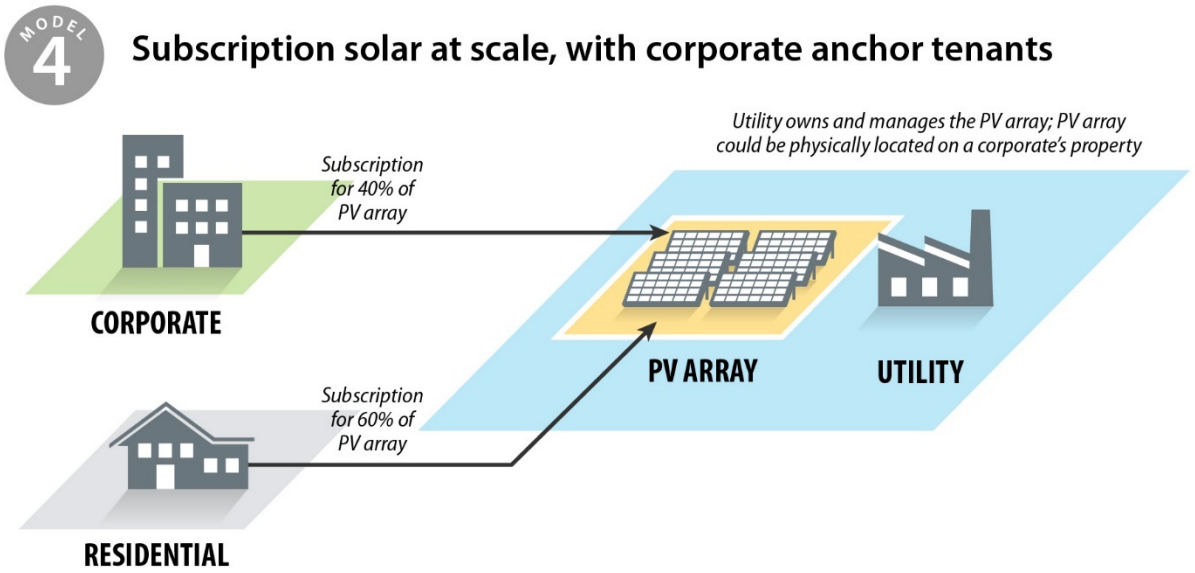

Figure 21. Market-based rates and separate contract with an off-site project in RTO/ISO territory.

5 Summary and Market Outlook

Overall, there are nearly 740 MW of off-site renewable projects in the Southeast with corporate involvement.[24] This includes PURPA projects with a corporate owner, utility partnerships (green tariffs and bilateral agreements), off-site PPAs, and community solar (Figure 22). Utilities have developed an additional 380 MW on military sites.

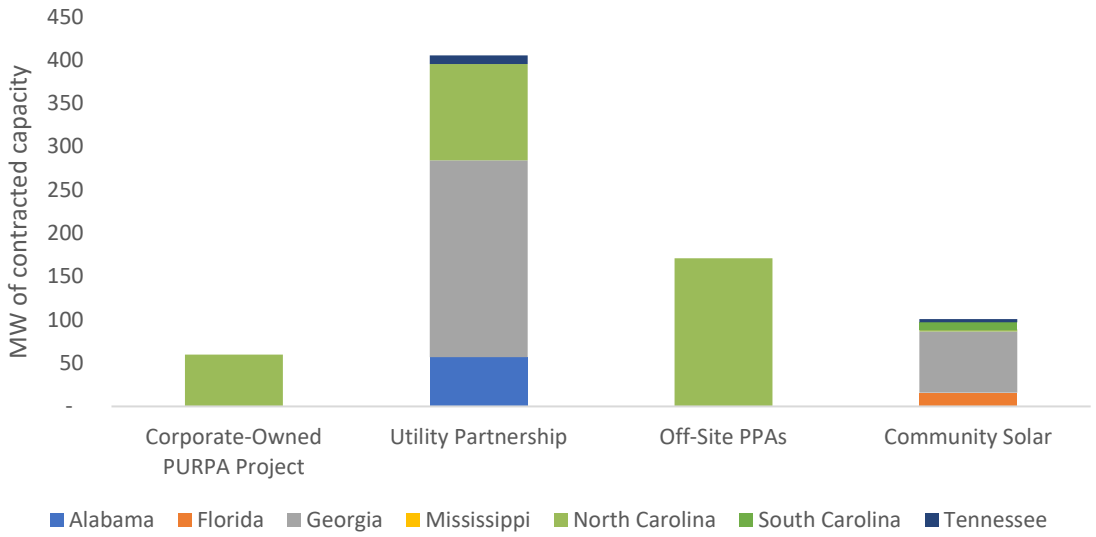

Figure 221. Contracted off-site corporate renewable capacity in the Southeast, by procurement option.

On a state basis, North Carolina has seen the most deployment (344 MW) using a mix of off-site PPAs, green tariffs, and PURPA projects. It is followed closely by Georgia (298 MW), which also deployed three pathways: Community solar, bilateral agreements, and a green tariff. Alabama, Florida, Mississippi, and Tennessee each have seen less than 60 MW of deployment (Figure 23).

[24] This estimate was identified by a review of a variety datasets from the Energy Information Administration, SNL Financial Inc., and Bloomberg New Energy Finance among others. The estimate was also vetted through discussions with electric service providers and corporates across the Southeast. We include Georgia Power's green tariff is "contracted" in 2017 in our figures, since that is when the program was launched, however, individual off-taker contracts were signed in 2018.

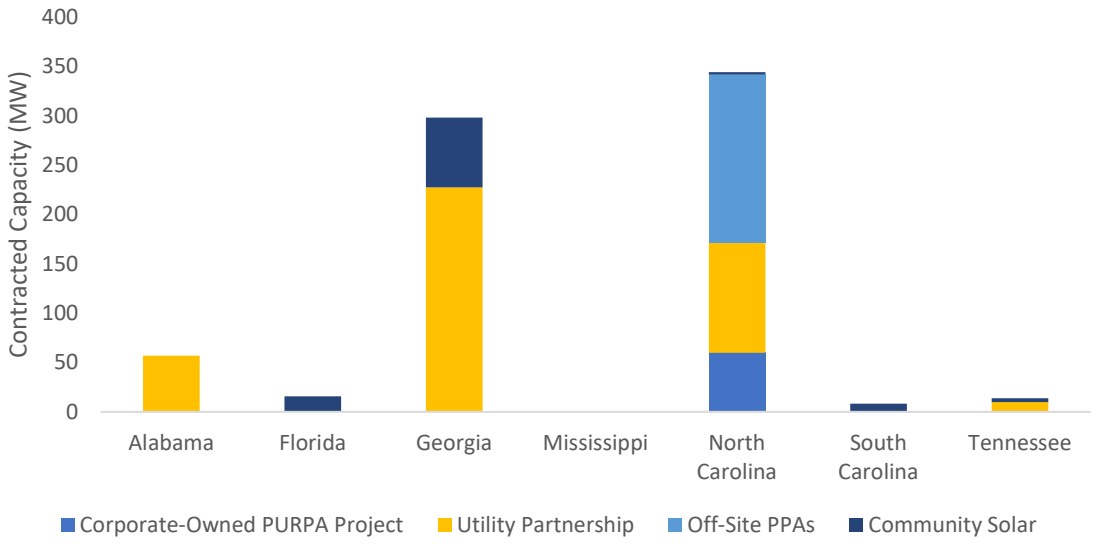

Figure 23. Contracted off-site corporate renewable capacity in the Southeast, by state.

The current capacity satisfies 22% of identified renewable energy demand, using the lower estimate which only includes renewable energy demand from municipal facilities, and not from communities as a whole. This renewable energy demand is an underestimate because the study was limited to data supplied directly from corporations via Second Nature and Sierra Club's Ready for 100 campaign.

In states with the greatest renewable energy demands (North Carolina, Georgia, and Florida), existing pathways could provide 36%, 43%, and 3%, respectively (Figure 24). These pathways leave about 4 million MWh of unmet demand. If solar was used to provide that capacity, it would result in more than 2,000 MW of new solar projects (assuming a 22% capacity factor). If instead of using the lower estimate for renewable energy demand, we use the higher estimate—which includes community-wide electricity use in cities and counties that have made a renewable energy commitment—then unmet demand rises to 26.8 million MWh. If new solar projects were to supply that demand, nearly 13,900 MW of new generation would be required.

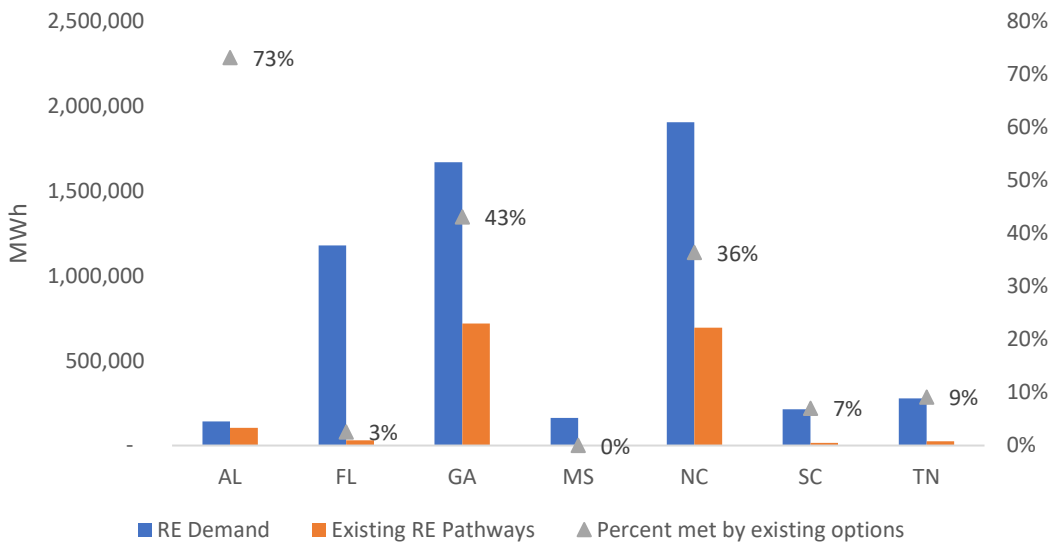

Figure 24. Renewable energy demand and contracted renewable energy capacity in the Southeast.

If the planned future capacity in the Southeast is developed, then it would more than double current contracted capacity. Planned capacity includes 426 MW remaining in eligibility for Alabama Power's program, 600 MW under Duke Energy's Green Source Advantage Program, and 20 MW of community solar announced by the City of Tallahassee, Florida (Figure 25).

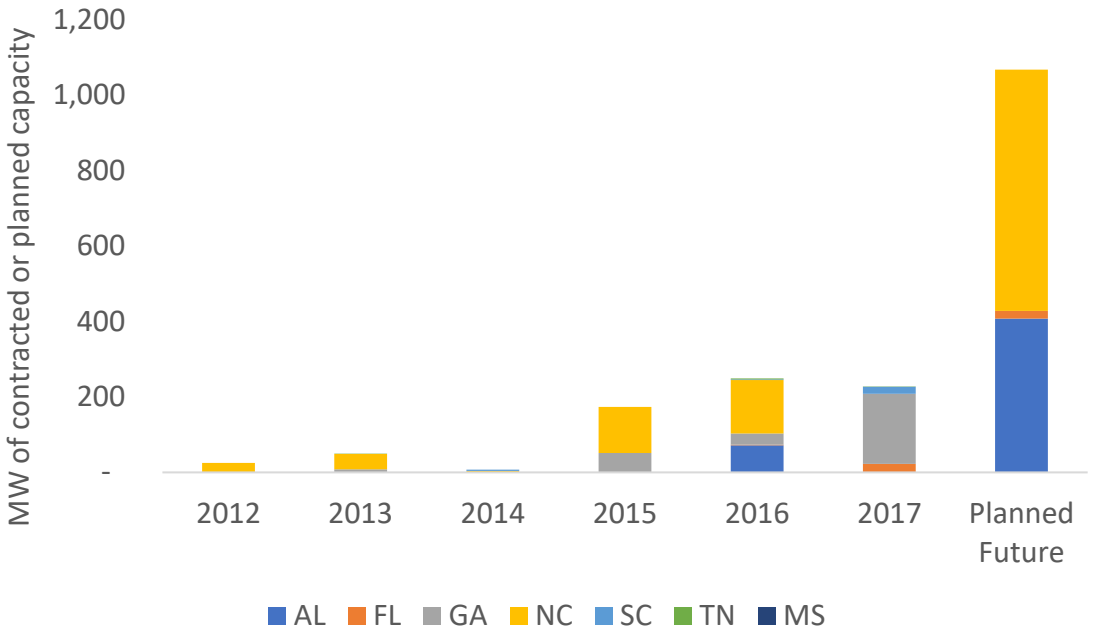

Figure 25. Contracted and planned future capacity by year and state.

Our estimate of renewable energy demand only includes the corporations who provided data directly to NREL. There are likely additional corporations who did not submit data, resulting in an underestimate of renewable energy demand. Future analysis could include more robust estimates of renewable energy demand, including more detailed estimates of renewable energy

demand by utility service territory. A more robust estimate of renewable energy demand could inform individual utilities seeking to develop programs and policies to support corporate procurement of off-site RE.

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