Economic Impact Analysis of Clean Energy Development in North Carolina

2023 Update

Prepared for

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Appendix A: Technical Appendix

A.1 Renewable Technology Data Sources and Assumptions

A.1.1 Solar Photovoltaic

Installed solar photovoltaic capacity between 2007 and 2022 was estimated based on data from the combination of North Carolina Renewable Energy Tracking System (NC-RETS, 2021), and the North Carolina Utility Commission docket system, along with using Google Earth to verify the existence of projects. It is important to note that while these data sources capture most of the installed renewable energy capacity in North Carolina, they are not intended to be comprehensive in their coverage. NC-RETS was established by the North Carolina Utilities Commission (NCUC) to issue and track renewable energy certificates (RECs). Utilities use the tracking system to demonstrate compliance with the State's Renewable Energy Portfolio Standard (REPS) policy. In more recent years, it has become necessary to use additional data from the NCUC to augment the NC-RETS data. The NCUC reports (Duke Energy Carolinas LLC, 2018a) provide a new source of information on projects operating in the state that are not reported in the NC-RETS database. The NCUC reports are combined by the North Carolina Sustainable Energy Association (NCSEA) into a useable format for analysis.

Energy generated was estimated by applying a capacity factor of 19%, based on RTI's review of 2011 photovoltaic generation in North Carolina (U.S. Energy Information Administration [EIA], 2011) and PVWattv2 (National Renewable Energy Laboratory [NREL], 2012b).

Because of the magnitude of solar photovoltaic relative to other clean energy projects and the rapid decline in the cost of photovoltaic installations over the period (NREL, 2012a), we developed cost estimates for installations by size of system and year of installation. These estimates rely on projected photovoltaic project costs from developers through December 31, 2022, that the NCSEA compiled from the NCUC. For systems in the database with capacity not specified as AC, RTI converted from DC to AC by applying a derate factor of 0.79. As a data quality check, RTI independently reviewed several registrations to verify values within the database against NCUC dockets. RTI further cleaned the data by removing outliers (removing values 1.5x the interquartile range below the first and above the third quartile for each year). Costs for each year were then adjusted to 2022$ using the consumer price index (CPI) (Bureau of Labor Statistics [BLS], 2023).

Table A-1 shows RTI's estimates of the average costs per kW (AC), which are consistent with other available photovoltaic cost data sources over the study period. Annual fixed operating and maintenance (O&M) costs were assumed to be $26/kW.

Table A-1. Average Cost for Solar Photovoltaic Installations by Year and Size (AC kW, 2022$)

Expected Year Online	<10 kW	10 kW–100 kW	100 kW–1 MW	1 MW–2 MW	>2 MW
2006	15,791				
2007	10,298	9,114	9,114		
2008	10,622	10,672	12,025	5,355	
2009	9,942	9,407	7,017	5,355	5,355
2010	8,850	7,644	5,889	5,355	5,355
2011	8,195	6,652	5,952	5,417	3,781
2012	7,841	6,320	5,126	4,676	4,087
2013	6,799	4,850	3,271	3,185	3,365
2014	6,260	4,798	3,137	2,433	2,956
2015	6,435	3,854	3,173	2,878	2,776
2016	5,537	4,221	2,764	2,767	2,726
2017	5,251	3,539	2,788	2,141	2,446
2018	5,531	3,807	2,788	2,229	2,665
2019	5,290	3,899	2,538	2,037	2,362
2020	5,834	3,848	1,398	1,756	2,748
2021	5,943	4,144	1,658	2,094	2,645
2022	6,208	4,376	3,682	2,713	2,359

A.1.2 Landfill Gas

Capacity for landfill gas (LFG) facilities was estimated using data from NC-RETS (2021) and modified based on personal communication for one facility. We estimated generation by LFG facilities based on EIA 2011 and 2012 generation data (EIA, 2011, 2012) where available and otherwise applied a uniform capacity factor. Installation and O&M costs were also based on uniform estimates with the exception of personal communication regarding installation costs for one facility.

In addition to standard LFG facilities, the NC-RETS (2021) database indicated the addition of an LFG fuel cell project in 2012. Project capacity was provided by NC-RETS but was modified based on EIA generation data (EIA, 2012). Installation costs were assumed to be $7,000 per kW of rated output, with variable O&M costs of $43 per MWh (EIA, 2013).

A.1.3 Hydroelectric

NC-RETS (2021) represents the universe from which we pulled specific hydroelectric projects. Because NC-RETS tracks only hydroelectric projects under 10 MW, our analysis may underestimate total hydroelectric investment over the study period. RTI estimated new or incremental capacity at hydroelectric facilities between 2007 and 2022 (no additional projects in years 2017, 2018, 2019, 2020, and 2021) from NC-RETS, EIA data (EIA, 2011), and NCUC registrations (Duke Energy, 2012; Kleinschmidt, N/A; Brooks Energy, 2008; Advantage Investment Group LLC, 2004; Cliffside Mills LLC, 2008; Madison Hydro Partners, 2010). Additional 600 kW was added in 2022 based on fillings to the NCUC.

A.1.4 Biomass

Capacity for biomass facilities installed was estimated using data from NC-RETS (2021) and adjusted to reflect data in NCUC registrations for two facilities (EPCOR USA, 2009). Capacity for co-fired facilities was adjusted to reflect the 2011 fraction of renewable fuel consumed (EIA, 2011). We estimated generation by biomass facilities based on EIA 2011 generation data (EIA, 2011) where available and otherwise applied a uniform capacity factor. Installation, O&M, and fuel costs were based on uniform estimates or reported costs in NCUC dockets or press releases where available (Capital Power, 2011; Coastal Carolina Clean Power LLC, 2008; Prestage Farms Incorporated, 2011).

A.1.5 Biomass Combined Heat and Power

Thermal output capacity at biomass combined heat and power (CHP) facilities was developed from NC-RETS (2021) and NCUC registrations for eight facilities (EPCOR USA, 2009). Capacity for co-fired facilities was adjusted to reflect the fraction of renewable fuel consumed (EIA, 2011). For CHP facilities in the EIA-923 database, capacity was further adjusted to reflect the fraction of heat generated used for electricity. We estimated generation by biomass facilities based on EIA generation data (EIA, 2011) where available and otherwise applied a uniform capacity factor. Costs of these facilities are incorporated in the biomass cost estimates discussed above.

A.1.6 Wind

Wind power installations were developed from NC-RETS (2021), North Carolina GreenPower (personal communication, March 30, 2021), and one 208MW system added via press release (ELP, 2017). Cost for new wind investment were included in 2016 totals because construction was completed by year end but did not generate electricity until 2017. Capacity factor and installation and O&M costs were based on uniform estimates or reported costs in NCUC dockets or press releases where available (ASU News, 2009; Madison County School System, 2009).

A.1.7 Solar Thermal Heating

Estimates of solar thermal heating capacity installed are based on data reported in NC-RETS (2021). RTI reviewed publicly available sources of project installation costs, annual energy generation, and system O&M (North Carolina Department of Commerce, 2010; NREL, 2011a) to develop the assumptions that solar thermal systems cost $3,500/kW to install and $60/kW for annual O&M. Installation costs for one project were taken from a news report (*News and Observer*, 2012). We assumed that solar thermal heating systems have the same capacity factor as photovoltaic systems.

A.1.8 Geothermal Heat Pumps

Geothermal heat pump capacity is not reported in NC-RETS. The North Carolina Department of Environmental Quality (NCDEQ) provided permit data for geothermal wells (NCDEQ, personal communication, March 15, 2021). Although the number of wells per system varies based on system type and local conditions, given the available data, we assumed that a typical 3-ton system in North Carolina required five wells to convert wells to system size based on a project case study (Bosch Group, 2007). Based on personal communication with geothermal system contractors in North Carolina, we assumed the cost of an average 3-ton system to be $20,000. Because of a lack of suitable publicly available data in North Carolina, conversion of system tons to kW and annual energy savings per ton were estimated from available project data for a large installation in Louisiana (NREL, 2011b). O&M cost per year are assumed to be $35/kW (International Energy Agency [IEA], 2010).

A.1.9 Passive Solar

Passive solar tax credit spending data from the North Carolina Department of Revenue (2007–2022) are the only available data for passive solar projects over the study period. Passive solar tax credit was assumed to be $0 for 2021 and 2022 due to lack of data. Energy savings were estimated based on the number of passive solar projects from North Carolina Department of Revenue data, as well as information on typical kWh savings provided by the Oregon Department of Energy (2012) and a study by RETScreen International (2004).

A.1.10 State Incentives for Renewable Energy

Tax credits taken for 2007 through 2017 were developed from figures provided by the North Carolina Department of Revenue (2011b, 2012a, 2013, 2014, 2015, 2016, 2017, 2018). Due to changes in NC policy in 2017, no new credits were generated in 2018 and 2019; therefore, only credits claimed are visual on the report (North Carolina Department of Revenue, 2019, 2020). Since tax credits are no longer being generated, NC DOR does not produce the same report as above. Actual 2022 tax credit claims were not available at the time of the report.

A.1.11 Spending Changes from Renewable Energy Generation

We applied the following assumptions to estimate spending changes resulting from energy generated at renewable energy facilities. For electricity produced by renewable facilities, we assumed that renewable project owners receive the avoided cost of electricity net of O&M and fuel costs that would be otherwise spent on conventional energy generation. Based on a review of avoided cost schedules for qualifying facilities from Duke Energy Carolinas (2012b) and Progress (2012a), we applied the simplifying assumption that the avoided cost paid to all renewable facilities is $60/MWh.

For nonelectric renewable energy, we assumed that the energy saved results in a reduction in retail energy spending. For biomass thermal generation at CHP facilities, we assumed the cost of energy saved is the industrial retail price for electricity, $69.75/MWh (EIA, 2016). For geothermal, solar thermal, and passive solar, we assumed that the cost of energy saved is the average retail price for electricity, $102.80/MWh (EIA, 2016).

The total REPS rider charged to customers over the study period was taken from NCUC dockets (Duke Energy Carolinas, 2009b, 2010, 2011, 2012a, 2013, 2014, 2015a, 2017a, 2018, 2019; Progress, 2009b, 2010a, 2011b, 2012a, 2013a, 2014, 2015a, 2016, 2018, 2019; GreenCo, 2010a, 2010c, 2012a, 2012b, 2013, 2014, 2015, 2016; ElectriCities, 2009, 2010, 2011a, 2012a, 2013a, 2014, 2015, 2016; NCUC, 2020, 2021a, 2021b, 2022) and included in the analysis as a change in spending to project owners from utility customers.

A.1.12 Universe of Included Projects

Table A-2 summarizes the sources used to compile our list of renewable energy and energy efficiency projects. Although additional resources were used to characterize these projects, the universe of projects in this analysis was limited to the sources below.

Table A-2. Sources Used in Compiling the Universe of Included Projects

	NC-RETS	NC Green-Power	Press Releases	Personal Communication	NC DEQ	NC DOR	NCUC Dockets
Solar photovoltaic	x	x	x	x			x
Landfill gas	x						x
Hydroelectric	x						x
Biomass	x						
Wind	x	x	x				x
Solar thermal heating	x						
Geothermal heat pumps					x		
Passive solar						x	
Utility energy efficiency							x

A.1.13 Inflation Adjustments

To accurately compare expenditures over time, it was necessary to convert all dollars to the same year. **Table A-3** presents the CPI data from the BLS that we used to adjust for inflation.

Table A-3. Inflation Adjustment Factors

Year	Consumer Price Index for All Urban Consumers	Multiplier for Conversion to 2020 USD
2006	201.59	1.44
2007	207.34	1.40
2008	215.30	1.35
2009	214.54	1.35
2010	218.06	1.33
2011	224.94	1.29
2012	229.59	1.26
2013	232.96	1.25
2014	236.74	1.23
2015	237.03	1.22
2016	240.01	1.21
2017	244.98	1.19
2018	251.11	1.16
2019	255.76	1.14
2020	257.56	1.13
2021	270.97	1.07
2022	290.32	1.00

Source: BLS, 2023

A.2 ENERGY EFFICIENCY DATA SOURCES AND ASSUMPTIONS

A.2.1 Utility Programs

Energy efficiency program costs were taken from the start of the program for Dominion North Carolina Power (2010, 2011, 2012, 2013, 2014, 2015b, 2016, 2017, 2018, 2019, 2020, 2022), Duke Energy Carolinas (2013, 2014, 2016, 2017a, 2018a, 2020, 2021), NC GreenCo (2010b, 2021), NCMPA1 and NCEMPA (ElectriCities, 2011b; 2011c; 2011d; 2011e; 2011f; 2011g; 2012b; 2012c; 2013b; 2013c), and Progress (2008, 2009a, 2010b, 2011a, 2012b, 2016, 2017, 2018, 2019, 2020, 2022). Demand-side management program costs were only included for 2011 through 2020 because these programs could not pass along costs to consumers until 2011 (General Assembly, 2011).

Energy savings associated with utility programs between 2007 and 2022 were estimated based on NC-RETS data (2021). Energy savings from utility programs in 2022 were estimated from expected 2022 savings from NCUC dockets. We assumed that the change in spending associated with these energy savings is equal to the avoided cost of electricity, $60/MWh, and is distributed evenly between the utilities and utility customers, consistent with cost savings under Duke's Save-A-Watt program (Duke Energy Carolinas, 2009a).

A list of the utility programs considered in our analysis is included in **Table A-4**.

A.2.2 Solar Rebate Program

In 2018, Duke Energy, LLC. and Duke Energy Progress, LLC. began their Solar Rebate Program. The program for each utility allowed up to 3,750 kW-AC in Residential rebates at $0.60 per watt of installation (Duke Energy Carolinas LLC, 2021). Up to 1,225kW-AC of Non-residential rebates were provided at $0.50 per watt of installation, and Nonprofits were able to receive a rebate of $0.75 per watt up to 25kW-AC) (Duke Energy Carolinas LLC, 2021). Using (Duke Energy Carolinas LLC, 2021) total rebate costs were allocated to either residential or non-residential clean energy investments. The results of the Solar Rebate Program were run separately in IMPLAN to capture the impact of the rebates on utility and consumer spending.

Table A-4. Utility Energy Efficiency Programs

Program	Utility
Air Conditioner Cycling	Dominion
Appliance Recycling	Dominion
Commercial Distributed Generation Program	Dominion
Commercial Energy Audit	Dominion
Commercial Duct Testing & Sealing	Dominion
Commercial Heating, Ventilation, and Air Conditioning (HVAC) Upgrade Program	Dominion
Commercial Lighting Program	Dominion
Efficient Products Marketplace	Dominion
Heating and Cooling Efficiency	Dominion
Home Energy Assessment	Dominion
Lighting Systems and Controls	Dominion
Low Income Program	Dominion
Qualifying Small Business Improvements	Dominion
Residential Air Conditioning Cycling	Dominion
Residential Audit	Dominion
Residential Duct Testing & Sealing	Dominion
Residential Heat Pump Tune-up	Dominion
Residential Heat Pump Upgrade	Dominion
Residential Lighting Program	Dominion
Window Film	Dominion
Appliance Recycling Program	Duke
Business Energy Report	Duke
DSM	Duke
Energy Efficiency Appliances	Duke

(continued)

Table A-4. Utility Energy Efficiency Programs (continued)

Program	Utility
Energy Efficiency Education	Duke
Energy Efficiency in Schools	Duke
Energy Management Information Systems	Duke
Home Retrofit	Duke
HVAC Energy Efficiency	Duke
Low Income Weatherization	Duke
Multi-Family Energy Efficiency	Duke
My Home Energy Report	Duke
Non-Residential Energy Efficient Equipment	Duke
Non-Residential Energy Efficient Pumps and Drives	Duke
Non-Residential Smart Saver Lighting	Duke
Non-Residential Smart Saver Custom	Duke
Non-Residential Energy Assessments	Duke
Non-Residential Smart Saver	Duke
Power Manager	Duke
Power Share	Duke
Residential Energy Assessments	Duke
Residential Energy Comparison Report	Duke
Residential Neighborhood Program	Duke
Residential Energy Assessments	Duke
Residential Smart Saver	Duke
Small Business Energy Saver	Duke
Smart Energy in Offices	Duke
Smart Energy Now	Duke
Agricultural Energy Efficiency	NCEMC (formally GreenCo)
Commercial Energy Efficiency	NCEMC (formally GreenCo)
Commercial New Construction	NCEMC (formally GreenCo)
Community Efficiency Campaign	NCEMC (formally GreenCo)
Energy Cost Monitor	NCEMC (formally GreenCo)
Energy Star Appliances	NCEMC (formally GreenCo)
Energy Star Lighting	NCEMC (formally GreenCo)
Low Income Efficiency Campaign	NCEMC (formally GreenCo)
Refrigerator/Freezer Turn-In	NCEMC (formally GreenCo)
Residential New Home Construction	NCEMC (formally GreenCo)
Water Heating Efficiency	NCEMC (formally GreenCo)

(continued)

Table A-4. Utility Energy Efficiency Programs (continued)

Program	Utility
C&I Energy Efficiency Program	NCMPA
Commercial Prescriptive Lighting Program	NCMPA
High Efficiency Heat Pump Rebate	NCMPA
Home Energy Efficiency Kit	NCMPA
Light Emitting Diode (LED) and Enterprise Content Management (ECM) Pilot for Refrigeration Cases	NCMPA
Municipal Energy Efficiency Program	NCMPA
Business Energy Report	Progress
Commercial, Industrial, and Government Demand Response	Progress
Commercial, Industrial, and Government Energy Efficiency	Progress
Compact Fluorescent Light Pilot	Progress
Distribution System Demand Response	Progress
Energy Efficiency Benchmarking	Progress
Energy Efficiency Education	Progress
Energy Efficiency for Business	Progress
Energy Efficiency Lighting	Progress
Energy Education Program for Schools	Progress
EnergyWise	Progress
EnergyWise for Business	Progress
Lighting—General Service	Progress
Multi-Family Energy Efficiency	Progress
My Home Energy Report	Progress
Neighborhood Energy Saver	Progress
Non-Profit	Progress
Non-Residential Smart Saver	Progress
Residential Energy Efficiency Benchmarking	Progress
Residential Appliance Recycling	Progress
Residential Energy Efficiency Benchmarking	Progress
Residential Energy Assessments	Progress
Residential Home Advantage	Progress
Residential Home Energy Improvement	Progress
Residential Lighting	Progress
Residential Low Income Program	Progress
Residential New Construction	Progress
Residential Energy Assessments	Progress
Residential Found Revenue	Progress

(continued)

Table A-4. Utility Energy Efficiency Programs (continued)

Program	Utility
Residential Smart Saver	Progress
Save Energy and Water Kit	Progress
Small Business Energy Saver	Progress
Smart Saver Performance Incentive	Progress
Smart Saver Prescriptive	Progress
Solar Hot Water Heating Pilot	Progress

A.2.3 Utility Savings Initiative

Data on the cost, savings, and incentives for the Utility Savings Initiative (USI) were taken from the project's 2019 annual report (North Carolina Department of Environmental Quality, 2019a, 2019b). The USI no longer is required to report annually; therefore, data for 2015-2022 were estimated from previous years.

A.3 IMPLAN Analysis

We distributed spending for each renewable facility, efficiency program, government incentive, and change in spending resulting from renewable energy generation and energy savings across IMPLAN sectors based on distributions in other comparable reports and models where appropriate (NREL, 2012c; NREL, 2012d; Regulatory Assistance Project, 2005; Bipartisan Policy Center, 2009), 2018 IMPLAN default data for North Carolina (MIG Inc., 2021), and original assumptions where necessary (**Table A-5**).

In the 2018 version of IMPLAN, the energy sector is no longer disaggregated into a traditional fossil fuel sector and six separate renewable energy sectors as it was in the 2013 version. The 2018 IMPLAN model consolidated the traditional fossil fuel sector and renewable energy sector into one commodity type; therefore, eliciting the same impact factor on each energy technology.

Three breakouts were developed using IMPLAN default data to model additional spending or savings to utility customers. First, post-tax consumer income was created using the proportion of money spent by consumers. Second, corporate net income was created using the proportion of money spent, saved, and taxed from corporations. Third, state spending was developed using the three categories that IMPLAN has for state spending: investment, education, and non-education. Dollars not spent by the state were deducted based on the proportion of state spending in these three categories.

Table A-5. IMPLAN Breakout for Renewable Energy, Energy Efficiency, and State Spending

Type	Direct Spending	Secondary Effects
Renewable Energy		
Solar Photovoltaic	Investment spending was allocated across IMPLAN sectors using the default breakout in the JEDI Photovoltaic model (NREL, 2012c) according to the installation size.	The avoided cost of energy produced was transferred to Sector 454, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 44, Electrical power generation—solar.
Hydroelectric	Investment spending was allocated to IMPLAN Sector 54, Construction of Other New Non-residential Structures.	Avoided cost net of fixed and variable O&M costs was transferred to Sector 446, Lessors of Non-financial intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 41, Electrical power generation—Hydroelectric. Fixed and variable O&M costs were allocated to IMPLAN Sector 62, Maintenance and Repair Construction of Non-residential Structures.
Wood Biomass	Investment spending was allocated based on the Wood Biomass IMPLAN distribution in the 2009 Bipartisan Policy Center report.	Avoided cost of energy produced net of fuel, fixed O&M, and variable O&M costs were transferred to Sector 446, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 47, Electrical power generation—Biomass. Fixed and variable O&M costs were allocated based on the Wood Biomass IMPLAN distribution in the 2009 Bipartisan Policy Center. Fuel costs were allocated to Sector 15, Forestry, Forest Products, and Timber Tract Production.
Biomass Co-fire	Investment spending was allocated based on the Biomass Co-Fire IMPLAN distribution in the 2009 Bipartisan Policy Center report.	Avoided cost net of fuel, fixed O&M, and variable O&M costs were transferred to Sector 446, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 47 Electrical power generation—Biomass. Fixed and variable O&M costs were allocated based on the Biomass Co-Fire IMPLAN distribution in the 2009 Bipartisan Policy Center report. Fuel costs were allocated to Sector 15, Forestry, Forest Products, and Timber Tract Production.
Swine Biomass	Investment spending was allocated based on the Swine Biomass IMPLAN distribution in the 2009 Bipartisan Policy Center report.	Avoided cost net of fixed O&M and variable O&M costs were transferred to Sector 446, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 47 Electrical power generation—Biomass. Fixed and variable O&M costs were allocated based on the Swine Biomass IMPLAN distribution in the 2009 Bipartisan Policy Center report.

(continued)

Table A-5. IMPLAN Breakout for Renewable Energy, Energy Efficiency, and State Spending (continued)

Type	Direct Spending	Secondary Effects
Renewable Energy		
Wind	Investment spending was allocated across IMPLAN sectors using the default breakout in JEDI Wind model (NREL, 2012d).	The avoided cost of energy net of fixed O&M produced was transferred to Sector 446, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 45, Electrical power generation—wind. Fixed O&M costs were allocated across IMPLAN sectors using the default breakout in JEDI Wind model (NREL, 2012d).
Landfill Gas	Investment spending was allocated based on the Landfill Gas IMPLAN distribution in the 2009 Bipartisan Policy Center report.	The avoided cost of energy produced net of fixed O&M costs was transferred to Sector 446, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from inputs to Sector 48, Electric power generation—all other. Fixed O&M costs were allocated based on the Landfill Gas IMPLAN distribution in the 2009 Bipartisan Policy Center report.
Geothermal Heat Pumps	Investment spending was allocated 50% to Sector 277, Air Conditioning, Refrigeration, and Warm Air Heating Equipment Manufacturing, 25% to Sector 54, Construction of Other New Non-residential Structures, and 25% to Sector 395, Wholesale Trade.	The retail cost of energy saved net of O&M costs was transferred 70% to corporate net income and 30% to post-tax consumer spending (assuming systems with 10 or fewer wells were for residential customers, and those with more were commercial customers) from Sector 42, Electrical power generation—fossil fuels. Fixed O&M costs were allocated to IMPLAN Sector 62, Maintenance and Repair Construction of Non-residential Structures.
Passive Solar	Investment spending was allocated to Sector 59, Construction of New Residential Permanent Site Single and Multi-family Structures.	The retail cost of energy saved was transferred to Post-Tax Consumer Spending from Sector 42, Electricity, Generation, Transmission, and Distribution.
Solar Thermal	Investment spending was allocated across IMPLAN sectors using the photovoltaic breakout for 100 kW–1 MW systems from JEDI Photovoltaic model (NREL, 2012c).	The retail cost of energy saved net of O&M costs was transferred to Corporate Net Income from Sector 42, Electricity, Generation, Transmission, and Distribution. Fixed O&M costs were allocated to IMPLAN Sector 62, Maintenance and repair construction of non-residential structures.
REPS Rider		REPS rider was transferred to Sector 446, Lessors of Non-financial Intangible Assets (Regulatory Assistance Project, 2005) from a split of 50% from corporate net income for commercial and industrial customers and 50% from post-tax consumer spending for residential customers.
Solar Rebate		Rebate payment deducted from corporate net income from IMPLAN Electricity, Generation Sub-Sectors 41-45, 47,48. Expenditure was distributed based on EIA reported Annual Generation for North Carolina in 2017 (EIA, 2018).

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Table A-5. IMPLAN Breakout for Renewable Energy, Energy Efficiency, and State Spending (continued)

Type	Direct Spending	Secondary Effects
Efficiency Programs		
Utility Programs	Efficiency program investments were allocated to IMPLAN sectors according to the 2005 Regulatory Assistance Project report breakouts for the following categories: residential retrofit, residential new construction, commercial retrofit and commercial new construction. In addition, for residential appliance recycling program, we distributed investment spending 10% to Sector 471, Waste Management and Remediation Services, and 90% to Sector 395, Wholesale Trade Businesses. For school education programs, we distributed spending across 100% to Sector 460, All Other Miscellaneous Professional, Scientific and Technical Services.	The avoided cost of energy saved was transferred 50% to Sector 446, Lessors of Non-financial Intangible Assets for Utility Recovery of Avoided Costs, 25% to corporate net income for industrial and commercial customer savings and 25% to post-tax consumer spending for residential customer savings from inputs to Sector 42, Electrical power generation—fossil fuels.
Utility Savings Initiative	Utility Savings Initiative program investments were allocated to IMPLAN sectors according to the Commercial Retrofit category in the 2005 Regulatory Assistance Project report.	Utility Savings Initiative savings transferred to State Spending and taken from Sector 42, Electrical power generation – fossil fuels.
Government Initiatives		
Tax Credit		Tax credit deducted from IMPLAN State Spending breakout.
Utility Savings Initiative		Utility Savings Initiative appropriations deducted from IMPLAN State Spending breakout.

A.4 Differences from Previous Report

The results of this analysis differ from last year's Economic Impact Analysis of Clean Energy Development in North Carolina—2021 Update (RTI, 2021). The list below outlines several changes to the underlying data, study scope, and reporting conventions that may lead to differences between the reports.

- The study frame was expanded to include 2021 and 2022, whereas the last report's study frame was 2007 to 2020.
- Differences in yearly renewable energy investment can be explained by the availability of new data on the timing of photovoltaic investments from North Carolina GreenPower, the addition of new renewable energy projects in the NC-RETS database and filings at the NCUC that were not present at the time of the 2018 report, updated geothermal data from NCDEQ, updated data for estimating passive solar investments, and increased data on photovoltaic costs per kW.

- Utility Savings Initiative spending data are not available annually; lengthening the study frame requires a new allocation of total investment to prior years.
- Differences in yearly state incentives can be explained by several factors. For one, because Utility Savings Initiative state appropriation data are not available annually, lengthening the study frame requires a new allocation of total appropriation to prior years. Also, this study used retrospective data provided by the North Carolina Department of Revenue for this year’s tax credits for the fiscal year 2021 and estimated tax credits for fiscal year 2022. Since tax credits for renewable energy are no longer being generated in North Carolina, the NC Department of Revenue can no longer provide the same report.

Appendix B: Renewable Energy Projects by County and North Carolina State Legislative Districts

Table B-1. Major Investments in Renewable Energy Across North Carolina Counties (Millions 2022$)

County Name	County Distress Rankings 2023	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
Alamance	2	–	–	–	119.6	–	–	119.6
Alexander	2	–	–	–	36.9	–	–	36.9
Alleghany	2	–	–	–	–	–	–	–
Anson	1	–	–	–	332.6	–	–	332.6
Ashe	2	–	–	–	–	–	–	–
Avery	3	–	–	–	15.0	–	–	15.0
Beaufort	2	–	–	–	405.4	–	–	405.4
Bertie	1	1.8	–	–	161.9	–	–	163.7
Bladen	1	–	–	–	521.9	–	–	521.9
Brunswick	3	51.4	–	–	31.8	–	–	83.1
Buncombe	3	–	–	4.0	64.3	–	–	68.3
Burke	1	–	36.4	–	38.9	–	–	75.3
Cabarrus	3	6.9	–	31.3	285.9	16.7	–	340.8
Caldwell	2	–	–	–	4.4	–	–	4.4
Camden	3	–	–	–	25.4	–	–	25.4
Carteret	3	–	–	–	0.9	–	–	0.9
Caswell	1	–	–	–	57.5	–	–	57.5
Catawba	2	–	–	77.9	401.2	–	–	479.1
Chatham	3	–	15.0	–	137.2	–	–	152.1
Cherokee	1	–	–	–	38.4	–	–	38.4
Chowan	1	–	–	–	40.4	–	–	40.4
Clay	2	–	–	–	19.5	–	–	19.5
Cleveland	2	–	1.8	–	278.8	–	–	280.6
Columbus	1	–	–	–	232.9	–	–	232.9
Craven	2	–	–	12.2	82.8	–	–	95.0
Cumberland	1	–	2.9	–	580.2	–	–	583.1
Currituck	3	–	–	–	454.4	–	–	454.4
Dare	2	–	–	–	0.1	–	–	0.1
Davidson	2	–	–	4.6	124.7	–	–	129.3
Davie	2	–	–	–	113.1	–	–	113.1
Duplin	1	403.4	–	–	525.3	–	–	928.7
Durham	3	–	–	9.4	84.9	–	–	94.3

(continued)

Table B-1. Major Investments in Renewable Energy Across North Carolina Counties (Millions 2022$) (continued)

County Name	County Distress Rankings 2023	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
Edgecombe	1	–	–	–	593.1	–	–	593.1
Forsyth	2	4.0	–	6.7	38.6	2.4	–	51.8
Franklin	2	–	–	–	261.5	–	–	261.5
Gaston	2	–	–	13.0	149.3	–	–	162.3
Gates	2	–	–	–	30.2	–	–	30.2
Graham	1	–	–	–	0.2	–	–	0.2
Granville	2	–	–	–	109.0	–	–	109.0
Greene	1	–	–	–	40.3	–	–	40.3
Guilford	2	–	–	3.9	112.1	1.4	–	117.4
Halifax	1	–	–	–	601.6	–	–	601.6
Harnett	2	–	–	–	156.9	–	–	156.9
Haywood	2	–	–	–	13.8	–	–	13.8
Henderson	3	–	–	–	38.8	2.9	–	41.8
Hertford	1	1.4	–	–	406.1	–	–	407.5
Hoke	1	–	–	–	52.9	–	–	52.9
Hyde	1	–	–	–	–	–	–	–
Iredell	3	–	–	13.0	24.5	–	–	37.5
Jackson	2	–	–	–	1.5	–	–	1.5
Johnston	3	–	–	4.3	300.7	–	–	305.0
Jones	1	–	–	–	70.5	–	–	70.5
Lee	2	–	–	–	105.1	–	–	105.1
Lenoir	1	–	–	–	290.7	–	–	290.7
Lincoln	3	–	–	–	41.0	–	–	41.0
Macon	2	–	–	–	1.0	–	–	1.0
Madison	2	–	–	–	–	–	–	–
Martin	2	–	–	–	245.7	–	–	245.7
McDowell	2	–	–	–	1.9	–	–	1.9
Mecklenburg	3	45.8	–	5.1	83.5	–	–	134.4
Mitchell	1	–	–	–	0.5	–	–	0.5
Montgomery	2	–	–	25.6	150.1	–	–	175.7
Moore	3	–	–	–	130.8	–	–	130.8
Nash	1	–	1.2	–	490.6	–	–	491.8

(continued)

Table B-1. Major Investments in Renewable Energy Across North Carolina Counties (Millions 2022$) (continued)

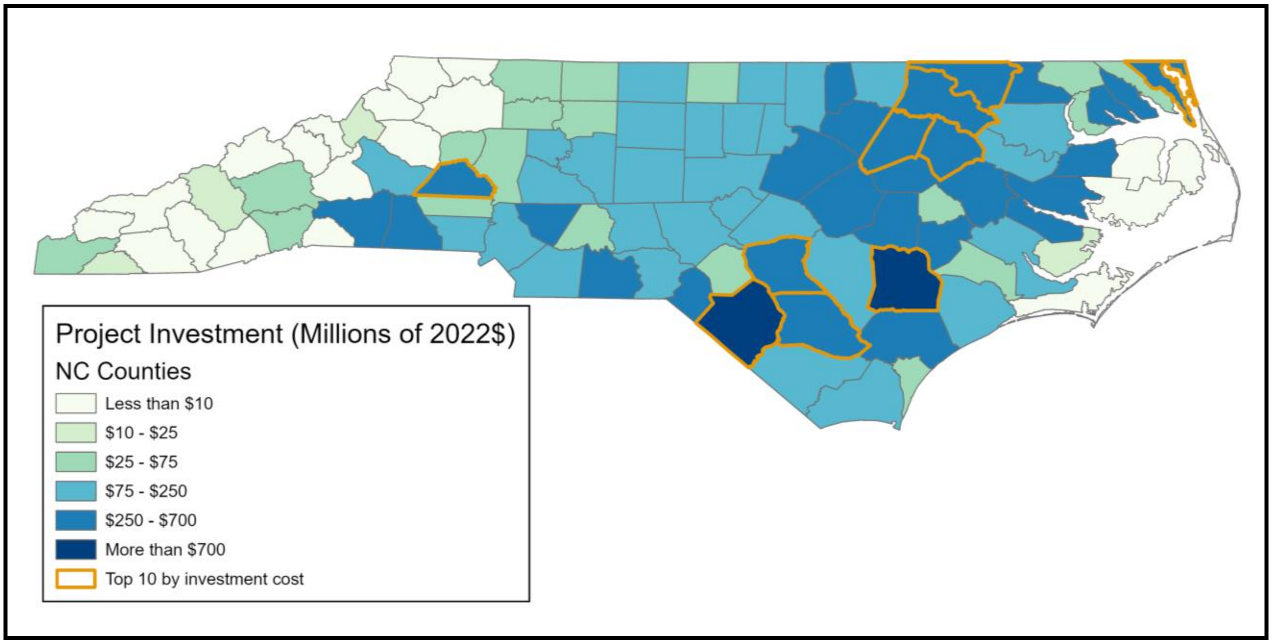
County Name	County Distress Rankings 2023	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
New Hanover	3	–	–	–	26.4	1.1	–	27.6
Northampton	1	–	–	–	523.5	–	–	523.5
Onslow	1	–	–	5.3	99.0	–	–	104.2
Orange	3	–	–	–	73.5	1.5	–	75.0
Pamlico	2	–	–	–	13.7	–	–	13.7
Pasquotank	2	–	–	–	73.1	–	214.6	287.7
Pender	3	–	–	–	334.7	–	–	334.7
Perquimans	2	–	–	–	108.5	–	214.6	323.1
Person	2	51.4	–	–	86.3	–	–	137.7
Pitt	1	5.9	–	–	249.0	–	–	254.8
Polk	2	–	–	–	0.9	–	–	0.9
Randolph	1	–	–	–	132.9	–	–	132.9
Richmond	1	–	–	–	229.3	–	–	229.3
Robeson	1	127.1	–	2.7	638.3	–	–	768.2
Rockingham	1	2.5	–	2.2	100.0	–	–	104.8
Rowan	2	1.4	–	–	154.2	–	–	155.7
Rutherford	1	–	–	–	365.9	–	–	365.9
Sampson	1	59.2	–	17.2	119.2	–	–	195.6
Scotland	1	–	–	–	431.3	–	–	431.3
Stanly	2	–	–	–	30.7	–	–	30.7
Stokes	2	–	–	–	27.2	–	–	27.2
Surry	1	–	–	12.7	32.2	–	–	45.0
Swain	2	–	–	–	0.6	–	–	0.6
Transylvania	2	–	–	–	1.8	–	–	1.8
Tyrrell	1	–	–	–	–	–	–	–
Union	3	–	–	–	231.2	–	–	231.2
Vance	1	–	–	–	312.4	–	–	312.4
Wake	3	–	–	17.1	263.0	–	–	280.1
Warren	1	–	–	–	169.5	–	–	169.5
Washington	1	–	–	–	339.5	–	–	339.5
Watauga	2	–	–	–	–	–	–	–
Wayne	1	–	–	9.2	352.6	–	–	361.8

(continued)

Table B-1. Major Investments in Renewable Energy Across North Carolina Counties (Millions 2022$) (continued)

County Name	County Distress Rankings 2023	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
Wilkes	1	–	–	–	1.7	–	–	1.7
Wilson	1	–	–	–	369.0	–	–	369.0
Yadkin	2	–	–	–	59.2	–	–	59.2
Yancey	2	–	–	–	0.1	–	–	0.1
Grand Total	**N/A**	**762.4**	**57.3**	**277.4**	**15709.0**	**26.1**	**429.3**	**17261.5**

Figure B-1. Major Investments in Renewable Energy Across North Carolina Counties (Millions 2022$)



Figures 2-2, B-1, B-2, B-3, and B-4 illustrate the geographic distribution of renewable energy projects aggregated to North Carolina counties, Senate and House districts, and the U.S. Congressional districts.

The North Carolina Department of Commerce County Distress Rankings is an annual ranking of counties based on economic well-being with 1 being the most distressed and 3 being the least (NCDOC, 2023). For this analysis, we used 2023 rankings. North Carolina State House and Senate and Congressional districts as well as NC counties used in this analysis were based on boundaries defined for the 2022 US Census Cartographic Boundary Files. Shape files for these district and county boundaries were obtained from the U.S. Census website (Cartographic Boundary Files (census.gov)).

The figures include all eligible wind, landfill gas, biomass, hydroelectric, solar photovoltaics, and solar thermal projects. Senate districts 1, 3, 9, 11, and 24 had the most investment with over $1 billion of investment each. Several senate districts had between $500 and $900 million, including 2, 5, 4, 19, and 29.

House districts 1, 4, 23, and 27 had over $1 billion in investment, while several had between $500 and $800 million, including 5, 22, 47, 55, and 111. All of the House districts mentioned are located either partially or completely in the previously mentioned senate districts.

Readers may note some differences in the geographic allocation of renewable energy investments in this year's report compared to previous years. These differences are primarily the result of changes in the data used to determine the location of renewable energy investments. RTI has historically relied on mailing address (when available) or information gleaned from project names as a proxy for location. This year RTI relied on lat/long data provided by NCSEA to determine project location. RTI mapped the lat/long coordinates reported in the NCSEA database to the RTI database developed for this study. While the lat/long coordinates provide a more precise indication of project location, it has resulted in some shifts in the county or district where the project investment is reported compared to reports from previous years. In the case of large project footprints, it is possible that a proportion of the project is located in an adjacent county or district. It is important to note that the location of the investment does not impact the results of the economic impact analysis, which is conducted at a state level.

RTI and NCSEA still maintain two separate databases of renewable energy facilities and RTI has endeavored to only use NCSEA data to augment missing information. NCSEA has developed its database using publicly available data filed at the NCUC for all facilities who have filed a Report of Proposed Construction or Certificate of Public Convenience and Necessity, whereas RTI primarily relies on aggregate data from facilities who have registered to create, track, and manage RECs with NC-RETS. As in previous reports, we endeavor to include in our analysis all additional facilities not registered with NC-RETS whose existence can be verified via filings with NCUC.

Table B-2. Major Investments in Renewable Energy Across North Carolina Senate Districts (Millions 2022$)

NC Senate District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
1	–	–	–	576.1	–	429.2	1005.4
2	–	–	12.2	778.9	–	–	791.0
3	3.3	–	–	2618.3	–	–	2621.5
4	–	–	9.2	761.9	–	–	771.1
5	5.9	–	–	842.1	–	–	848.0
6	–	–	5.3	99.0	–	–	104.2

(continued)

Table B-2. Major Investments in Renewable Energy Across North Carolina Senate Districts (Millions 2022$) (continued)

NC Senate District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
7	–	–	–	26.1	1.1	–	27.3
8	51.4	–	–	264.9	–	–	316.3
9	462.7	–	17.2	1571.5	–	–	2051.3
10	–	–	4.3	300.7	–	–	305.0
11	–	1.2	–	1064.5	–	–	1065.7
12	–	–	–	262.1	–	–	262.1
13	–	–	–	11.9	–	–	11.9
14	–	–	–	98.9	–	–	98.9
15	–	–	–	28.6	–	–	28.6
16	–	–	–	36.8	–	–	36.8
17	–	–	17.1	76.1	–	–	93.2
18	–	–	–	119.8	–	–	119.8
19	–	2.9	–	579.6	–	–	582.5
20	–	15.0	–	163.1	–	–	178.0
21	–	–	–	131.4	–	–	131.4
22	–	–	9.4	59.0	–	–	68.4
23	51.4	–	–	217.3	1.5	–	270.2
24	127.1	–	2.7	1122.5	–	–	1252.4
25	–	–	–	176.1	–	–	176.1
26	2.5	–	2.2	172.6	–	–	177.3
27	–	–	–	18.6	–	–	18.6
28	–	–	3.9	20.9	1.4	–	26.3
29	–	–	25.6	837.7	–	–	863.3
30	–	–	4.6	237.7	–	–	242.3
31	–	–	6.7	43.6	–	–	50.3
32	4.0	–	–	22.2	2.4	–	28.7
33	1.4	–	–	184.9	–	–	186.3
34	6.9	–	31.3	49.9	16.7	–	104.8
35	–	–	–	417.9	–	–	417.9
36	–	–	12.7	130.0	–	–	142.7
37	–	–	13.0	24.9	–	–	37.9
38	18.7	–	–	12.0	–	–	30.7
39	–	–	–	20.3	–	–	20.3
40	–	–	–	11.2	–	–	11.2

(continued)

Table B-2. Major Investments in Renewable Energy Across North Carolina Senate Districts (Millions 2022$) (continued)

NC Senate District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
41	23.3	–	5.1	31.0	–	–	59.4
42	3.9	–	–	8.6	–	–	12.5
43	–	–	13.0	80.5	–	–	93.5
44	–	1.8	–	388.7	–	–	390.5
45	–	–	77.9	405.4	–	–	483.3
46	–	36.4	–	52.2	–	–	88.6
47	–	–	–	23.5	–	–	23.5
48	–	–	–	405.7	2.9	–	408.6
49	–	–	4.0	52.9	–	–	56.9
50	–	–	–	69.1	–	–	69.1
Total	**762.4**	**57.3**	**277.4**	**15709.0**	**26.1**	**429.3**	**17261.5**

Figure B-2. Major Investments in Renewable Energy Across North Carolina Senate Districts (Millions 2022$)

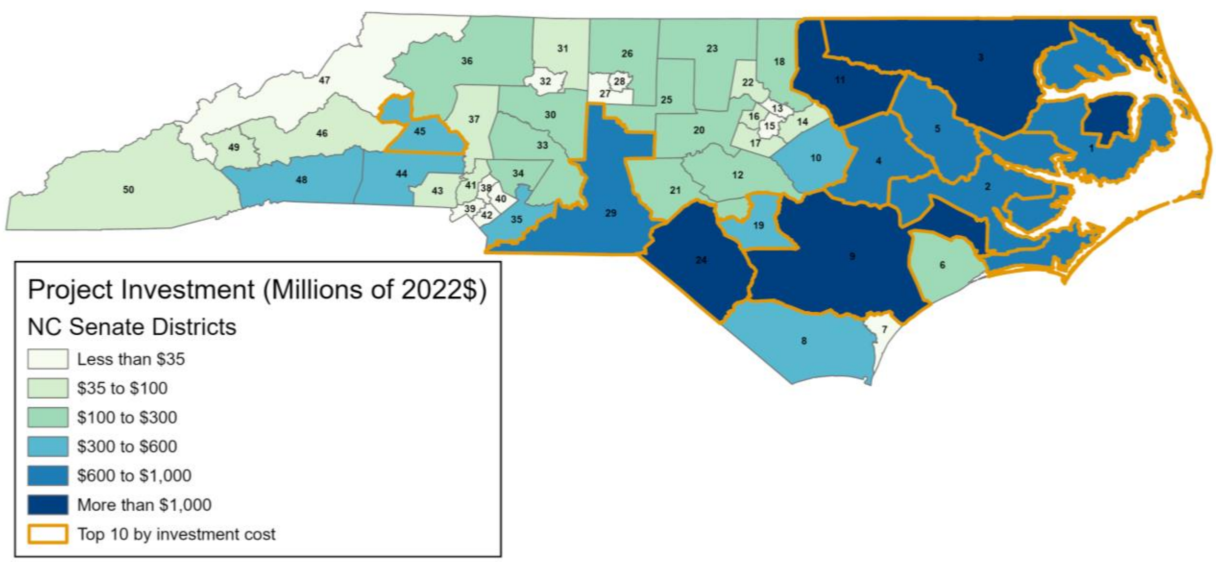


Table B-3. Major Investments in Renewable Energy Across North Carolina House Districts (Millions 2022$)

NC House District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
1	–	–	–	942.7	–	214.6	1,157.3
2	51.4	–	9.4	121.7	–	–	182.5
3	–	–	12.2	82.7	–	–	94.9
4	403.4	–	9.2	769.6	–	–	1,182.2
5	1.4	–	–	534.8	–	214.6	750.8
6	–	–	–	67.2	–	–	67.2
7	–	–	–	262.0	–	–	262.0
8	5.9	–	–	86.4	–	–	92.3
9	–	–	–	162.6	–	–	162.6
10	–	–	–	108.4	–	–	108.4
11	–	–	–	5.3	–	–	5.3
12	–	–	–	401.5	–	–	401.5
13	–	–	–	1.0	–	–	1.0
14	–	–	–	67.6	–	–	67.6
15	–	–	5.3	31.3	–	–	36.5
16	–	–	–	334.7	–	–	334.7
17	–	–	–	28.2	–	–	28.2
18	–	–	–	19.7	1.1	–	20.9
19	51.4	–	–	6.5	–	–	57.9
20	–	–	–	3.8	–	–	3.8
21	–	–	–	12.2	–	–	12.2
22	59.2	–	17.2	641.0	–	–	717.4
23	1.8	–	–	1,000.7	–	–	1,002.6
24	–	–	–	369.1	–	–	369.1
25	–	1.2	–	490.5	–	–	491.7
26	–	–	–	50.3	–	–	50.3
27	–	–	–	1,294.6	–	–	1,294.6
28	–	–	4.3	219.8	–	–	224.1
29	–	–	–	6.7	–	–	6.7
30	–	–	–	5.9	–	–	5.9
31	–	–	–	36.8	–	–	36.8
32	–	–	–	420.8	–	–	420.8
33	–	–	–	77.0	–	–	77.0
34	–	–	–	6.2	–	–	6.2

(continued)

Table B-3. Major Investments in Renewable Energy Across North Carolina House Districts (Millions 2022$) (continued)

NC House District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
35	–	–	–	4.6	–	–	4.6
36	–	–	17.1	11.4	–	–	28.4
37	–	–	–	61.1	–	–	61.1
38	–	–	–	21.7	–	–	21.7
39	–	–	–	23.6	–	–	23.6
40	–	–	–	7.9	–	–	7.9
41	–	–	–	5.6	–	–	5.6
42	–	–	–	0.3	–	–	0.3
43	–	–	–	333.6	–	–	333.6
44	–	–	–	0.3	–	–	0.3
45	–	2.9	–	246.0	–	–	248.9
46	–	–	2.7	391.3	–	–	394.0
47	127.1	–	–	479.9	–	–	607.0
48	–	–	–	484.2	–	–	484.2
49	–	–	–	21.7	–	–	21.7
50	–	–	–	127.2	–	–	127.2
51	–	–	–	105.9	–	–	105.9
52	–	–	–	245.1	–	–	245.1
53	–	–	–	120.2	–	–	120.2
54	–	15.0	–	163.1	–	–	178.0
55	–	–	–	544.6	–	–	544.6
56	–	–	–	3.8	1.5	–	5.4
57	–	–	–	11.0	–	–	11.0
58	–	–	–	3.0	–	–	3.0
59	–	–	3.9	78.6	–	–	82.6
60	–	–	–	3.4	–	–	3.4
61	–	–	–	1.7	1.4	–	3.1
62	–	–	–	14.3	–	–	14.3
63	–	–	–	29.4	–	–	29.4
64	–	–	–	90.2	–	–	90.2
65	2.5	–	2.2	100.0	–	–	104.8
66	–	–	–	4.8	–	–	4.8
67	–	–	25.6	180.8	–	–	206.4
68	–	–	–	15.6	–	–	15.6

(continued)

Table B-3. Major Investments in Renewable Energy Across North Carolina House Districts (Millions 2022$) (continued)

NC House District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
69	–	–	–	3.7	–	–	3.7
70	–	–	–	38.6	–	–	38.6
71	4.0	–	–	17.5	–	–	21.5
72	–	–	6.7	2.4	2.4	–	11.6
73	–	–	31.3	9.1	16.7	–	57.1
74	–	–	–	3.9	–	–	3.9
75	–	–	–	8.1	–	–	8.1
76	1.4	–	–	102.8	–	–	104.2
77	–	–	–	210.6	–	–	210.6
78	–	–	–	182.6	–	–	182.6
79	–	–	–	419.1	–	–	419.1
80	–	–	4.6	13.9	–	–	18.5
81	–	–	–	110.8	–	–	110.8
82	6.9	–	–	26.2	–	–	33.1
83	–	–	–	263.6	–	–	263.6
84	–	–	13.0	15.5	–	–	28.5
85	–	–	–	17.4	–	–	17.4
86	–	36.4	–	38.9	–	–	75.3
87	–	–	–	4.4	–	–	4.4
88	–	–	–	8.8	–	–	8.8
89	–	–	77.9	308.1	–	–	386.0
90	–	–	12.7	32.4	–	–	45.1
91	–	–	–	34.0	–	–	34.0
92	–	–	–	10.5	–	–	10.5
93	–	–	–	–	–	–	–
94	–	–	–	38.5	–	–	38.5
95	–	–	–	8.3	–	–	8.3
96	–	–	–	93.8	–	–	93.8
97	–	–	–	41.0	–	–	41.0
98	–	–	–	2.2	–	–	2.2
99	–	–	–	3.9	–	–	3.9
100	–	–	–	2.1	–	–	2.1
101	23.3	–	–	19.4	–	–	42.7
102	18.7	–	–	2.4	–	–	21.0

(continued)

Table B-3. Major Investments in Renewable Energy Across North Carolina House Districts (Millions 2022$) (continued)

NC House District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
103	–	–	–	3.0	–	–	3.0
104	–	–	–	3.0	–	–	3.0
105	3.9	–	–	4.0	–	–	8.0
106	–	–	5.1	7.1	–	–	12.2
107	–	–	–	11.2	–	–	11.2
108	–	–	–	59.4	–	–	59.4
109	–	–	–	20.8	–	–	20.8
110	–	–	13.0	134.9	–	–	147.9
111	–	1.8	–	554.1	–	–	555.9
112	–	–	–	5.8	–	–	5.8
113	–	–	–	38.8	–	–	38.8
114	–	–	–	15.1	–	–	15.1
115	–	–	–	21.9	–	–	21.9
116	–	–	4.0	27.3	–	–	31.3
117	–	–	–	25.9	2.9	–	28.8
118	–	–	–	13.8	–	–	13.8
119	–	–	–	3.9	–	–	3.9
120	–	–	–	59.1	–	–	59.1
Total	**762.4**	**57.3**	**277.4**	**15,709.0**	**26.1**	**429.3**	**17,261.5**

Figure B-3. Major Investments in Renewable Energy Across North Carolina House Districts (Millions 2022$)

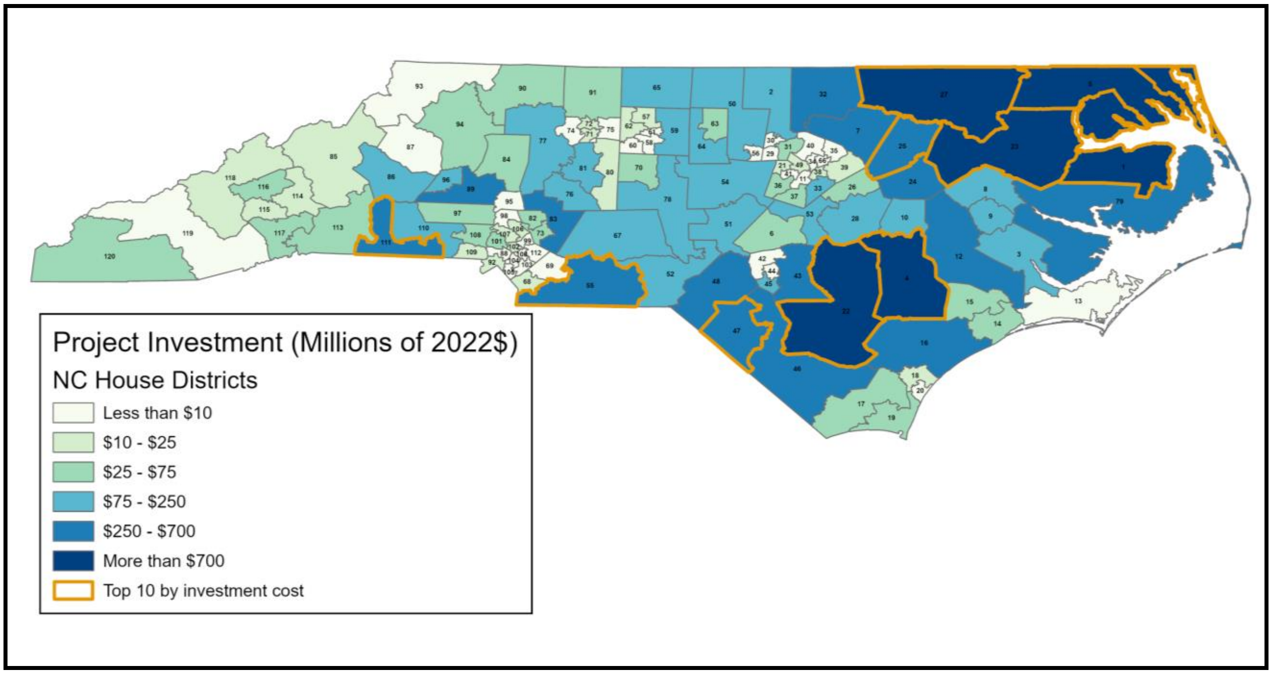
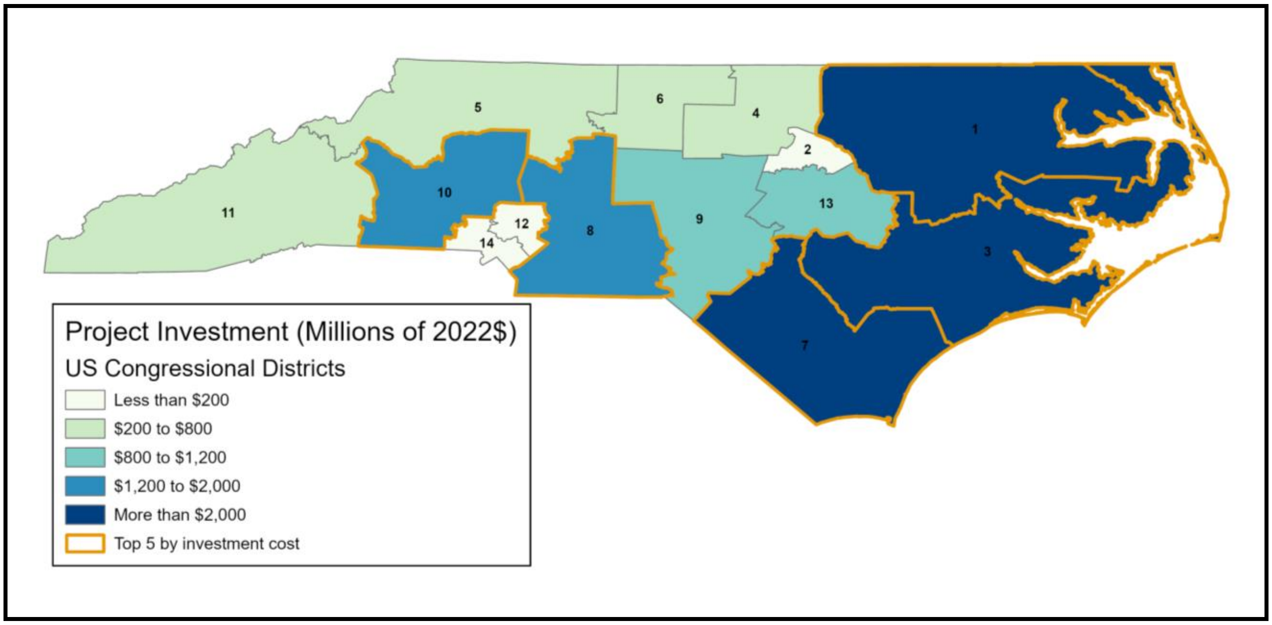


Table B-4. Major Investments in Renewable Energy Across North Carolina Congressional Districts (Millions 2022$)

NC Congressional District	Biomass	Hydro	Landfill Gas/ Fuel Cell	Solar Photovoltaic	Solar Thermal	Wind	Total
1	9.1	1.2	–	4,868.2	–	429.2	5,307.8
2	–	–	–	95.6	–	–	95.6
3	462.7	–	34.6	2,321.5	–	–	2,818.8
4	51.4	–	9.4	473.3	1.5	–	535.6
5	4.0	–	19.5	285.7	2.4	–	311.6
6	2.5	–	6.1	275.7	1.4	–	285.7
7	178.5	2.9	2.7	2,365.2	1.1	–	2,550.5
8	1.4	–	30.2	1,471.1	–	–	1,502.8
9	–	15.0	–	1,042.5	–	–	1,057.5
10	–	38.2	103.9	1,241.8	–	–	1,383.9
11	–	–	4.0	197.4	2.9	–	204.3
12	25.5	–	36.4	72.2	16.7	–	150.8
13	–	–	30.6	871.9	–	–	902.5
Grand Total	**762.4**	**57.3**	**277.4**	**15,709.0**	**26.1**	**429.3**	**17,261.5**

Figure B-4. Major Investments in Renewable Energy Across North Carolina Congressional Districts (Millions 2022$)



References

Advantage Investment Group LLC. (2004). “Application to Transfer Spencer Mountain Hydroelectric Station.” SP-143 Sub 0. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed January 15, 2013.

ASU News. (2009). “Appalachian Installs Wind Turbine on Campus.” http://www.news.appstate.edu/2009/06/24/wind-turbine-on-campus/. Accessed January 15, 2013.

Bipartisan Policy Center. (2009). “Projected Impacts of Proposed Federal Renewable Energy Portfolio Standards on the North Carolina Economy.” Washington, DC: Bipartisan Policy Center.

Bosch Group. (2007). “Green Home Raleigh.” http://www.fhp-mfg.com/?p=view_case_study&n=7. Accessed January 15, 2013.

Brooks Energy. (2008). “Registration Statement.” SP-140 Sub 1. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed January 15, 2012.

Bureau of Labor Statistics (2023). “CPI Index”. Washington, DC: Bureau of Labor Statistics.

Capital Power. (2011). “Capital Power Confirms Strategic Direction.” http://www.capitalpower.com/ MediaRoom/newsreleases/2011-news-releases/Pages/062011.aspx. Accessed January 15, 2013.

Cliffside Mills LLC. (2008). “Registration Statement.” SP-147 Sub 1. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed January 15, 2013.

Coastal Carolina Clean Power LLC. (2008). “Petition to Construct a Cogeneration Plant in Duplin Co. & Petition for Renewable Energy Facility.” SP-161 Sub 1. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Dominion North Carolina Power. (2010). “Application for Approval of a Cost Recovery Rider for Demand Side Mgmt./ Energy Efficiency Measures.” E-22 Sub 464. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

Dominion North Carolina Power. (2011). “Application for Approval of Cost Recovery for Demand-Side Management & Energy Efficient Program.” E-22 Sub 473. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

Dominion North Carolina Power. (2012). “Dominion’s Application for Approval of Cost Recovery for Demand-side Management & Energy Efficiency.” E-22 Sub 486. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

Dominion North Carolina Power. (2013). “Direct Testimony of David L. Turner Filed 8-20-2013 with Application.” E-22 Sub 494. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Dominion North Carolina Power. (2014). “2014 REPS Compliance Plan” Filed on August 28, 2014

Dominion North Carolina Power. (2015a). “ORDER APPROVING REPS AND REPS EMF RIDERS AND 2014 REPS COMPLIANCE (12-16-2015)”

Dominion North Carolina Power. (2015b). “E-22 sub 524 Petition for Cost Recovery for DSM - "Application for Approval of Cost Recovery for DSM Programs and EE Measures Exhibit" No. DLT-1 Schedule 7”

Dominion North Carolina Power. (2017). E-22 Sub 556 - "Application of Dominion Energy NC for Approval of Cost Recovery for DSM/EE Measures”

Dominion North Carolina Power. (2018). E-22 Sub 556 - "Application of Dominion Energy NC for Approval of Cost Recovery for DSM/EE Measures”

Dominion North Carolina Power. (2019). “Application for Approval of Cost Recovery for Demand-Side Management & Energy Efficient Program.” E-22 Sub 589. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed March 15th. 2021

Dominion North Carolina Power. (2020). “Application for Approval of Cost Recovery for Demand-Side Management & Energy Efficient Program.” E-22 Sub 556. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed March 15th. 2021

Dominion North Carolina Power. (2022). “Application for Approval of Cost Recovery for Demand-Side Management & Energy Efficient Program.” E-22 Sub 645. https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=1fad01b6-103d-4da0-b8d3-70791c6df0e7. Accessed March 16th, 2023

Duke Energy Carolinas, LLC. (2009a). “Agreement and Joint Stipulation of Settlement.” E-7 Sub 831. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Duke Energy Carolinas, LLC. (2009b). “Renewable Energy and Energy Efficiency Portfolio Standards.” E-7 Sub 872. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Duke Energy Carolinas, LLC. (2010). “Application for Approval of REPS Cost Recovery.” E-7 Sub 936. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Duke Energy Carolinas, LLC. (2011). “Duke Energy’s 2010 REPS Compliance Report and Application for Approval of REPS Cost Recovery.” E-7 Sub 984. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Duke Energy Carolinas, LLC. (2012a). “Duke’s REPS Cost Recovery Rider and 2011 REPS Compliance Report.” E-7 Sub 1008. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 22, 2013.

Duke Energy Carolinas, LLC. (2012b). “Duke Energy Carolinas, LLC’s 2011 REPS Compliance Report and Application for Cost Recovery.” E-7 Sub 1034. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Duke Energy Carolinas, LLC. (2013). “Integrated Resource Plan (Annual Report). http://www.duke-energy.com/pdfs/DEC_2013_IRP_10.23.2013.pdf. Accessed February 14, 2014.

Duke Energy. (2014). “Order Approving REPS and REPS EMF Rider and 2013 REPS Compliance”

Duke Energy Carolinas, LLC. (2016). “DEC's Supplemental Testimony and Exhibits of Miller and Evans Motion for Additional Public Hearing” E-7 Sub 1105.

Duke Energy Carolinas, LLC. (2017a). “DEC's Application for Approval of Demand-Side Management and Energy Efficiency Rider” E-7 Sub 1130.

Duke Energy Carolinas, LLC. [DEC] (2017b). “Duke Energy Carolinas, LLC Small Generator Interconnection Consolidated Annual Report” E-100 sub 113b. Available at http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=ba7 a50f1-4c40-48aa-8a14-da1b131fe5f6. Accessed September 1, 2017.

Duke Energy Carolinas, LLC. (2018a). “DEC's Application for Approval of Demand-Side Management and Energy Efficiency Rider” E-7 Sub 1131.

Duke Energy Carolinas, LLC. (2018b) (January 08, 2019). Docket No. E-2, Sub 1167. “Duke Energy Progress, LLC and Duke Energy Carolinas, LLC’s Rebate Applications Status”. Available at https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=2bf7e2ec-dfb5-4a72-b251-0a8601d3aca5. Accessed March 20, 2019.

Duke Energy Carolinas, LLC. (2018). “Application of Duke Energy Carolinas, LLC for Approval of Renewable Energy and Energy Efficiency Portfolio Standard (REPS) Compliance Report and Cost Recovery Rider Pursuant to N.C.G.S 62-133.8 and Commission Rule R8-67”. Available at https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=b1b9dcde-efbe-4a05-b29a-a5dd68a5b4e1. Accessed March 15, 2021.

Duke Energy Carolinas, LLC. (2019). “Application of Duke Energy Carolinas, LLC for Approval of Renewable Energy and Energy Efficiency Portfolio Standard (REPS) Compliance Report and Cost Recovery Rider Pursuant to N.C.G.S 62-133.8 and Commission Rule R8-67”. Available at https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=63f3677d-fc27-43cc-ade4-375b2bb04a21. Accessed March 15, 2021.

Duke Energy Carolinas, LLC. (2020). “Duke Energy Progress, LLC and Duke Energy Carolinas, LLC’s Solar Rebate Program Annual Report and Request to Amend Program Application Periods”. Docket No. E-2, Sub 1167 and E-7, Sub 1166.

Duke Energy Carolina, LLC. (2021) “NC Solar Rebate Program”. Accessed March 15th, 2021.

Duke Energy. (2012). “Bridgewater Hydroelectric Station.” http://www.duke-energy.com/pdfs/Bridgewater-Hydroelectric-Station.pdfhttp://www.duke-energy.com/pdfs/Bridgewater-Hydroelectric-Station.pdf. Accessed January 15, 2013.

Duke Energy. (2013). “Duke Energy Renewables Completes Solar Farm in Eastern N.C.” Jan. 10, 2013. http://www.duke-energy.com/news/releases/ 2013011001.asp. Accessed February 12, 2013.

Duke Energy. (2014). “Order Approving REPS and REPS EMF Rider and 2013 REPS Compliance”

Duke Energy. (2015a). “Order Approving REPS and REPS EMF Rider and 2014 REPS Compliance”

Duke Energy. (2015b). Docket No. E-7 Sub 1050 "Application for Approval of DSM EE Rider and Testimonies of Duuf, McGee, and Ham”

Duke Energy. (2017). Docket No. E-100 Sub 147 "REPS Compliance Plan Revisions”

Duke Energy. (2018). Docket No. E-12 Sub 1167 "REPS Compliance Plan Revisions”

Duke Energy Progress [DEP] (2017). “Duke Energy Progress, LLC Small Generator Interconnection Consolidated Annual Report” E-100 sub 113b. Available at http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=180 a6184-c982-4136-bf4f-70a8bf2455be. Accessed September 1, 2017.

Duke Energy Progress [DEP] (2018). “Application of Duke Energy Progress, LLC for Approval of Renewable Energy and Energy Efficiency Portfolio Standard (REPS) Compliance Report and Cost Recovery Rider Pursuant to N.C.G.S 62-133.8 and Commission Rule R8-67”. Available at: https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=45a8ad8b-d294-4503-9208-1f15a38f3dda. Accessed March 15, 2021.

Duke Energy Progress [DEP] (2019). “Application of Duke Energy Progress, LLC for Approval of Renewable Energy and Energy Efficiency Portfolio Standard (REPS) Compliance Report and Cost Recovery Rider Pursuant to N.C.G.S 62-133.8 and Commission Rule R8-67”. Available at https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=fe2b1a3e-1240-45e7-92d6-69ad4c0123df. Accessed March 15, 2021.

Duke Energy Progress [DEP] (2022). “Duke Energy Progress, LLC’s Application for Approval of DemandSide Management and Energy Efficiency Cost Recovery Rider Docket No. E-2, Sub 1294”. Available at https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=fd44805b-9e62-4a7d-bf6f-875748a11b33. Accessed March 15, 2022.

Electric Light & Power. (2017). “Amazon Wind Farm US East completed in North Carolina.” http://www.elp.com/articles/2017/02/amazon-wind-farm-us-east-completed-in-north-carolina.html

ElectriCities. (2009). “2009 REPS Compliance Plans and 2008 REPS Compliance Reports.” E-100 Sub 125. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

ElectriCities. (2010). “2010 REPS Compliance Plans and 2009 REPS Compliance Reports.” E-100 Sub 129. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

ElectriCities. (2011a). “2011 REPS Compliance Plans and 2010 REPS Compliance Reports.” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

ElectriCities. (2011b). “NCEMPA’s Revised 2008 REPS Compliance Report.” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2011c). “NCEMPA’s Revised 2009 REPS Compliance Report.” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2011d). “NCEMPA’s 2010 REPS Compliance Report (Redacted).” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2011e). ”NCMPA1’s Revised 2008 REPS Compliance Report (Redacted).” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2011f). “NCMPA1’s Revised 2009 REPS Compliance Report.” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2011g). “NCMPA1’s 2010 REPS Compliance Report.” E-100 Sub 131. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2012a). “2012 REPS Compliance Plans and 2011 REPS Compliance Reports.” E-100 Sub 135. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

ElectriCities. (2012b). “NCEMPA’s 2011 REPS Compliance Report—Public Version.” E-100 Sub 135. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2012c). “NCMPA1’s 2011 REPS Compliance Report—Public Version.” E-100 Sub 135. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2013a). “2013 REPS Compliance Plans & 2012 REPS Compliance Reports.” E-100 Sub 139. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed February 14, 2014.

ElectriCities. (2013b). “NCEMPA’s REPS Compliance Report for 2012.” E-100 Sub 139. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2013c). “NCMPA1’s 2011 REPS Compliance Report for 2012.” E-100 Sub 139. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2014a). “NCEMPA's 2013 REPS Compliance Report, Docket No. E-100, Sub 143 (8-28-2014)” http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed March 15, 2016.

ElectriCities. (2014b). “NCMPA1’s 2013 REPS Compliance Report for 2013.” E-100 Sub 143. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

ElectriCities. (2015a). “NCEMPA's 2014 REPS Compliance Report, Docket No. E-100, Sub 145 (9-1-2015)” http://www.ncuc.commerce.state.nc.us /docket.htm Accessed March 15, 2016.

ElectriCities. (2015b). “NCMPA1's 2014 REPS Compliance Report, Docket No. E-100, Sub 145 (9-1-2015)” http://www.ncuc.commerce.state.nc.us /docket.htm Accessed March 15, 2016.

EPCOR USA North Carolina, LLC. (2009). “Order Issuing Amended Certificates, Accepting Registration Statement, and Issuing Declaratory Ruling.” Docket SP-165 Sub 3. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed January 20, 2013.

General Assembly of North Carolina. (2011). Session Law 2011-55. “Senate Bill 75: An Act to Promote the Use of Electricity Demand Reduction to Satisfy Renewable Energy Portfolio Standards.” http://www.ncleg.net/ Sessions/2011/Bills/Senate/PDF/S75v4.pdf. Accessed on January 15, 2013.

GreenCo. (2010a). “2008 REPS Compliance Reports.” EC-83 Sub 1. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

GreenCo. (2010b). “Amended Energy Efficiency Approval Requests.” EC-83 Sub 0. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

GreenCo. (2010c). “Investigation of Integrated Resource Planning in NC-2010.” E-100 Sub 128. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

GreenCo. (2012a). “2012 REPS Compliance Plans & 2011 REPS Compliance Reports.” E-100 Sub 135. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed November 1, 2012.

GreenCo. (2012b). “2012 Biennial Integrated Resource Plans and Related 2012 REPS Compliance Plans.” E-100 Sub 137. http://www.ncuc.commerce.state.nc.us/ docket.htm. Accessed February 14, 2014.

GreenCo. (2013). “2013 REPS Compliance Plans & 2012 REPS Compliance Reports.” E-100 Sub 139. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed February 14, 2014.

GreenCo. (2014). “GreenCo Solutions, Inc.'s Redacted 2013 REPS Compliance.” E-100 Sub 143 http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed March 15, 2016.

GreenCo. (2014). “GreenCo Solutions, Inc.'s Redacted 2014 REPS Compliance.” E-100 Sub 145 http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed March 15, 2016

GreenCo. (2021). “2020 REPS Compliance Plants and 2019 REPS Compliance Reports.” E-100 Sub 168 https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=d93a5d05-3e1f-460d-8bb2-e1ef397af943. Accessed March 17, 2021

International Energy Agency (IEA) Energy Technology Network. (2010). “Technology Brief E07: Geothermal Heat and Power.”

Kleinschmidt. “Jordan Hydroelectric Project.” http://www.kleinschmidtusa.com/projects/hydro-engineering/jordan-hydroelectric-project/. Accessed January 15, 2013.

Lawrence, S., Loomis, R., Stevens R., Heller K., Pereira, A., Gilbert C., et al. (2013). *The Economic, Utility Portfolio, and Rate Impact of Clean Energy Development in North Carolina – Final Report*. Prepared for the North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International. http://energync.org/assets/files/ RTI%20Study%202013.pdf.

Madison County School System. (2009). “Report of Proposed Construction & Registration Statement for 2.4 kW Grid Tied Turbine.” SP-432 Sub 1. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Madison Hydro Partners. (2010). “Registration Statement for Hydroelectric Facility Named Ivy River Dam.” SP-781 Sub 0. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

MIG, Inc., (2012). “IMPLAN System: Software North Carolina 2011 Data.” 1725 Tower Drive West, Suite 140, Stillwater, MN 55082 www.implan.com.

MIG, Inc., (2021). “IMPLAN System: Software North Carolina 2018 Data.” 1725 Tower Drive West, Suite 140, Stillwater, MN 55082 www.implan.com.

National Renewable Energy Laboratory (NREL). (2011a). “Break-Even Cost for Residential Solar Water Heating in the United States: Key Drivers and Sensitivities.” http://www.nrel.gov/docs/fy11osti/48986.pdf. Accessed January 15, 2013.

National Renewable Energy Laboratory (NREL). (2011b). “A Broad Overview of Energy Efficiency and Renewable Energy Opportunities for Department of Defense Installations.” http://www.nrel.gov/docs/fy11osti/ 50172.pdf. Accessed January 22, 2013.

National Renewable Energy Laboratory (NREL). (2012a). “Tracking the Sun V: A Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2011.” http://eetd.lbl.gov/sites/all/files/ publications/lbnl-5919e-report.pdf. Accessed December 4, 2011.

National Renewable Energy Laboratory (NREL). (2012b). “PVWatts Grid Data Calculator (Version 2).” http://www.nrel.gov/rredc/pvwatts/grid.html. Accessed January 15, 2013.

National Renewable Energy Laboratory (NREL). (2012c). “Jobs and Economic Development Solar Photovoltaic Model.” http://www.nrel.gov/analysis/jedi/. Accessed December 4, 2011.

National Renewable Energy Laboratory (NREL). (2012d). “Jobs and Economic Development Wind Model.” http://www.nrel.gov/analysis/jedi/. Accessed December 4, 2011.

News and Observer. (2012). “Company Building Gigantic Solar Water Heating System at Turkey Plant.” http://www.newsobserver.com/2012/03/24/1955756/nc-company-building-gigantic-solar.html. Accessed January 15, 2013.

North Carolina Department of Commerce. (2010). “Recovery Act Funds Support Innovative N.C. Energy Projects.” May 27, 2010. http://www.thrivenc.com/newsand events/recovery-act-funds-support-innovative-nc-energy-projects. Accessed January 15, 2013.

North Carolina Department of Commerce. (2013). “2014 Utility Savings Initiative (USI) Annual Report.” November 1, 2015. Raleigh, NC: North Carolina Department of Commerce.

North Carolina Department of Commerce. (November 1, 2015). “Annual Report for the Utility Savings Initiative for Fiscal Year July 1, 2014–June 30, 2015.” Raleigh, NC: North Carolina Department of Commerce.

North Carolina Department of Commerce. (November 1, 2015). “Annual Report for the Utility Savings Initiative for Fiscal Year July 1, 2014–June 30, 2015.” Raleigh, NC: North Carolina Department of Commerce.

North Carolina Department of Commerce. (July 14, 2023). “County Distress Rankings (Tiers).” Raleigh, NC: North Carolina Department of Commerce.

North Carolina Department of Environmental Quality (2019a). “Comprehensive Program to Manage Energy, Water, and Other Utility Use for State Agencies and State Institutions of Higher Learning.” February 1, 2019. Raleigh, NC: North Carolina Department of Environmental Quality.

North Carolina Department of Environmental Quality (2019b). “Comprehensive Program to Manage Energy, Water, and Other Utility Use for State Agencies and State Institutions of Higher Learning.” December 1, 2019. Raleigh, NC: North Carolina Department of Environmental Quality.

North Carolina Department of Environmental Quality (NC DEQ). (May 1, 2017). Personal communication with Len Hoey.

North Carolina Department of Environmental Quality (NCDEQ). (March 15, 2020). Personal communication with Michael Rogers.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2007–2016). Unaudited NC-478G. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2007). “Energy Tax Credit Generated, Process Year 2007.” Unpublished. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2008). “Energy Tax Credit Generated, Process Year 2008.” Unpublished. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2009). “Energy Tax Credit Generated, Process Year 2009.” Unpublished. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2010). “Energy Tax Credit Generated, Process Year 2010.” Unpublished. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2011a). “Energy Tax Credit Generated, Process Year 2011.” Unpublished. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2011b). “Unaudited NC-478G Forms.” Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Revenue Research Division. (2012a). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2012.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Policy Analysis and Statistics Division. (2012b). “Energy Tax Credit Generated, Process Year 2012.” Unpublished. Raleigh, NC: North Carolina Department of Revenue, Policy Analysis and Statistics Division.

North Carolina Department of Revenue, Revenue Research Division. (2013). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2013.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2014). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2013.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2015). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2013. (Preliminary)” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2015). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2014.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2016). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2015.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2017). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2016.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2018). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2017.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division.

North Carolina Department of Revenue, Revenue Research Division. (2019). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2018.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division

North Carolina Department of Revenue, Revenue Research Division. (2020). “Credit for Investing in Renewable Energy Property Processed during Calendar Year 2019.” Raleigh, NC: North Carolina Department of Revenue, Revenue Research Division

North Carolina Renewable Energy Tracking System (NC-RETS). Available at http://www.ncrets.org/. Accessed April 3, 2017.

North Carolina Renewable Energy Tracking System (NC-RETS). Available at http://www.ncrets.org/. Accessed April 3, 2018.

North Carolina Renewable Energy Tracking System (NC-RETS). Available at http://www.ncrets.org/. Accessed March 15, 2021.

North Carolina GreenPower. (April 10, 2017). Personal communication with Katie Lebrato.

North Carolina GreenPower. (March 30th, 2021). Personal communication with Katie Lebrato.

North Carolina Utilities Commission (2014b). “Order Approving 2011 REPS Compliance and Requiring Additional Measurement and Verification of Energy Efficiency Measures.” E-100 sub 135. Available at http://starw1.ncuc.net/NCUC/portal/ncuc/portal.aspx. Accessed September 29, 2014.

North Carolina Utilities Commission (2020). “2020 REPS Compliance Plans and 2019 REPS Compliance Reports”. E-100, Sub 163. Raleigh, NC: North Carolina Utilities Commission.

North Carolina Utilities Commission (2021a). “2020 REPS Compliance Plans and 2019 REPS Compliance Reports”. E-100, Sub 168. Raleigh, NC: North Carolina Utilities Commission.

North Carolina Utilities Commission (2021b). “ORDER APPROVING REPS AND REPS EMF RIDERS AND 2020 REPS COMPLIANCE REPORT”. E-7, Sub 1246. Raleigh, NC: North Carolina Utilities Commission.

North Carolina Utilities Commission (2022). “ORDER APPROVING REPS AND REPS EMF RIDERS AND 2021 REPS COMPLIANCE REPORT”. E-7, Sub 1264. Raleigh, NC: North Carolina Utilities Commission.

Oregon Department of Energy. (2012). “Basic Solar Information.” http://www.oregon.gov/energy/RENEW/ Solar/docs/BasicSolarInformation.pdf. Accessed January 15, 2013.

Prestage Farms Incorporated. (2011). “Report of Proposed Construction and Registration Statement.” SP-1209 Sub 0. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Progress Energy Carolinas, Inc. (2008). “Application for Approval of DSM & Energy Efficiency Cost Recovery & Testimony & Exhibits of Evans.” E-2 Sub 931. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Progress Energy Carolinas, Inc. (2009a). “Application for Approval of DSM & Energy Efficiency Cost Recovery Rider.” E-2 Sub 951. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Progress Energy Carolinas, Inc. (2009b). “Renewable Energy and Energy Efficiency Portfolio Standard Compliance Report.” E-2 Sub 948. http://www.ncuc.commerce.state.nc.us/docket.htm. Accessed January 15, 2013.

Progress Energy Carolinas, Inc. (2010a). “2009 Annual REPS Compliance Report and Application for Approval of REPS Cost Recovery Rider.” E-2 Sub 974. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Progress Energy Carolinas, Inc. (2010b). “Application for Approval of DSM and Energy Efficiency Cost Recovery Rider.” E-2 Sub 977. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Progress Energy Carolinas, Inc. (2011a). “Application for Approval of DSM and Energy Efficiency Cost Recovery and Direct Testimony.” E-2 Sub 1002. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Progress Energy Carolinas, Inc. (2011b). “Petition for Approval of REPS Cost Recovery Rider Per G.S. 62-133.8 & Comm. Rule R8-67.” E-2 Sub 1000. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Progress Energy Carolinas, Inc. (2012a). “2012 Annual Renewable Energy and Energy Efficiency Portfolio Standard Compliance Report (REPS).” E-2 Sub 1020. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed January 15, 2013.

Progress Energy Carolinas, Inc. (2012b). “Application for Approval of DSM and Energy Efficiency Cost Recovery Rider.” E-2 Sub 1019. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Progress Energy Carolinas, Inc. (2012c). “Progress Energy Carolinas Integrated Resource Plan.” http://www.energy.sc.gov/files/view/ProgressEnergyResource%20Plan2012.pdf. Accessed February 14, 2014.

Progress Energy Carolinas, Inc. (2013a). “Application for Approval of Renewable Energy Efficiency Portfolio Standard (REPS) Cost Recovery Rider.” E-2 Sub 1032. http://www.ncuc.commerce.state.nc.us /docket.htm. Accessed February 14, 2014.

Progress Energy Carolinas, Inc. (2015). Order Approving REPS and REPS EMF Rider and 2014 REPS Compliance

Progress Energy Carolinas, Inc. (2016). “Duke Energy Progress, LLC's Application for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider.” E-2 Sub 1108.

Progress Energy Carolinas, Inc. (2017). “Duke Energy Progress, LLC's Application for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider.” E-2 Sub 1174.

Progress Energy Carolinas, Inc. (2018). “Duke Energy Progress, LLC's Application for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider.” E-2 Sub 1174.

Progress Energy Carolinas, Inc. (2019). “Duke Energy Progress, LLC's Application for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider.” E-2 Sub 1206.

Progress Energy Carolinas, Inc. (2020). “Duke Energy Progress, LLC's Application for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider.” E-2 Sub 1252.

Regulatory Assistance Project. (2005). “Electric Energy Efficiency and Renewable Energy in New England: An Assessment of Existing Policies and Prospects for the Future.” Montpelier, VT: Regulatory Assistance Project.

RETScreen International. (2004). “Passive Solar Heating Project Analysis.” http://www.retscreen.net/ang/passive_solar_heating_e_textbook_chapter.php. Accessed February 17, 2014.

RTI International. (2014). *Economic Impact Analysis of Clean Energy Development in North Carolina – 2014 Update*. Prepared for the North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

RTI International. (2015). *Economic Impact Analysis of Clean Energy Development in North Carolina—2015 Update*. Prepared for North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

RTI International. (2016). *Economic Impact Analysis of Clean Energy Development in North Carolina—2016 Update*. Prepared for North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

RTI International. (2017). *Economic Impact Analysis of Clean Energy Development in North Carolina—2017 Update*. Prepared for North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

RTI International. (2019). *Economic Impact Analysis of Clean Energy Development in North Carolina—2019 Update*. Prepared for North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

RTI International. (2021). *Economic Impact Analysis of Clean Energy Development in North Carolina—2019 Update*. Prepared for North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

RTI International and La Capra Associates. (2013). *The Economic, Utility Portfolio, and Rate Impact of Clean Energy Development in North Carolina*. Prepared for the North Carolina Sustainable Energy Association. Research Triangle Park, NC: RTI International.

U.S. Bureau of Labor Statistics. (2023). “Consumer Price Index All Urban Consumers.” http://www.bls.gov/cpi/#data. Accessed March 15, 2023.

U.S. Energy Information Administration (EIA). (2011). Form EIA-923 Annual Electric Utility Database. http://www.eia.gov/electricity/data/eia923/index.html. Accessed January 15, 2013.

U.S. Energy Information Administration (EIA). (2012). Form EIA-923 Annual Electric Utility Database. http://www.eia.gov/electricity/data/eia923/index.html. Accessed February 15, 2014.

U.S. Energy Information Administration (EIA). (2012). AEO2013 Early Release Overview. http://www.eia.gov/forecasts/aeo/er/index.cfm.

U.S. Energy Information Administration (EIA). (2013). “Updated Capital Cost Estimates for Utility Scale Electricity Generating Plants.” http://www.eia.gov/forecasts/capitalcost/pdf/updated_capcost.pdf.

U.S. Energy Information Administration (EIA). (2015a). “Average monthly residential electricity consumption, prices, and bills by state”. www.eia.gov/tools/faqs/faq.cfm?id=97&t=3

U.S. Energy Information Administration (EIA). (2015b). Electric Power Annual Data. http://www.eia.gov/electricity/annual/?src=Electricity-f4

U.S. Energy information Administration (EIA). (2016). “Assumptions to the Annual Energy Outlook 2016.” http://www.eia.gov/forecasts/aeo/assumptions/pdf/electricity.pdf.

U.S. Energy Information Administration (EIA). (2016). “Electric Power Monthly.” http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a. Accessed April 10, 2017.

U.S. Energy Information Administration (EIA). (2018). “Average Price of Electricity to Ultimate Customers.” Available at https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_03. Accessed February 15, 2019.

U.S. Energy Information Administration (EIA). (2018). “Electric Power Annual - Net Generation by State by Type of Producer by Energy Source”. https://www.eia.gov/electricity/data/state/ Accessed March 18, 2019.

U.S. Energy Information Administration (EIA). (2020). “Electric Power Annual - Net Generation by State by Type of Producer by Energy Source”. https://www.eia.gov/electricity/data/state/ Accessed March 15, 2021.