

Local Government Clean Energy Report

Asheville, North Carolina



NC SUSTAINABLE
ENERGY ASSOCIATION

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Asheville, North Carolina

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About North Carolina Sustainable Energy Association

North Carolina Sustainable Energy Association (NCSEA) is the leading 501(c)(3) non-profit organization that drives public policy and market development for clean energy. Our work enables clean energy jobs, economic opportunities, and affordable energy options for North Carolinians. Learn more about NCSEA, our mission, and vision at www.energync.org.



Introduction

Highlights

- Of the 10 cities with the most residential solar photovoltaic (solar PV) systems, Asheville has the most systems per 1,000 people.
- Of the 10 cities with the largest residential solar PV capacity, Asheville has the 3rd highest capacity per 1,000 people.
- Of the 10 counties in North Carolina with the highest number of electric vehicles and plug-in hybrid electric vehicles per 1,000 people, Buncombe County ranks 5th.
- Of the 10 counties in North Carolina with the highest total populations, Buncombe County ranks 3rd in the number of electric vehicles per 1,000 people.

Where does this data come from?

Solar PV and Wind

Before electricity-generating systems can be interconnected, they must register with paperwork that is filed to the North Carolina Utilities Commission (NCUC). This paperwork includes Reports of Proposed Construction (ROPs) and Certificates of Public Convenience and Necessity (CPCNs), depending on their generating capacity. NCSEA tracks these ROP and CPCN filings and compiles them into the Renewable Energy Database (REDB), which is the source of information for this report. The REDB is the most comprehensive source of data on clean energy systems in the state, and includes information on system technology type, size, and location.

What does the REDB contain?

| | |
|--|---|
| • Application Information | • System Notes |
| • NCUC Docket Number | • Poultry Waste, Swine Waste, Rooftop, Ground-mount, etc. |
| • Docket Description | • System Capacity |
| • Application Date, Quarter, and Year | • System Total Cost and Cost per Watt |
| • Facility Type | • To whom the electricity and RECs are sold |
| • Residential, Commercial, etc. | • Installer Company |
| • Project Name | • Whether the system has been installed |
| • Account Holder Company | • System Operation Date, Year, and Quarter |
| • Project Location | • How the system information was verified |
| • Address, City, County, NCSEA Region, State, Zip Code, Lat/Long | • Political Districts in which system is located |
| • General System Type | • NC House and Senate |
| • Biomass, Solar, Wind, etc. | • US Senate |
| • Specific System Type | |
| • Biogas, PV, Thermal, Waste to Heat, etc. | |

Figure 1. Information contained in NCSEA's Renewable Energy Database (REDB)



How does NCSEA define renewable energy categories?

While there is no industry standard for defining renewable energy system categories, based on research and internal discussion, NCSEA groups them into three general categories which depend on their location, size, and/or use:

1. **Residential** - a renewable energy system of any generating capacity that is installed on or near a home/residence and produces electricity for use in that home/residence.
2. **Commercial/Industrial** - a renewable energy system with a generating capacity under 2 MW (AC) that is installed on or near a non-residential building that produces electricity for use in that non-residential building.
3. **Utility-Scale** - a renewable energy system with a generating capacity of 2 MW (AC) or greater that generates electricity for sale to an electricity utility.

Background Information

North Carolina is a leader in renewable energy, and specifically in solar PV systems. As of Q3 2021, North Carolina has the fourth most installed solar PV capacity in the United States, with over 7,460 MW.¹

While most of that capacity comes from utility-scale solar PV systems, there are many residential and commercial/industrial systems across the state too. Solar PV, however, is not the only type of renewable energy technology that contributes electricity to our grid. In fact, there are many hydroelectric, bioenergy, and wind systems in North Carolina, but this report focuses on solar PV and wind, since those are the only renewable energy systems in Asheville.



Current Renewable Energy Systems in Asheville

All Systems

Asheville has almost 700 renewable energy generating systems, most of which are residential (91%). All but one of these systems are solar PV; the other is a wind energy system.

| CATEGORY | # OF SYSTEMS | CAPACITY (MW) |
|-------------|--------------|---------------|
| RESIDENTIAL | 632 | 3.8 |
| COMMERCIAL | 62 | 2.4 |
| TOTAL | 694 | 6.2 |

Table 1. Renewable energy systems in Asheville by category

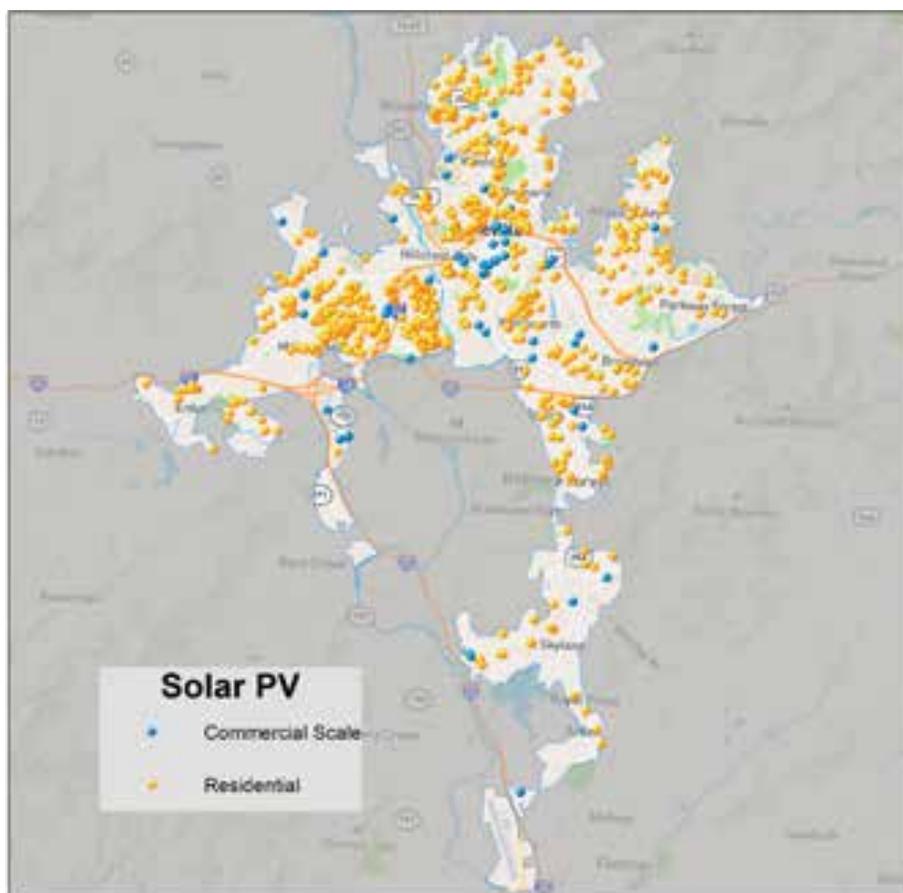


Figure 2. Solar PV systems installed in Asheville



Commercial System Subcategories

Renewable energy systems in Asheville serve a variety of commercial purposes including breweries, a hotel, and many offices.

| SUBCATEGORY | # OF SYSTEMS | CAPACITY (MW) |
|----------------------|--------------|---------------|
| OFFICE | 13 | 0.07 |
| RETAIL | 12 | 1.25 |
| HEALTHCARE | 8 | 0.32 |
| BEVERAGE | 5 | 0.29 |
| EDUCATION | 5 | 0.06 |
| RELIGIOUS FACILITY | 4 | 0.10 |
| GOVERNMENT | 3 | 0.04 |
| WAREHOUSE | 3 | 0.06 |
| RETIREMENT COMMUNITY | 2 | 0.02 |
| NON-PROFIT | 1 | 0.02 |
| BAR | 1 | 0.01 |
| APARTMENT/CONDOS | 1 | 0.05 |
| EMERGENCY SERVICES | 1 | 0.02 |
| RECREATION | 1 | 0.04 |
| HOTEL | 1 | 0.02 |
| HOUSING | 1 | 0.05 |

Table 2. Commercial renewable energy systems in Apex by subcategory



Asheville’s Renewable Energy Systems Compared to Other Cities in North Carolina

Of the 10 cities in North Carolina with the most residential solar PV systems, Asheville has the most systems per 1,000 people - with almost 15% more than the next highest city.²

| CITY | # OF RESIDENTIAL SOLAR PV SYSTEMS | POPULATION | RESIDENTIAL SOLAR PV SYSTEMS PER 1,000 PEOPLE |
|---------------|-----------------------------------|------------|---|
| ASHEVILLE | 632 | 94,589 | 6.68 |
| FUQUAY-VARINA | 199 | 34,152 | 5.83 |
| HOLLY SPRINGS | 195 | 41,239 | 4.73 |
| CARY | 589 | 174,721 | 3.37 |
| DURHAM | 908 | 283,506 | 3.20 |
| RALEIGH | 1,032 | 467,665 | 2.21 |
| CHARLOTTE | 1,693 | 874,579 | 1.94 |
| WILMINGTON | 152 | 115,451 | 1.32 |
| WINSTON-SALEM | 308 | 249,545 | 1.23 |
| GREENSBORO | 362 | 299,035 | 1.21 |

Table 3. Residential solar PV systems per 1,000 people in 10 cities in NC with the most systems

Of the 10 cities in North Carolina with the most residential solar PV capacity, Asheville has the third most capacity per 1,000 people.³

| CITY | TOTAL CAPACITY (KW) | POPULATION | CAPACITY PER 1,000 PEOPLE |
|---------------|---------------------|------------|---------------------------|
| FUQUAY-VARINA | 1,338.0 | 34,152 | 1.37 |
| HOLLY SPRINGS | 1,304.7 | 41,239 | 1.14 |
| ASHEVILLE | 3,733.7 | 94,589 | 0.49 |
| WILMINGTON | 1,060.3 | 115,451 | 0.41 |
| CARY | 4,125.1 | 174,721 | 0.27 |
| WINSTON-SALEM | 1,887.1 | 249,545 | 0.19 |
| DURHAM | 5,429.0 | 283,506 | 0.17 |
| GREENSBORO | 2,224.4 | 299,035 | 0.16 |
| RALEIGH | 6,546.4 | 467,665 | 0.10 |
| CHARLOTTE | 10,280.4 | 874,579 | 0.05 |

Table 4. Residential solar PV capacity per 1,000 people in 10 cities in NC with most capacity



Renewable Energy Systems Since 2011

Since 2011, most of the new renewable energy systems have been residential. Over that time, the number of residential systems has grown by over 6,000%, while the number of commercial systems has grown by 500%.

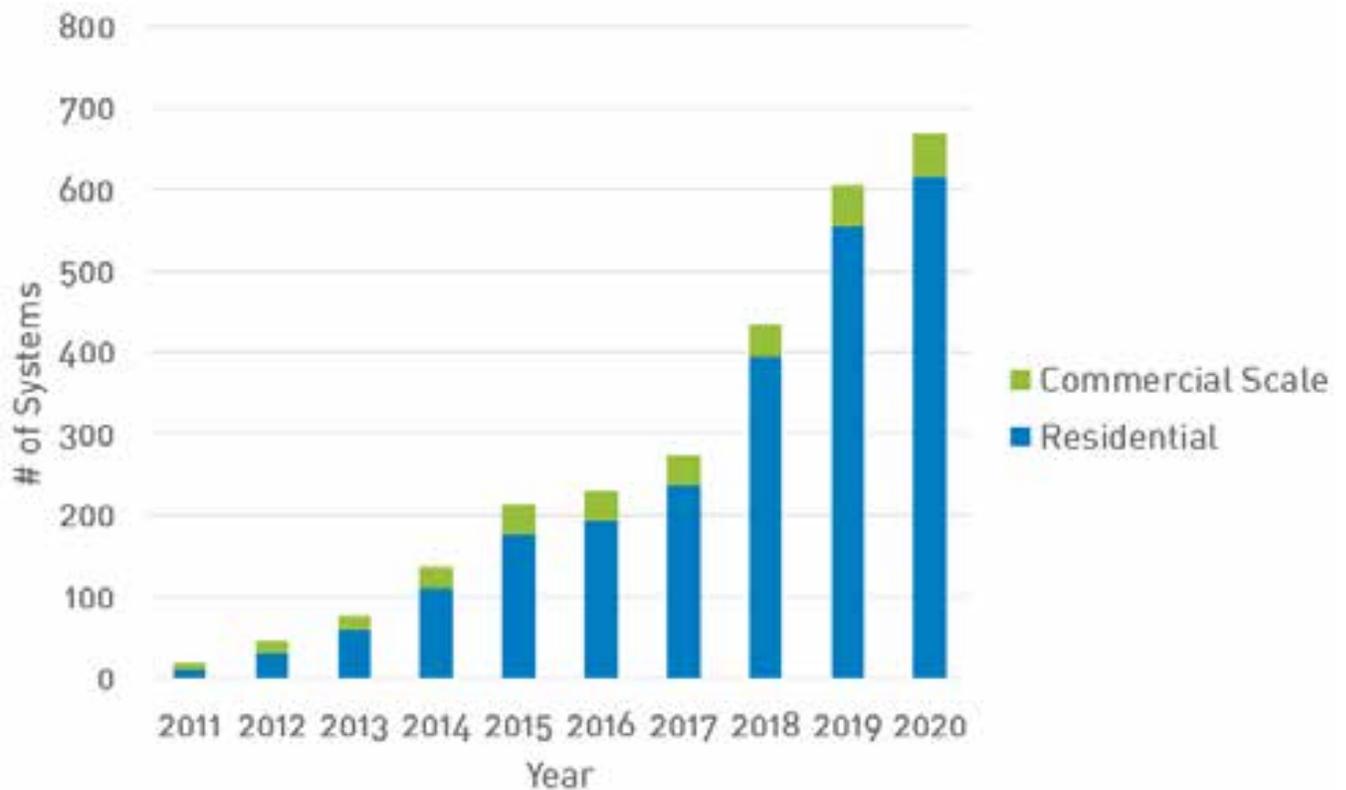


Figure 3. Cumulative renewable energy systems installed in Asheville, 2011-2020



Since 2011, residential capacity has increased over three times more than commercial capacity, with 7566% and 2568%, respectively.

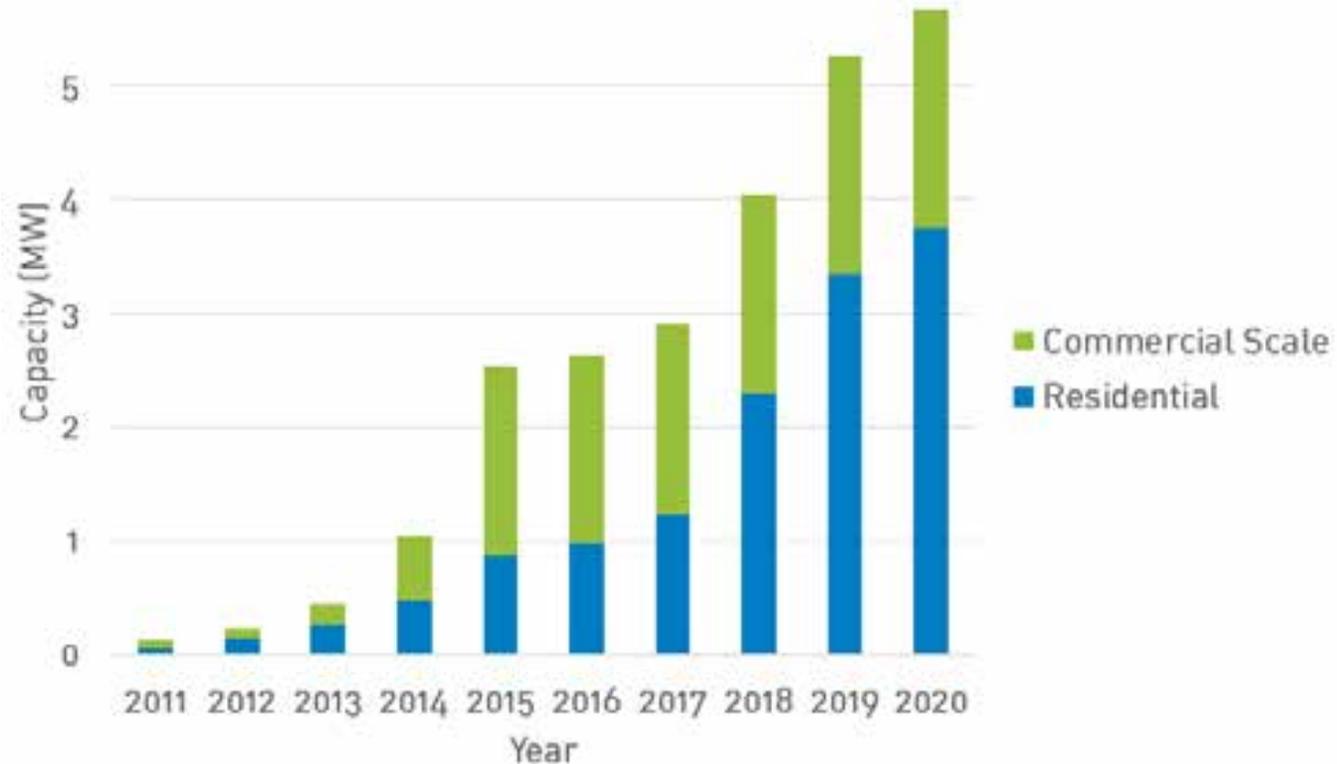


Figure 4. Cumulative renewable energy generating capacity installed in Asheville, 2011-2020



City of Asheville’s (Buncombe County) Clean Energy Timeline

While both the City of Asheville and Buncombe County have committed to 100% clean energy goals, both entities have taken many more actions to improve their energy efficiency and increase their renewable energy.^{4,5} Some of these other actions are listed on the chart on the following page.

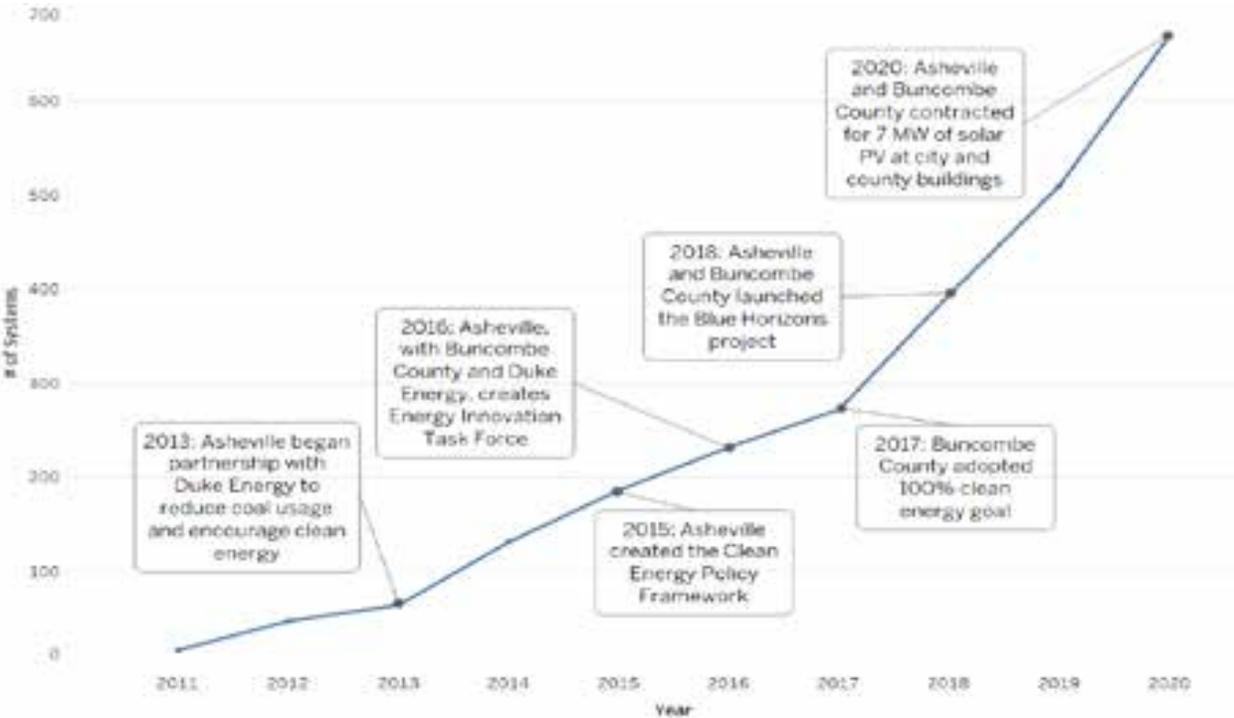


Figure 5. Key clean energy related actions in Asheville and Buncombe County

Energy Efficient Buildings

Types of Certification: ENERGY STAR® and LEED®

Two of the most popular certifications for buildings to demonstrate their energy efficiency are ENERGY STAR and LEED. For commercial buildings, the US Environmental Protection Agency’s ENERGY STAR program helps building owners benchmark their energy usage and assigns each building a score according to its efficiency.⁶ The median score of these buildings is 50, and those with scores of 75 or more are eligible for ENERGY STAR certification.⁷

Leadership in Energy and Environmental Design (LEED) is a program run by the US Green Building Council that focuses on whole building sustainability, including water use reduction and improved indoor air quality, in addition to building energy efficiency.⁸ There are a variety of certifications that can be achieved depending on the use of the building and its stage of development.⁹

Both ENERGY STAR and LEED maintain datasets of the buildings that currently meet their certification standards.^{10,11}



Asheville currently has 42 certified energy efficient buildings, with slightly more LEED certified ones (22) than ENERGY STAR ones (20).

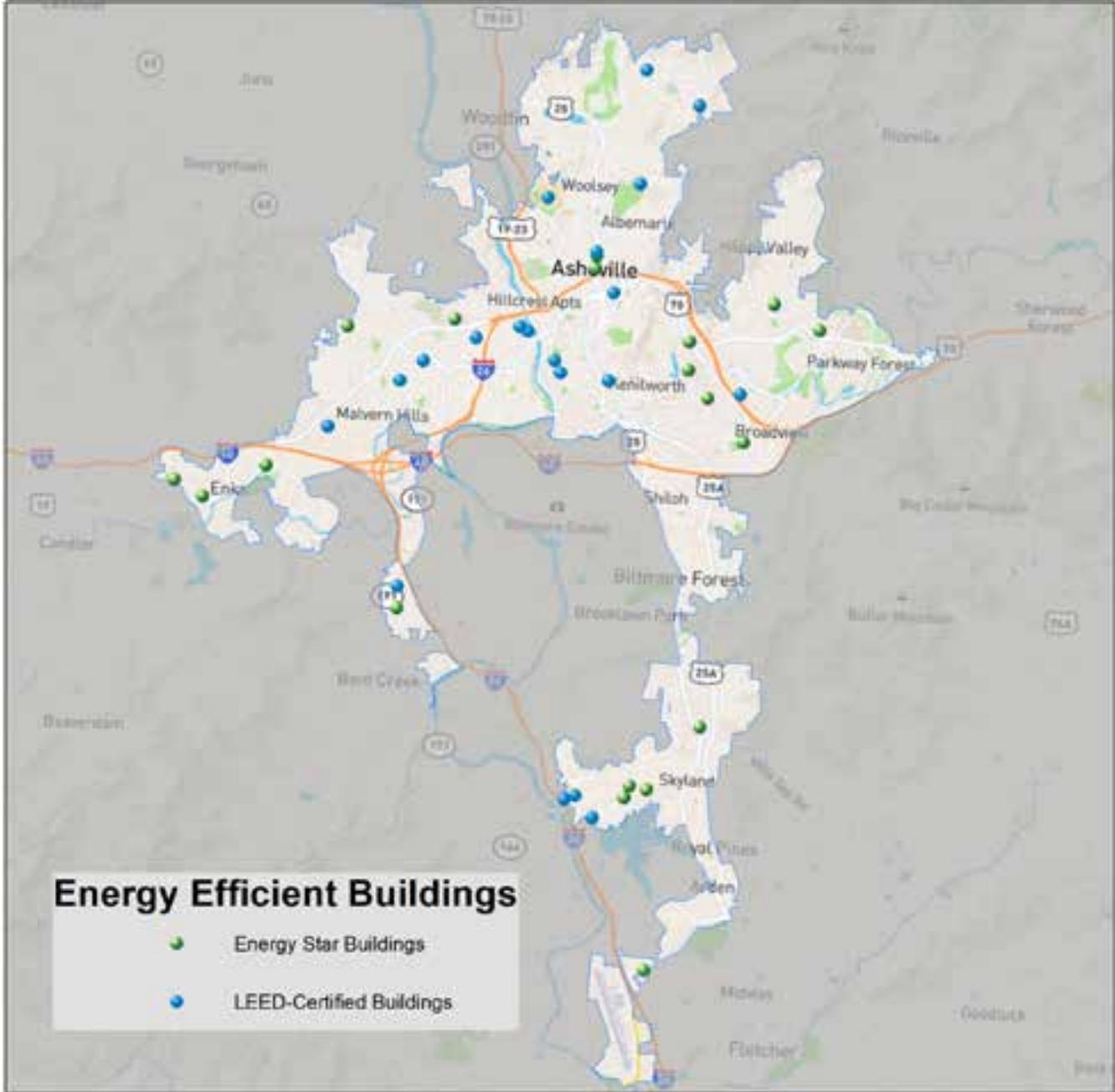


Figure 6. Certified energy efficient buildings in Asheville



Of the cities in North Carolina with the most certified energy efficient buildings, Asheville has the 6th most per 1,000 people.¹²

| CITY | LEED-CERTIFIED BUILDINGS | ENERGY STAR BUILDINGS | TOTAL ENERGY EFFICIENCY CERTIFIED BUILDINGS | POPULATION | ENERGY EFFICIENCY CERTIFIED BUILDINGS PER 1,000 PEOPLE |
|---------------|--------------------------|-----------------------|---|------------|--|
| CHARLOTTE | 449 | 298 | 747 | 874,579 | 0.85 |
| GREENSBORO | 200 | 45 | 245 | 299,035 | 0.82 |
| CHAPEL HILL | 30 | 13 | 43 | 61,960 | 0.69 |
| DURHAM | 102 | 57 | 159 | 283,506 | 0.56 |
| RALEIGH | 129 | 107 | 236 | 467,665 | 0.50 |
| ASHEVILLE | 22 | 20 | 42 | 94,589 | 0.44 |
| CARY | 24 | 40 | 64 | 174,721 | 0.37 |
| WILMINGTON | 16 | 23 | 39 | 115,451 | 0.34 |
| WINSTON-SALEM | 37 | 33 | 70 | 249,565 | 0.28 |
| FAYETTEVILLE | 24 | 23 | 47 | 200,501 | 0.23 |

Table 5. Certified energy efficient buildings per 1,000 people in 10 NC cities with the most total energy efficiency certified buildings



Electric Vehicles

As part of NC Department of Transportation's (DOT) Zero Emission Vehicle (ZEV) Plan, DOT began releasing North Carolina vehicle registration information online. This information includes the number of electric and plug-in hybrid electric vehicles by county.^{13,14}

For context, Asheville is in Buncombe County and has 1,825 registered electric vehicles. This is third most registered EVs per 1,000 people of the ten counties in North Carolina with the highest population.¹⁵

| COUNTY | ELECTRIC VEHICLES | PLUG-IN HYBRID ELECTRIC VEHICLES | TOTAL ELECTRIC VEHICLES | POPULATION | ELECTRIC VEHICLES PER 1,000 PEOPLE |
|-------------|-------------------|----------------------------------|-------------------------|------------|------------------------------------|
| WAKE | 6,679 | 2,520 | 9,199 | 1,129,410 | 8.1 |
| DURHAM | 1,519 | 710 | 2,229 | 324,833 | 6.9 |
| BUNCOMBE | 1,112 | 713 | 1,825 | 269,452 | 6.8 |
| MECKLENBURG | 4,221 | 1,616 | 5,837 | 1,115,482 | 5.2 |
| UNION | 841 | 294 | 1,135 | 238,267 | 4.8 |
| CADARRUS | 556 | 209 | 765 | 225,804 | 3.4 |
| GUILFORD | 1,024 | 487 | 1,511 | 541,299 | 2.8 |
| FORSYTH | 597 | 375 | 972 | 382,590 | 2.5 |
| GASTON | 276 | 145 | 421 | 227,943 | 1.8 |
| CUMBERLAND | 371 | 231 | 602 | 334,728 | 1.8 |

Table 6. Total electric vehicles per 1,000 people in NC's ten most populous counties

Buncombe County has the 5th most number of registered electric vehicles per 1,000 people when compared to counties of any population size.¹⁶

| COUNTY | ELECTRIC VEHICLES | PLUG-IN HYBRID ELECTRIC VEHICLES | TOTAL ELECTRIC VEHICLES | POPULATION | ELECTRIC VEHICLES PER 1,000 PEOPLE |
|-------------|-------------------|----------------------------------|-------------------------|------------|------------------------------------|
| ORANGE | 1,162 | 535 | 1,697 | 148,696 | 11.4 |
| CHATHAM | 528 | 213 | 741 | 76,285 | 9.7 |
| WAKE | 6,679 | 2,520 | 9,199 | 1,129,410 | 8.1 |
| DURHAM | 1,519 | 710 | 2,229 | 324,833 | 6.9 |
| BUNCOMBE | 1,112 | 713 | 1,825 | 269,452 | 6.8 |
| MECKLENBURG | 4,221 | 1,616 | 5,837 | 1,115,482 | 5.2 |
| UNION | 841 | 294 | 1,135 | 238,267 | 4.8 |
| MOORE | 276 | 134 | 410 | 99,727 | 4.1 |
| NEW HANOVER | 630 | 289 | 919 | 225,702 | 4.1 |
| DARE | 83 | 57 | 140 | 36,915 | 3.8 |

Table 7. Registered electric vehicles per 1,000 people in counties with most electric vehicles



Electric Vehicle Charging Stations

There are a variety of sources for electric vehicle charging stations, ranging from federal government sources to private networks. Each source varies in how the stations and outlets are verified, so sometimes stations listed in our source may not be in another. For these reports, NCSEA uses the US Department of Energy’s Alternative Fuels Data Center database.¹⁷

Buncombe County has the 4th most electric vehicle charging stations of all the counties in North Carolina, with 51. Of the ten counties in North Carolina with the most electric vehicle charging stations, Buncombe County has the 6th most stations per 100 registered electric vehicles.

| COUNTY | ELECTRIC VEHICLE CHARGING STATIONS | TOTAL ELECTRIC VEHICLES | CHARGING STATIONS PER 100 ELECTRIC VEHICLES |
|-------------|------------------------------------|-------------------------|---|
| HENDERSON | 18 | 398 | 4.5 |
| ALAMANCE | 18 | 400 | 4.5 |
| DURHAM | 73 | 2,229 | 3.3 |
| CUMBERLAND | 19 | 602 | 3.2 |
| MECKLENBURG | 176 | 5,837 | 3.0 |
| BUNCOMBE | 51 | 1,825 | 2.8 |
| GUILFORD | 40 | 1,511 | 2.6 |
| CABARRUS | 18 | 765 | 2.4 |
| NEW HANOVER | 20 | 919 | 2.2 |
| WAKE | 186 | 9,199 | 2.0 |
| ORANGE | 24 | 1,697 | 1.4 |

Table 8. Electric vehicle charging stations per 100 registered electric vehicles



Endnotes

1. Solar Energy Industry Association (SEIA). "North Carolina Solar." <https://www.seia.org/state-solar-policy/north-carolina-solar>
2. The University of North Carolina at Chapel Hill: Carolina Demography. "First look at 2020 Census for North Carolina." <https://www.ncdemography.org/2021/08/12/first-look-at-2020-census-for-north-carolina/>
3. The University of North Carolina at Chapel Hill: Carolina Demography. "First look at 2020 Census for North Carolina." <https://www.ncdemography.org/2021/08/12/first-look-at-2020-census-for-north-carolina/>
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5. "Resolution of Buncombe County's Commitment to Strategic, Sustainable Priorities." <https://drive.google.com/file/d/1-T-LhbAVAz-jvEVBpUBeah8mhOOoxuCc/view>
6. ENERGY STAR. "About ENERGY STAR for Commercial Buildings." https://www.energystar.gov/about/origins_mission/energy_star_overview/about_energy_star_commercial_buildings
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13. North Carolina Department of Transportation. "North Carolina ZEV Plan: A Strategic Plan for Accelerating Electric Vehicle Adoption in North Carolina." <https://www.ncdot.gov/initiatives-policies/environmental/climate-change/Documents/nc-zev-plan.pdf>
14. North Carolina Department of Transportation. "ZEV Registration Data." <https://www.ncdot.gov/initiatives-policies/environmental/climate-change/Pages/zev-registration-data.aspx>
15. The University of North Carolina at Chapel Hill: Carolina Demography. "First look at 2020 Census for North Carolina." <https://www.ncdemography.org/2021/08/12/first-look-at-2020-census-for-north-carolina/>



16. The University of North Carolina at Chapel Hill: Carolina Demography. "First look at 2020 Census for North Carolina." <https://www.ncdemography.org/2021/08/12/first-look-at-2020-census-for-north-carolina/>
17. U.S. Department of Energy: Energy Efficiency & Renewable Energy. "Alternative Fuels Data Center: Electric Vehicle Charging Station Locations." https://afdc.energy.gov/fuels/electricity_locations.html#/analyze?region=US-NC&fuel=ELEC&ev_levels=1&ev_levels=2&ev_levels=dc_fast&access=public&access=private&country=US

