

2015

# North Carolina Clean Energy Industry Census



NC SUSTAINABLE  
ENERGY ASSOCIATION

# 2015 North Carolina Clean Energy Census

## **Authors:**

Robin Aldina  
Pierce Few  
Ivan Urlaub

## **Design:**

Samantha Radford

## **North Carolina Sustainable Energy Association:**

The NC Sustainable Energy Association (NCSEA) is a 501(c)(3) nonprofit membership organization of individuals, businesses, government and nonprofits interested in North Carolina's sustainable energy future. NCSEA is the leading North Carolina nonprofit devoted to leading public policy change and driving market development in ways that will create clean energy jobs.

Founded in 1978, NCSEA works every day to support and attract clean energy jobs, economic opportunities and affordable energy to benefit North Carolina. Today, our team of clean energy advisors, analysts and advocates works closely with policymakers, consumers and industry leaders to research, inspire and affect clean energy progress statewide.

## **Acknowledgements:**

NCSEA would like to thank all of the companies, institutions, and organizations that responded to the 2015 Southeast Clean Energy Industry Census. The willingness of respondents to generously donate their time and insights allows NCSEA to capture and share important data about the clean energy industry in North Carolina with regulators, legislators, and decision makers in the state and beyond.

NCSEA also appreciates the efforts of partner organization, Southface, on the Southeast Clean Energy Industry Census. Additional thanks are due to Karen Eller, Donna Hughes, and everyone at the Center for Urban Affairs and Community Services at North Carolina State University for their continued support of this project. The 2015 North Carolina Clean Energy Industry Census was made possible by the support of the Energy Foundation and the Foundation for the Carolinas.

*© 2016 NC Sustainable Energy Association. Any distribution of a modification, recreation, edit, or any other change in content, appearance or other aspect of a part or the entirety of this document without the express written consent of the NC Sustainable Energy Association is strictly forbidden.*

# Introduction

## About The Census

Since 2008, the NC Sustainable Energy Association (NCSEA) has surveyed companies, institutions, and organizations (collectively referred to as “Firms”) in the clean energy industry in order to quantify their impact on the state’s economy. The 2015 North Carolina Clean Energy Industry Census (North Carolina Census) represents the eighth edition of this survey and resulting report.

Since 2013 NCSEA has also produced an expanded Southeast Clean Energy Industry Census (Southeast Census). In 2015 NCSEA again partnered with Southface in Georgia to produce the Southeast Census.<sup>1</sup> These organizations are collectively referred to as the Partners. For the Southeast Census, the Partners surveyed firms to understand employment, revenue, and policy drivers of various sectors within each state and the southeast region clean energy industry. This report presents the survey results and analysis that pertains to North Carolina’s clean energy industry. Please visit [www.cleanenergyindustry.org](http://www.cleanenergyindustry.org) for information on the Southeast Census results.

Like the previous year, the 2015 Southeast Census results will also be incorporated into the US Department of Energy-funded Southeast Clean Energy Manufacturing Roadmap (Southeast Roadmap), which will provide an assessment of the region’s existing clean energy landscape and present a suite of considerations to grow the North Carolina and Southeast clean energy industry and market. The Southeast Roadmap and North Carolina Roadmap will be issued in mid-2016.

## Survey Process

Each Partner compiled a list of firms in its state. Each state-level Census relied on a common questionnaire developed by the Partners, as well as an online survey tool and phone-banking system managed by the North Carolina State University Center for Urban Affairs and Community Services (NC State).

## Data Analysis

NCSEA performed the analysis of all Census data with input from the Partners. NCSEA utilized the self-reported data from responding firms who classified themselves among a selection of clean energy business activities and sectors. This level of granularity allowed for the analysis of the activities being conducted within each clean energy sector of North Carolina’s economy. Data in this report is presented in aggregate in order to protect the privacy of responding firms, and includes a conservative modeling of firms that did not respond but are anticipated to be active in North Carolina’s clean energy industry. Readers interested in additional analysis on census data and related market intelligence should contact NCSEA staff directly at [info@energync.org](mailto:info@energync.org) with their questions.<sup>2</sup>

**Table 1. Clean Energy Business Activities**

Design or Construction of New Buildings
Sale of Building System Components
Sale of Renewable Energy Systems
Installation, Design, or Development of Renewable Energy Systems
Installation or Maintenance of Building System
Manufacturing/Production
Professional Services, Education, or Consulting
Research and Development

**Table 2. Clean Energy Business Sectors**

Alternative Fuel Vehicles
Biomass/Biofuels
Energy Efficiency
Energy Storage
Fuel Cells
Geothermal
Hydropower/Marine
Smart Grid
Solar
Wind

## About This Report

NCSEA created the Census to help measure the impact of North Carolina's clean energy policies and identify where policies are or are not achieving the results policymakers, economic developers, and industry envisioned. This report aims to provide a snapshot of the current state of the clean energy industry in North Carolina by addressing common questions such as:

- How many firms are currently working in the clean energy industry?
- What business sectors are they in, and what kinds of work are they doing?
- How many people are employed by these firms?
- How much revenue are these firms generating?
- What is the business climate surrounding these firms?
- What is going to drive continued growth in this industry going forward?

Presenting analysis on employment, revenues, geographic presence, export activity, and business climate, the North Carolina Census report has become an invaluable resource for stakeholders with myriad uses including:

- Benchmarking the overall industry and specific sectors;
- Supporting decision-makers in answering policy questions;
- Promoting the success of clean energy policies, businesses, and industries;
- Identifying policy challenges and possible solutions; and
- Tracking the development of clean energy markets in North Carolina.

For the 2015 analysis, the Partners utilized the approach taken by NCSEA during the first five iterations of the North Carolina Clean Energy Industry Census from 2008 – 2012, and again in 2014. This report presents direct findings from self-reported data provided by 678 firms operating within North Carolina. This is an additional 111 responses than were recorded in the 2014 Census, or an increase of more than 20% in response rate. This represents approximately 69% of the estimated 989 firms currently conducting clean energy related business in North Carolina, and an increase of 22% in response rate over last year.

These 678 responding firms and 311 modeled firms represent a significant portion of the state's clean energy industry, but certainly do not cover all activity. The conservative nature of the analysis means that the true economic impact of the clean energy industry in North Carolina is larger than what is presented in the 2015 Census. Please refer to Appendix B for greater detail of survey methodology. Additional data is available at [www.cleanenergyindustry.org](http://www.cleanenergyindustry.org).

## Related Policies

From 2007-2015, policies such as the Renewable Energy and Energy Efficiency Portfolio Standard (REPS)<sup>3</sup>, the state Renewable Energy Investment Tax Credit (REITC)<sup>4</sup> and government energy efficiency goals have allowed a clean energy market to form in North Carolina and our clean energy industry to develop and access the energy market, competing on price and quality, and building out a supply chain to benefit the entire North Carolina economy.

Despite policy uncertainty generated during the 2015 NC General Assembly long session and the expiration of the REITC at the end of the year, the clean energy industry in the state experienced tremendous growth, with double digit gains over 2014 in both jobs and revenues.

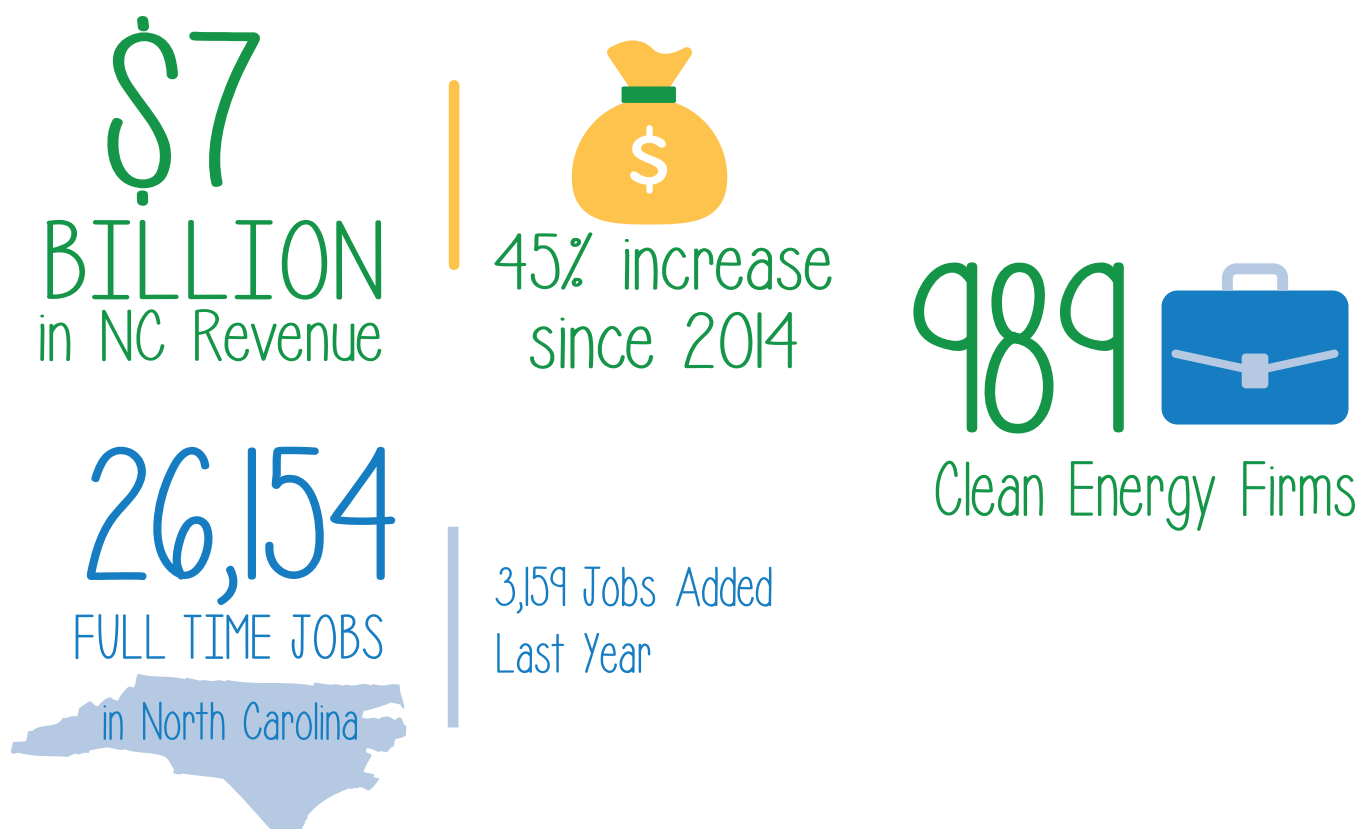
# Highlights

The clean energy industry in North Carolina has been a rapidly growing part of the state's economy since the first version of this report in 2008. It now boasts participation by approximately 1,000 firms, provides more than 26,000 full-time equivalent (FTE) jobs, and generates almost \$7 billion in annual gross revenues.

From 2014 to 2015, employment in the industry increased from 22,995 FTE to 26,154; an annual increase of 14% and over 3,000 more jobs for North Carolinians.

We've also seen an increase of \$2.1 billion in revenues generated by clean energy activities in the state since last year, reaching \$6.9 billion in the 2015 Census. Additional revenue allows companies to expand, add jobs, and create greater impact for our state and communities.

Figure 1. NC Clean Energy Firms, Revenue, and Employment



# Firms

The clean energy industry in North Carolina continues to be dominated by firms involved in the Energy Efficiency and Solar sectors, representing a combined 61% of all firms (41% Energy Efficiency, 20% Solar). The Geothermal sector is also well represented with another 10% of all firms.

Within all of the clean energy industry sectors, the activities of Design and Construction of New Buildings, and Professional Services, Education, or Consulting are the most numerous, accounting for 20% and 19% of all firms respectively. Various installation activities are also well represented with 14% of all firms engaged in Installation, Design, or Development of Renewable Energy Systems, and 13% involved in Installation or Maintenance of Building System Components.

Figure 2. NC Clean Energy Firms By Sector

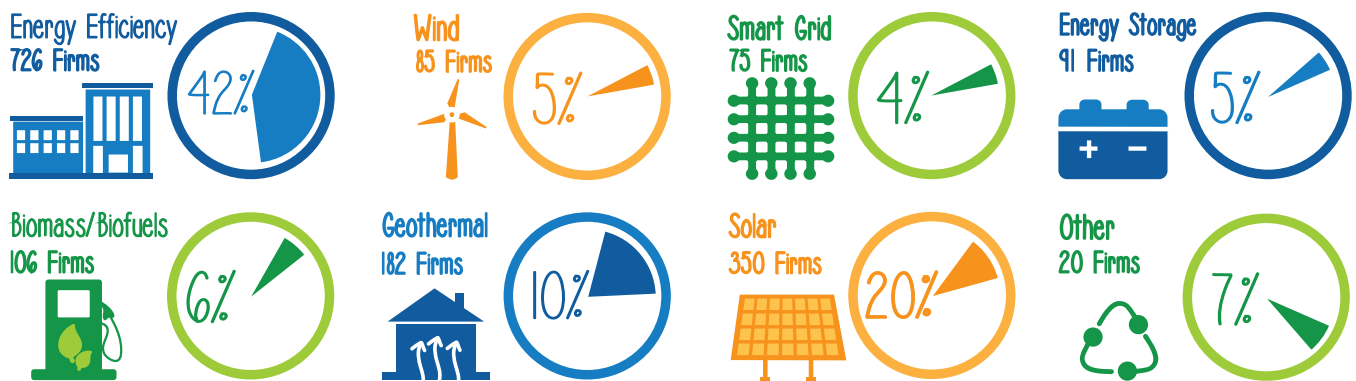


Table 3. NC Clean Energy Firms by Sector

Sector	Total	Percent
Alternative Fuel Vehicles	57	3%
Biomass/Biofuels	106	6%
Energy Efficiency	726	42%
Energy Storage	91	5%
Fuel Cells	16	1%
Geothermal	182	10%
Hydropower/Marine	49	3%
Smart Grid	75	4%
Solar	350	20%
Wind	85	5%
<b>Total</b>	<b>1,737</b>	<b>100%</b>

Table 4. NC Clean Energy Firms by Activity

Activity	Total	Percent
Design or Construction of New Buildings	362	20%
Sale of Building System Components	169	9%
Sale of Renewable Energy Systems	160	9%
Installation, Design, or Development of Renewable Energy Systems	261	14%
Installation or Maintenance of Building System Components	251	14%
Manufacturing/Production	104	6%
Power Generation	79	4%
Professional Services, Education, or Consulting	340	19%
Research and Development	101	6%
<b>Total</b>	<b>1,827</b>	<b>100%</b>

# Employment

Despite recurring policy uncertainty, the growth in clean energy employment in North Carolina has been steady and encouraging. The most notable finding in employment from this year's Census is the dominance of the Energy Efficiency sector as a clean energy employer. Accounting for approximately one half of all employment in the industry with 13,036 FTE, Energy Efficiency is certainly the leader in providing clean energy jobs. It is also interesting to note that the majority of jobs in Energy Efficiency are currently involved with the Design and Construction of New Buildings (3,375 FTE). This is promising both as an indicator of broad economic health in the state and as a signal that energy efficient buildings are in high demand.

Also worth noting about 2015 clean energy employment is the rise in jobs in the Wind sector. Up nearly seven-fold from 2014, there are now 1,721 FTE working on wind energy in North Carolina. The majority of these are involved in Installation, Design, or Development of Renewable Energy Systems, and may be associated with the announcement of North Carolina's first utility scale wind farm, Desert Wind, near Elizabeth City.

Figure 2. NC Clean Energy Firms By Sector

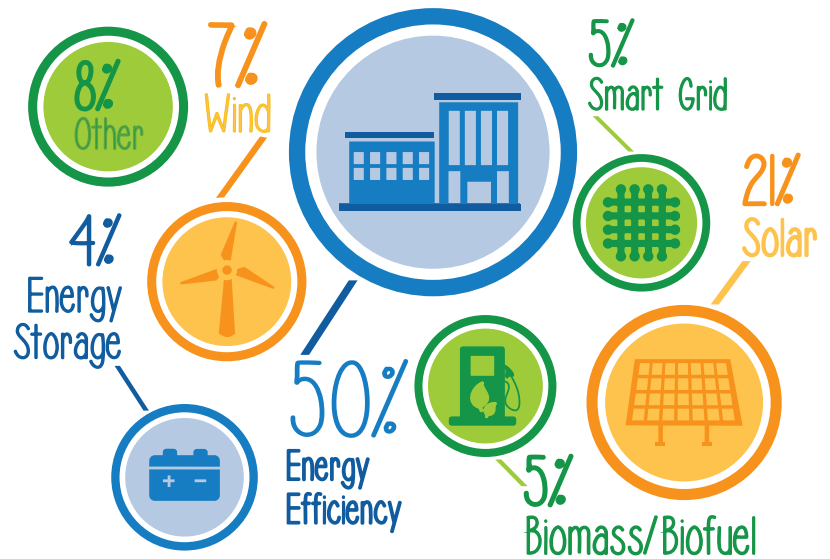


Table 5. NC Clean Energy Employment by Sector

Sector	Total	Percent
Alternative Fuel Vehicles	809	3%
Biomass/Biofuels	1,245	5%
Energy Efficiency	13,037	50%
Energy Storage	1,159	4%
Fuel Cells	244	1%
Geothermal	756	3%
Hydropower/Marine	350	1%
Smart Grid	1,291	5%
Solar	5,541	21%
Wind	1,721	7%
<b>Total</b>	<b>26,154</b>	<b>100%</b>

Table 6. NC Clean Energy Employment by Activity

Activity	Total	Percent
Design or Construction of New Buildings	4,286	16%
Sale of Building System Components	3,129	12%
Sale of Renewable Energy Systems	1,254	5%
Installation, Design, or Development of Renewable Energy Systems	5,502	21%
Installation or Maintenance of Building System Components	2,022	8%
Manufacturing/Production	4,298	16%
Power Generation	1,523	6%
Professional Services, Education, or Consulting	3,191	12%
Research and Development	950	4%
<b>Total</b>	<b>26,154</b>	<b>100%</b>

# Revenue

The Energy Efficiency sector was the top earner this year, bringing in more than \$2.3 billion, with the Design and Construction of New Buildings activity generating more than \$1 billion in clean energy revenue alone. Following closely behind Energy Efficiency was the Solar sector with earnings of \$1.8 billion. These top two sectors, however, only accounted for 60% of all clean energy industry revenues (34% and 26% respectively), compared with 73% (39% and 34% respectively) in 2014, showing strong and diverse growth across the industry.

Figure 4. NC Clean Energy Revenue By Sector

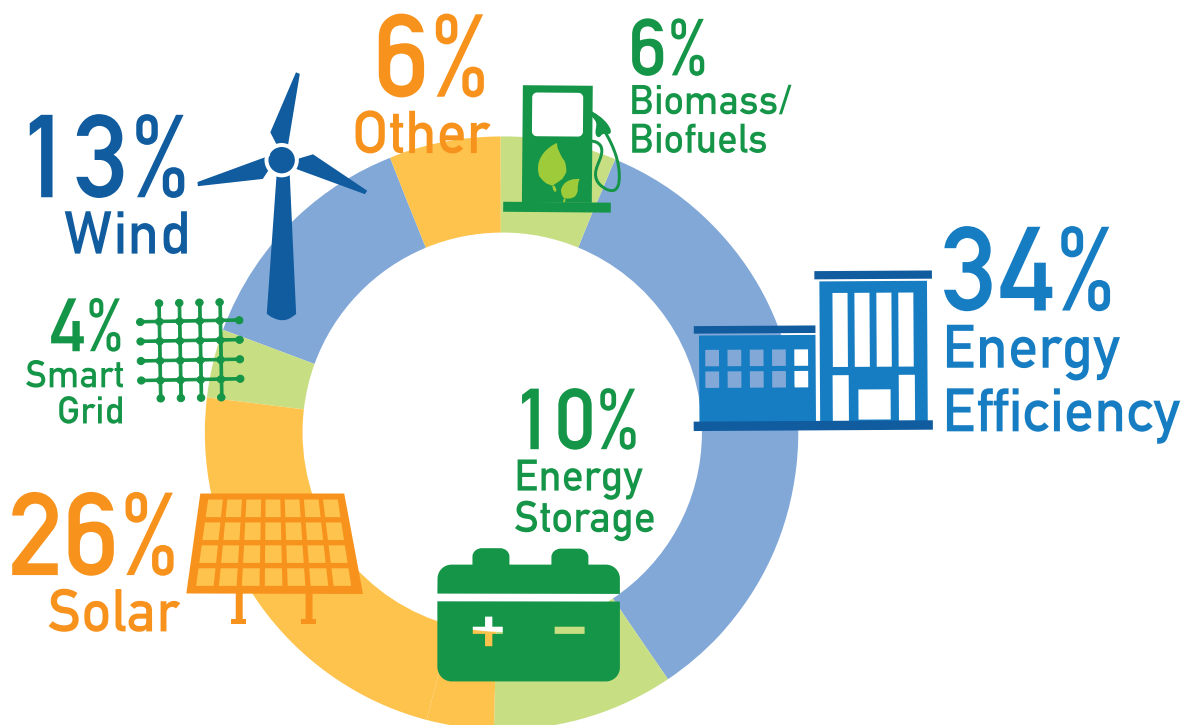


Table 7. NC Clean Energy Revenue By Sector

Sector	Revenue	Percent
Alternative Fuel Vehicles	\$220,833,392	3%
Biomass/Biofuels	\$433,673,029	6%
Energy Efficiency	\$2,356,116,119	34%
Energy Storage	\$681,930,463	10%
Fuel Cells	\$7,203,717	0.1%
Geothermal	\$92,225,361	1%
Hydropower/Marine	\$161,229,545	2%
Smart Grid	\$252,600,224	4%
Solar	\$1,839,185,860	26%
Wind	\$911,371,201	13%
<b>Total</b>	<b>\$6,956,368,912</b>	<b>100%</b>

Table 8. NC Clean Energy Revenue By Activity

Activity	Revenue	Percent
Design or Construction of New Buildings	\$1,552,220,217	22%
Sale of Building System Components	\$403,697,555	6%
Sale of Renewable Energy Systems	\$705,303,711	10%
Installation, Design, or Development of Renewable Energy Systems	\$1,809,618,738	26%
Installation or Maintenance of Building System Components	\$431,576,076	6%
Manufacturing/Production	\$481,798,220	7%
Power Generation	\$766,422,903	11%
Professional Services, Education, or Consulting	\$423,302,564	6%
Research and Development	\$382,428,929	5%
<b>Total</b>	<b>\$6,956,368,912</b>	<b>100%</b>



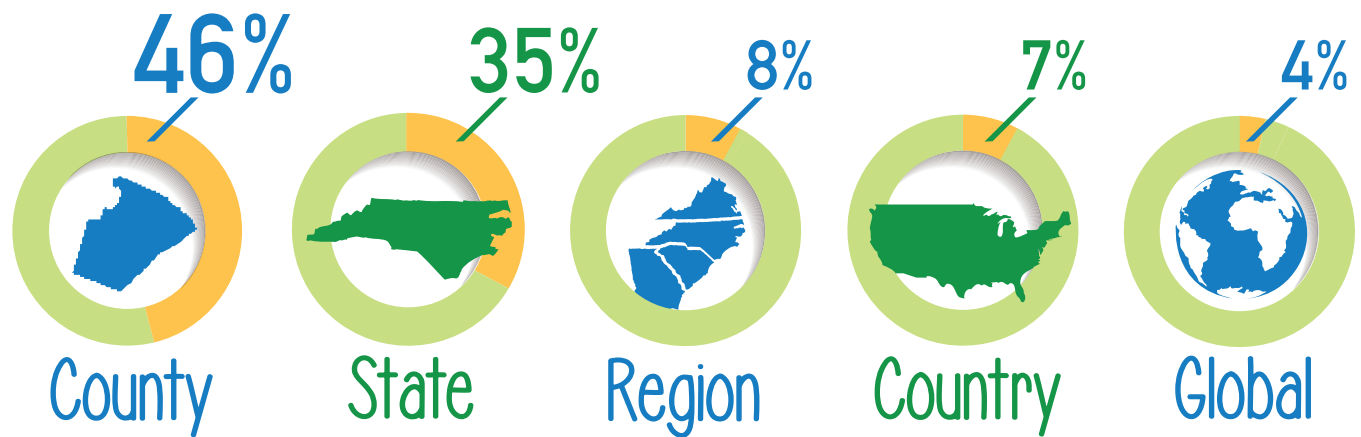
# Exports

While some clean energy goods and services generated in North Carolina remain close to home, nearly 20% of them land in markets outside the state. The products and services that are sold locally generally come from firms in the Geothermal and Energy Efficiency sectors, whose business activities are conducted close to their physical office locations. Indeed, 91% of all goods and services generated by the Geothermal sector and 85% of those from the Energy Efficiency sector remain in North Carolina. This, of course, is beneficial to North Carolinians as continued growth of these sectors will likely demand local labor for activities such as Design and Constructions of New Buildings, and Installation or Maintenance of Building System Components.

Also worth noting is that North Carolina's Wind energy sector is now sending a significant percentage of their goods and services outside of the state and region. Wind firms are sending approximately 46% of their products out of North Carolina. Other high-tech sectors such as Smart Grid and Hydropower/Marine are seeing 34% of their merchandise and expertise make it beyond state lines.

Again, firms engaged in clean energy product Manufacturing/Production led in exporting goods out of state this year, with 44% going to regional, national, or world-wide markets. Research and Development activities also have a strong out of state presence, with 37% of creation going out of state. While this is beneficial for bringing in revenue from outside North Carolina, it is also important that viable markets for these goods and services remain within the state.

Figure 5. NC Clean Energy Revenue By Sector

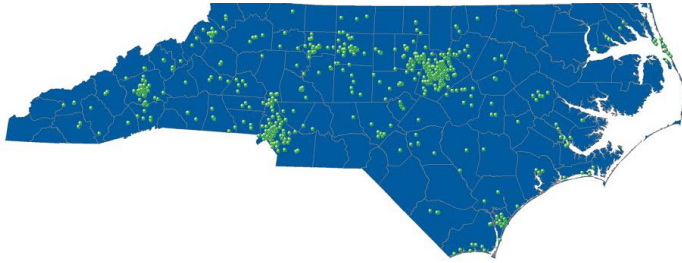


# Geography

Clean energy in North Carolina is no longer a niche industry. There are now firms that offer the goods and services needed to meet the rising demand for clean energy in every corner of the state, providing jobs and revenues to rural and urban counties alike.

There are, however, some distinct clusters of the clean energy industry forming around the Triangle, Triad, Charlotte, and Asheville areas. This is an indication of the positive network externalities that these firms are able to utilize in North Carolina's business climate.<sup>10</sup>

Figure 6. Clean Energy across NC



## Conclusion

We have known for several years now that North Carolina has a dynamic and growing clean energy industry. The 2015 North Carolina Census results further affirm that point by showing that there are approximately 1,000 clean energy firms providing 26,154 full-time equivalent jobs and generating nearly \$7 billion in gross revenue. This represents growth of approximately 14% in jobs and 45% in revenues since last year, far outpacing the growth seen in other industries.

North Carolina's growing clean energy economy also represents an increasingly diverse industry. The 2015 Census showed that more sectors within the industry are increasing their share of total revenues, as the top two earning sectors, Energy Efficiency and Solar, decreased their dominance over total share – and emerging sectors, like Wind and Storage, grew individual revenues. The jobs available in clean energy are also diversifying: In 2015, Manufacturing/Production saw the greatest job growth in number and percentage gain over 2014.

Clean energy firms are present in both rural and urban areas of the state, and in all counties. These firms bring with them jobs, investment, and opportunities to communities with diverse social and economic backgrounds. Furthermore, income enters the state through the sale of clean energy products and services that originate here and are exported to regional, national, and international markets.

Small, innovative companies have been the backbone of the clean energy industry since its inception and will continue to be the source of new economic development going forward. This is particularly true of the Energy Efficiency sector, which was the largest in terms of both 2015 employment and revenue. It is also important to note that the addition of jobs and revenue in the Wind sector this year have a positive effect on North Carolina's clean energy industry and the broader state economy. With construction continuing next year, we can expect this contribution to continue in 2016.

Perhaps most important to note is that this progress is occurring despite policy uncertainties in North Carolina. In fact, only a portion of the jobs and revenues reported in the Census are related to the now-expired REITC. If current clean energy policies allowing market access and limited competition remain in place, NCSEA anticipates 2016 will bring a ninth consecutive year of continued growth for the clean energy industry across the state.

# Appendix A: Section Definitions

## 2015 Southeast Clean Energy Industry Census - Sector Definitions

The clean energy industry is inclusive of both energy efficiency and renewable energy technologies and contains the following ten business sectors:

- 1. Alternative Fuel Vehicles** – Alternative Fuel Vehicles are those that run exclusively on alternative fuels, including electricity, or a blend of traditional petroleum fuels and alternative fuels. These include, but are not limited to:
  - Hybrid electric vehicles
  - Electric vehicles
  - Flexible-fuel vehicles
  - Biofuel vehicles, and
  - Natural gas vehiclesThis sector also includes firms involved in the conversion of traditional fuel vehicles to run on alternative fuels.
- 2. Biomass/Biofuels** – This sector relates to the generation of heat or electricity from either the combustion of organic and waste materials, or their conversion to biofuels. These organic and waste materials include, but are not limited to:
  - Plant-based sources (e.g., wood, grasses, or natural oils)
  - Municipal wastewater
  - Municipal solid waste
- 3. Energy Efficiency** – This sector employs technologies, products, and services that reduce the amount of energy required for processes, tasks, or buildings. Examples of firms in this sector, include, but are not limited to:
  - Developers or installers of more efficient lighting technologies or HVAC systems
  - Producers or installers of other energy conservation technologies for buildings
  - Energy Star, LEED, or EarthCraft builders
  - Developers of more efficient manufacturing processes
- 4. Energy Storage** – This sector covers energy storage devices or physical media that are used to store energy, in various forms, for use at a later time. Technologies and products currently included in the sector are:
  - Batteries
  - Mechanical storage mechanisms such as compressed air or flywheels
  - Thermal storage
- 5. Fuel Cells** – This sector includes technologies or devices that convert chemical energy from a fuel source into electricity through an oxidizing reaction. Fuel sources may include:
  - Hydrogen
  - Hydrocarbons such as natural gas, methanol, or other alcohols
- 6. Geothermal** – This sector includes both Geothermal Energy and Ground Source Heat Pump (GSHP) technology. Geothermal Energy utilizes the thermal energy (heat) stored in the Earth to generate electricity, while GSHP are a central heating and cooling system that transfers heat to or from the ground.
- 7. Hydropower/Marine** – Hydropower refers to harnessing the force of falling or flowing water, including marine waves, for useful purposes such as to generating electricity or creating mechanical force.

8. **Smart Grid** – This sector incorporates technologies and products related to updating the current electricity grid infrastructure with increased multidirectional communication, data collection, and automation. This includes, but is not limited to, digital metering equipment, sensors, controls, and related software.
9. **Solar** – This sector includes technologies and products related to the conversion of sunlight either directly into electricity through photovoltaic cells or indirectly through concentrated solar power. The sector also includes solar thermal products that harness sunlight to meet thermal requirements for residential, commercial, or industrial processes.
10. **Wind** – The wind sector includes products related to the harnessing of wind energy. This includes, but is not limited to, wind turbines for the creation of electricity, wind pumps for pumping and drainage power, and windmills for mechanical power.

To qualify as being active in a specific sector, a firm must perform at least one of the following nine activities with that sector:

- Design or Construction of New Buildings
- Sale of Building System Components
- Sale of Renewable Energy Systems
- Installation, Design, or Development of Renewable Energy Systems
- Installation or Maintenance of Building System Components
- Manufacturing/Production
- Power Generation
- Professional Services, Education, or Consulting
- Research and Development

# Appendix B: Methodology

The 2015 Southeast Clean Energy Industry Census is a collaboration between the North Carolina Sustainable Energy Association (NCSEA) and Southface in Georgia. These organizations are collectively referred to as the Partners.

Each Partner compiled a list of clean energy companies, organizations, and institutions (collectively referred to as firms) in its state. Each state-level Census relied on a common questionnaire developed by the Partners, as well as an online survey tool and phone-banking system managed by North Carolina State University Center for Urban Affairs and Community Services (NC State). NCSEA performed the data analysis of all Census data with input from Southface.

Results in this report are specific to clean energy business conducted within North Carolina. Please see [www.cleanenergyindustry.org](http://www.cleanenergyindustry.org) for information regarding all states included in the 2014 and 2015 Southeast Censuses.

## A Conservative Approach

The Partners utilized the approach taken by NCSEA during the first five iterations of the North Carolina Clean Energy Industry Census from 2008 – 2012. In eight years of conducting the census, NCSEA has identified approximately 1,000 firms believed to be in North Carolina’s clean energy industry. The 2015 North Carolina Clean Energy Industry Report presents direct findings from self-reported data provided by 678 firms, as well as information attributed to an additional 311 modeled firms. Taken together, these represent a significant portion of the state’s clean energy industry, but certainly do not cover all activity.

Moreover, because two employees who spend 50% of their time on clean energy are counted as 1 FTE, the actual number of people directly engaged in North Carolina’s clean energy industry is greater than 26,154 FTE identified in this report. The conservative nature of the analysis means that the true economic impact of the clean energy industry in North Carolina is larger than what is presented in the 2015 Census.

## Identifying Clean Energy Firms

1. NCSEA reviewed the 2014 list of clean energy firms and removed firms that are no longer in North Carolina’s clean energy industry.
2. NCSEA compiled a preliminary list of North Carolina firms potentially in the clean energy industry from the following sources:
  - Lists of firms maintained by NCSEA.
  - Publically available industry websites.
  - Lists maintained by other organizations.
  - Online searches.
3. NCSEA then assessed whether each firm is involved in a clean energy business sector included in the Census.
4. For firms deemed to be within the scope, NCSEA identified primary and secondary contacts and obtained their email and telephone information.
5. NCSEA shared its preliminary list of clean energy firms with other Partners in order to eliminate duplicate entries.
6. NCSEA delivered its preliminary list of North Carolina clean energy firms to NC State. NC State conducted the online survey and follow-up phone interviews.
7. NCSEA delivered additional lists of newly identified clean energy firms to NC State in July and August, 2015.
8. Performing the Survey
9. Each North Carolina firm received an email from NCSEA that included a hyperlink to the online survey, as well as unique login and password credentials.

## Performing the Survey

1. Each North Carolina firm received an email from NCSEA that included a hyperlink to the online survey, as well as unique login and password credentials.
2. NCSEA sent multiple reminder emails to those North Carolina firms that had not completed the survey.
3. NC State conducted phone interviews with North Carolina firms that had not yet completed the online survey.
4. The Partners closed the survey on October 1, 2015.

## Identifying Business Units

Firms were asked to self-identify as being involved in the clean energy industry by indicating they had at least one employee dedicating a portion of their time to one of the nine business activities in one of ten clean energy business sectors. Each activity within a clean energy industry sector is defined as a clean energy business unit (e.g., Research and Development / Solar). The 2015 Census has 90 activity/sector cross-sections resulting from combinations of the following activities and sectors:

### Activities:

1. Design or Construction of New Buildings
2. Sale of Building System Components
3. Sale of Renewable Energy Systems
4. Installation, Design, or Development of Renewable Energy Systems
5. Installation or Maintenance of Building System Components
6. Manufacturing/Production
7. Power Generation
8. Profession Services, Education, or Consulting
9. Research and Development

### Sectors:

1. Alternative Fuel Vehicles
2. Biomass/Biofuels
3. Energy Efficiency
4. Energy Storage
5. Fuel Cells
6. Geothermal
7. Hydropower/Marine
8. Smart Grid
9. Solar
10. Wind

Through this selection process, each responding firm indicated its clean energy business unit(s). Firms were asked to provide their total full-time equivalent (FTE) employment and total gross annual revenue at all locations. Firms were also asked to complete metrics for each of their clean energy business unit(s), including:

- Percentage of total staff time allocated to each business unit;
- Percentage of that work occurring in Georgia, North Carolina, South Carolina, and/or Virginia; and
- The percentage of goods and services delivered to each geographic market for each business unit.

## Calculating Full-Time Equivalent Employees of Responding Firms

The Partners used full-time equivalent employees, or FTEs, as opposed to the number of individual employees. FTE is representational of a single 30 hour per week block of employment. NCSEA calculated clean energy FTE employees by multiplying a firm's total number of FTE employees at the time of the survey by the percentage of total staff time that the firm dedicated to each of its clean energy business units in North Carolina. FTEs provide a high degree of flexibility for accurately modeling the equivalent man-hours spent working on clean energy. For example, two employees who spend 50% of their time on clean energy would be calculated as a clean energy FTE of 1.0.

Because Census analysis is based on direct responses of firms, any FTE modification or lack of participation by major employers will have a more pronounced impact on FTE totals of smaller sectors (e.g., Biomass/Biofuels and Energy Storage) than larger sectors (e.g., Energy Efficiency and Solar).

## Calculating Annual Revenue of Responding Firms

The Partners asked firms to report their total gross annual revenue from the most recent fiscal year (2014/2015 in this case) by selecting from the following revenue ranges:

1. Less than \$100,000
2. \$100,000 to less than \$250,000
3. \$250,000 to less than \$500,000
4. \$500,000 to less than \$1 million
5. \$1 million to less than \$2.5 million
6. \$2.5 million to less than \$5 million
7. \$5 million to less than \$10 million
8. \$10 million to less than \$25 million
9. \$25 million to less than \$50 million
10. \$50 million to less than \$100 million
11. \$100 million to less than \$250 million
12. \$250 million to less than \$500 million
13. \$500 million or more
14. Prefer not to answer
15. Do not know

Firms were then assigned a revenue number equal to the median value the range they selected. In other words, a firm falling in the "less than \$100,000" bracket was classified as "\$50,000." Firms in the "\$500 million or more" bracket were classified as \$500 million. To calculate a firm's revenue by clean energy business unit, NCSEA multiplied the firm's total revenue by the percentage of total staff time that the firm dedicated to each business unit active in North Carolina. As with the FTE analysis, any revenue modification, lack of providing revenue data, or lack of participation by major firms will have a more pronounced impact on revenue totals of smaller sectors than larger ones.

## Modeled Firms

NCSEA used survey response data to estimate the total number of clean energy firms active in North Carolina. This included firms that responded to the Census survey as well as additional firms that were modeled based on the data from responding firms. NCSEA used the following process for estimating the total number of clean energy firms and assigning them characteristics:

1. NCSEA compiled an updated list of firms potentially involved in North Carolina's clean energy industry. All of these firms were contacted via email and/or telephone and a percentage of them provided complete survey responses. NC State placed all of the firms, regardless of whether they provided a responses, into the following categories:

- **Completed Interviews** – Firms that completed the survey through a phone interview with NC State.
  - **Completed Online** – Firms that completed the survey online via the email link.
  - **Respondent Will Do Online** – Firms that indicated to NC State over the phone that they would take the survey online, but did not complete the survey.
  - **Respondent Ineligible** – Firms that self-identified as not being involved in the clean energy industry.
  - **Duplicate ID** – Firms that appeared on the initial list twice.
  - **Attempts Exhausted** – Firms that NC State was unable to contact over the phone and did not complete the survey online.
  - **Wrong Number** – The provided phone number was incorrect.
  - **Out of Service** – The provided phone number was no longer in service.
  - **Refused** – Firms that indicated they were not willing to participate in the survey but did not self-identify as being ineligible.
2. NCSEA identified the firms in the Completed Interviews, Completed Online, Respondent Will Do Online, and Refused categories as active in the North Carolina clean energy industry.
  3. NCSEA identified the firms in the Respondent Ineligible, Duplicate ID, Wrong Number, and Out of Service Categories as not active in the North Carolina clean energy industry.
  4. NCSEA estimated the percentage of the remaining firms, those in the Attempts Exhausted category, that are active in the North Carolina clean energy industry using the following calculation:

$$\frac{\text{Completed Interviews, Completed Online, Respondent Will Do Online, and Refused Categories}}{\text{Total Number of Firms Contacted}} \times \text{Attempts Exhausted} = \text{Additional Firms Active in NC Clean Energy}$$

5. NCSEA added the firms in Step 2 and 4 to determine the estimated number of firms active in North Carolina’s clean energy industry.
6. NCSEA determined the number of modeled firms by subtracting the number of Completed Interviews and Completed Online responses from the total number of firms in the industry.
7. NCSEA calculated an 80% trimmed mean for the FTE and revenue in each business unit (activity/sector cross-section) by removing the upper and lower 10% of the reported FTE and associated revenue.
8. NCSEA applied the resulting trimmed means of FTE and revenue for the 90 activity/sector cross-sections to the modeled firms based on their relative percentages in the direct response data, i.e., information provided through the Completed Interviews and Completed Online responses.

### **A Note about Removed Firms**

The Partners assessed all responses and identified firms that provided data that grossly overstated employment or revenues. These firms were contacted again in an effort to validate their responses. The Partners kept in the data set corrected responses from firms who retook the Census and eliminated from the dataset responses from firms that could not be reached.



## Endnotes:

1. The 2013 and 2014 Censuses included South Carolina and Virginia. Due to staffing changes in those states, the 2015 Census only includes Georgia and North Carolina.
2. Since 2008, NCSEA has expanded its data collection to include over twenty unique datasets measuring a diversity of market factors such as costs, projects, and resources. On a fee-for-service basis, NCSEA can assist private, public and non-profit entities needing more customized intelligence into clean energy market and policy in North Carolina.
3. NC Renewable Energy and Energy Efficiency Portfolio Standard - Available at: [www.ncuc.commerce.state.nc.us/reps/reps.htm](http://www.ncuc.commerce.state.nc.us/reps/reps.htm)
4. N.C. Gen. Stat. § 105-129.15 et seq. Available at: [http://www.ncleg.net/EnactedLegislation/Statutes/HTML/ByArticle/Chapter\\_105/Article\\_3B.html](http://www.ncleg.net/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_105/Article_3B.html)
5. Revenue collected in the 2014 Census refers to the previous fiscal year (i.e. 2013) and is compared to North Carolina's 2013 GSP growth.
6. Federal Reserve Bank of Richmond. Regional Profiles: North Carolina. [https://www.richmondfed.org/research/regional\\_economy/reports/regional\\_profiles/pdf/nc\\_regional\\_profile.pdf](https://www.richmondfed.org/research/regional_economy/reports/regional_profiles/pdf/nc_regional_profile.pdf)
7. It should be noted that GSP in North Carolina outpaced the national GDP growth of 1.8% in 2013.
8. RTI International. Economic Impact Analysis of Clean Energy Development in North Carolina - 2014 Update. [http://c.ymcdn.com/sites/www.energync.org/resource/resmgr/Resources\\_Page/NCSEA\\_econimpact2014.pdf](http://c.ymcdn.com/sites/www.energync.org/resource/resmgr/Resources_Page/NCSEA_econimpact2014.pdf)
9. Solar Energy Industries Association. State Solar Policy. North Carolina Solar. <http://www.seia.org/state-solar-policy/north-carolina>
10. NCSEA will release analysis of the clean energy clusters identified through the census in sector specific reports later this year.