

The Economic Impact of the Nuclear Industry in the Southeast United States

A Regional and State-Level Analysis

Presented by Lukas Brun, Ph.D.



About me:

- Global value chain specialist
- E4 Carolinas Director of Research, 2021-present
- Adjunct Faculty at Sanford School of Public Policy, Duke University, 2019-2023
- Duke University Global Value Chain Center analyst and project manager, 2009-2018
- Ph.D., School of Public and International Affairs, North Carolina State University



About **E4 Carolinas:**

- Trade association for SE energy companies and organizations
- Based in Charlotte, NC. Founded in 2009 as the Carolinas Nuclear Cluster
- Focused on “All of the Above” energy solutions geared toward economic growth, efficient use of resources, and care for our environment
- Over 100 members (companies, universities, nonprofits)
- Received a 3-year grant from the U.S. Economic Development Administration in 2021 to conduct research and planning activity around deploying nuclear technologies in the Southeast U.S.
- Organized the Southeast Nuclear Advisory Council



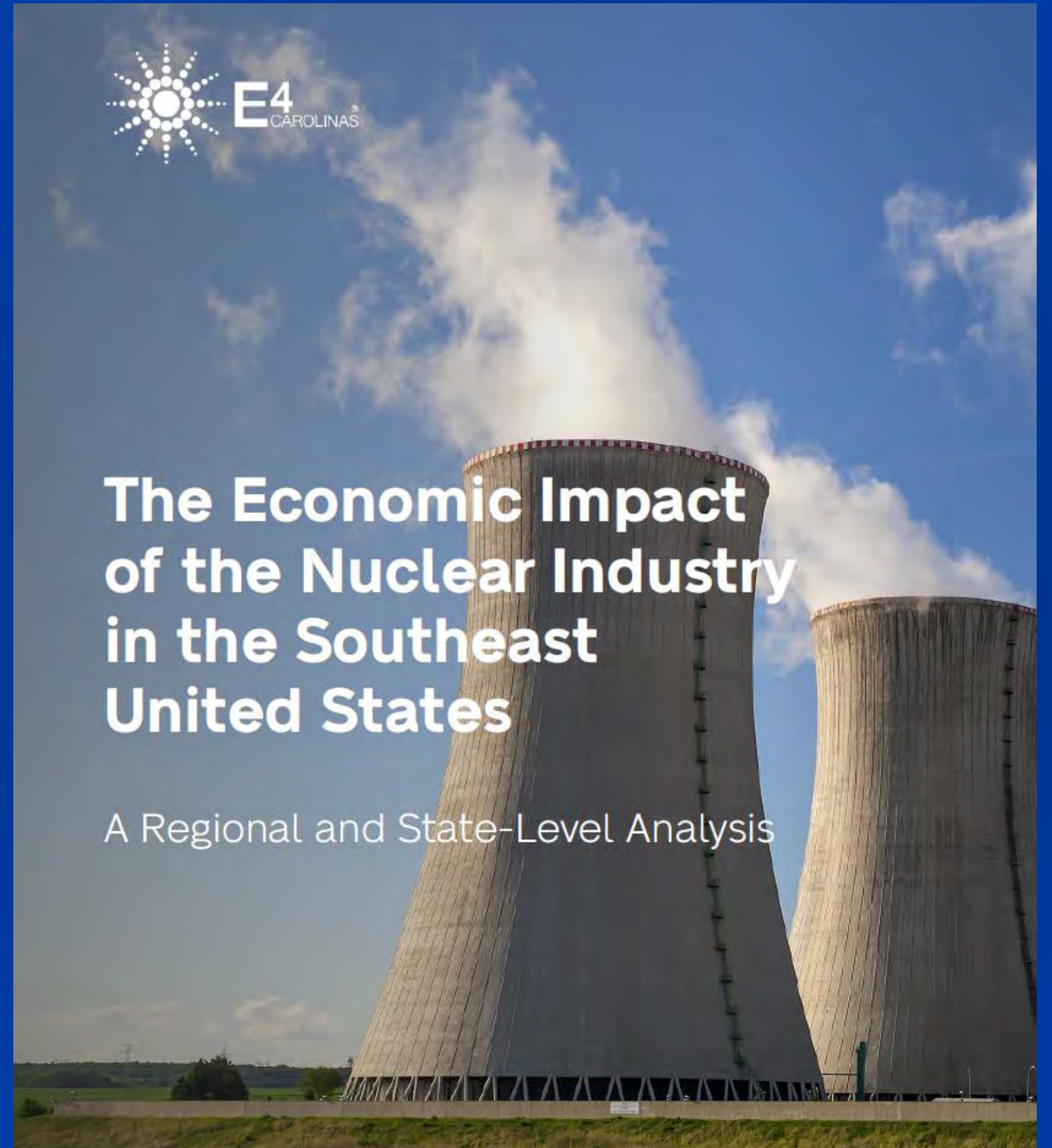
Report Outline

Part 1: Market Overview

- Industry overview
- SE nuclear companies

Part 2: Economic Impact Results

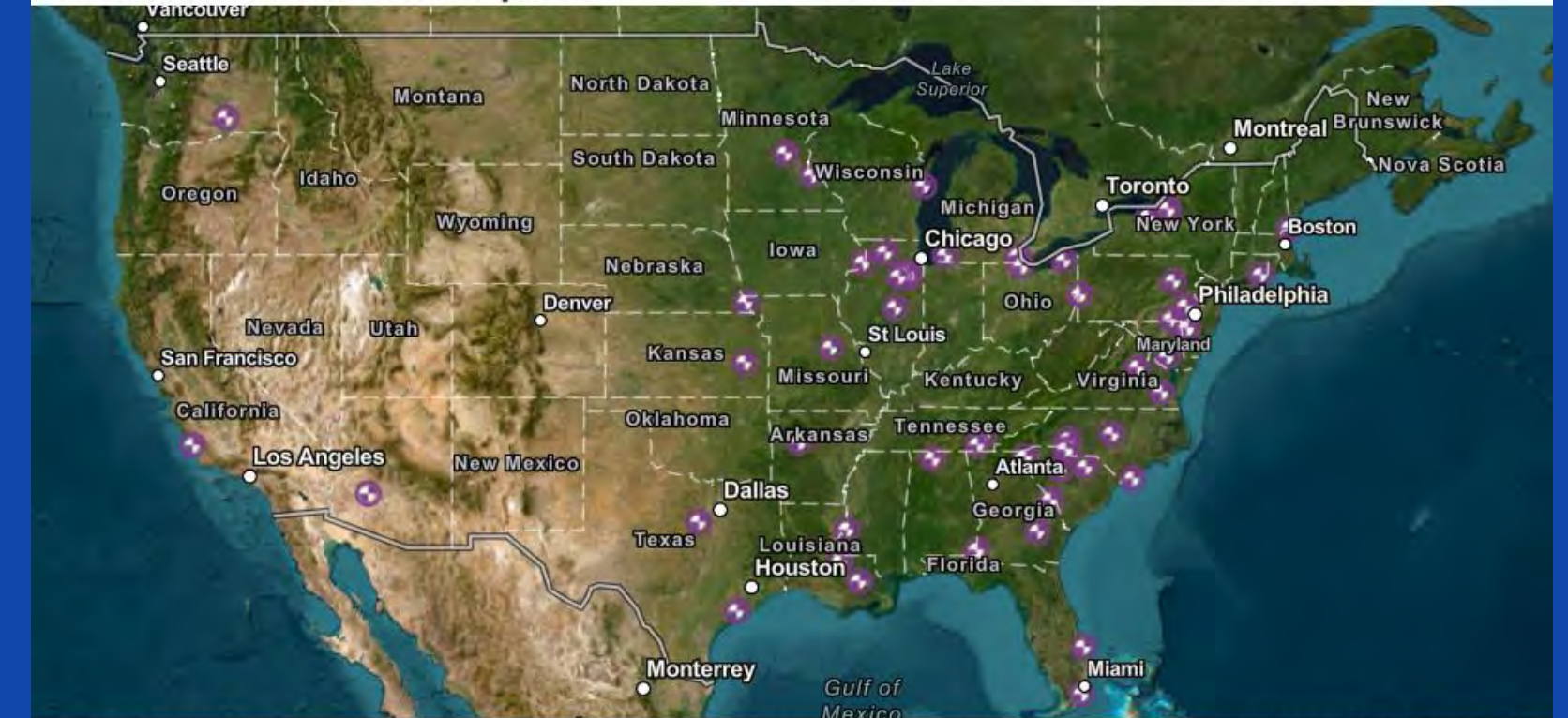
- SE Region
- State (GA, NC, SC, TN, VA)




Industry Overview

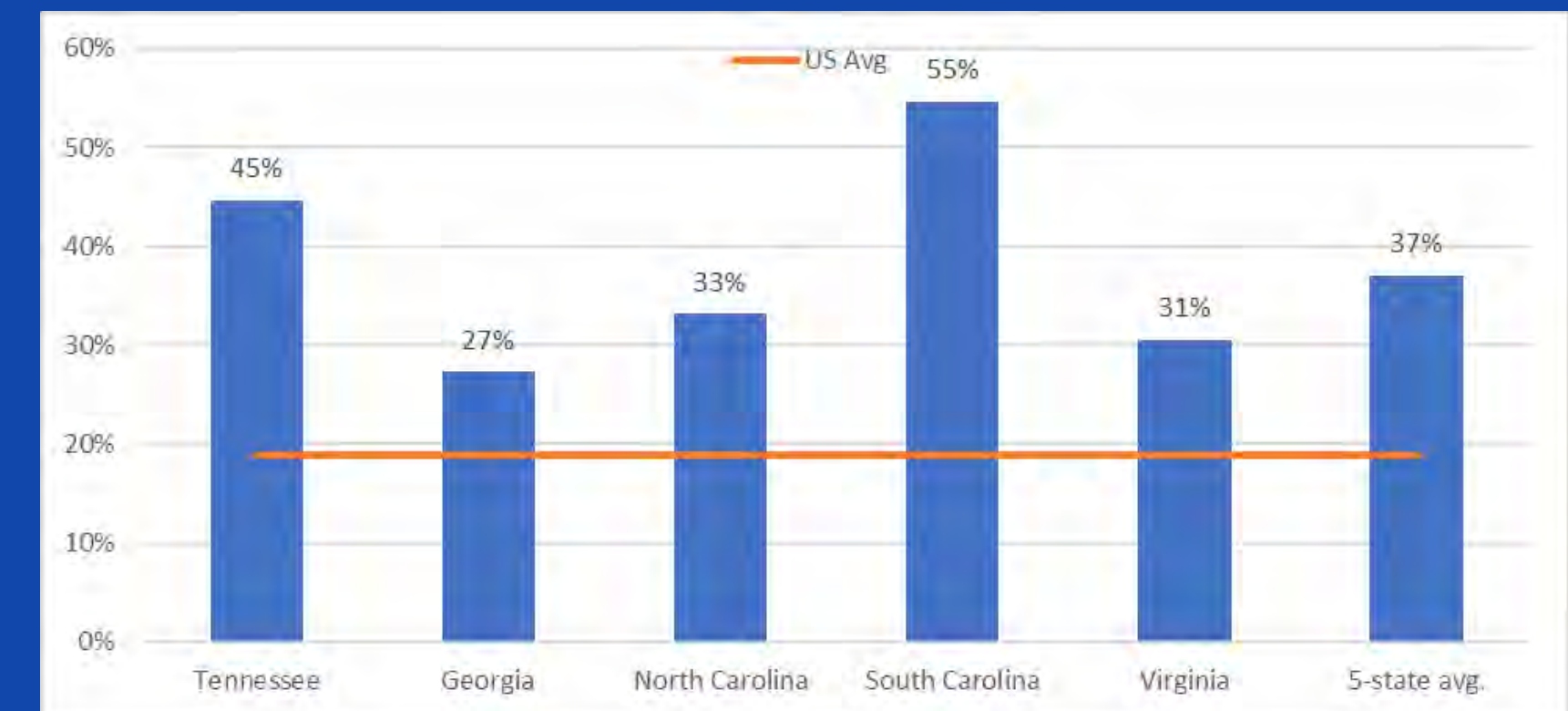
- SE has **25** of **93** nuclear reactors in the U.S. (13 of 55 operating plants)
- SC has **7** reactors at **4** plants (Catawba NPP (2), Oconee NPP (3), Robinson NPP (1), Summer NPP (1))
- Nuclear power makes up **37%** of electric generation capacity in the SE, compared to **19%** in US overall.
- In SC, **55%** of net electricity generation capacity is from nuclear sources.

Locations of U.S. nuclear plants



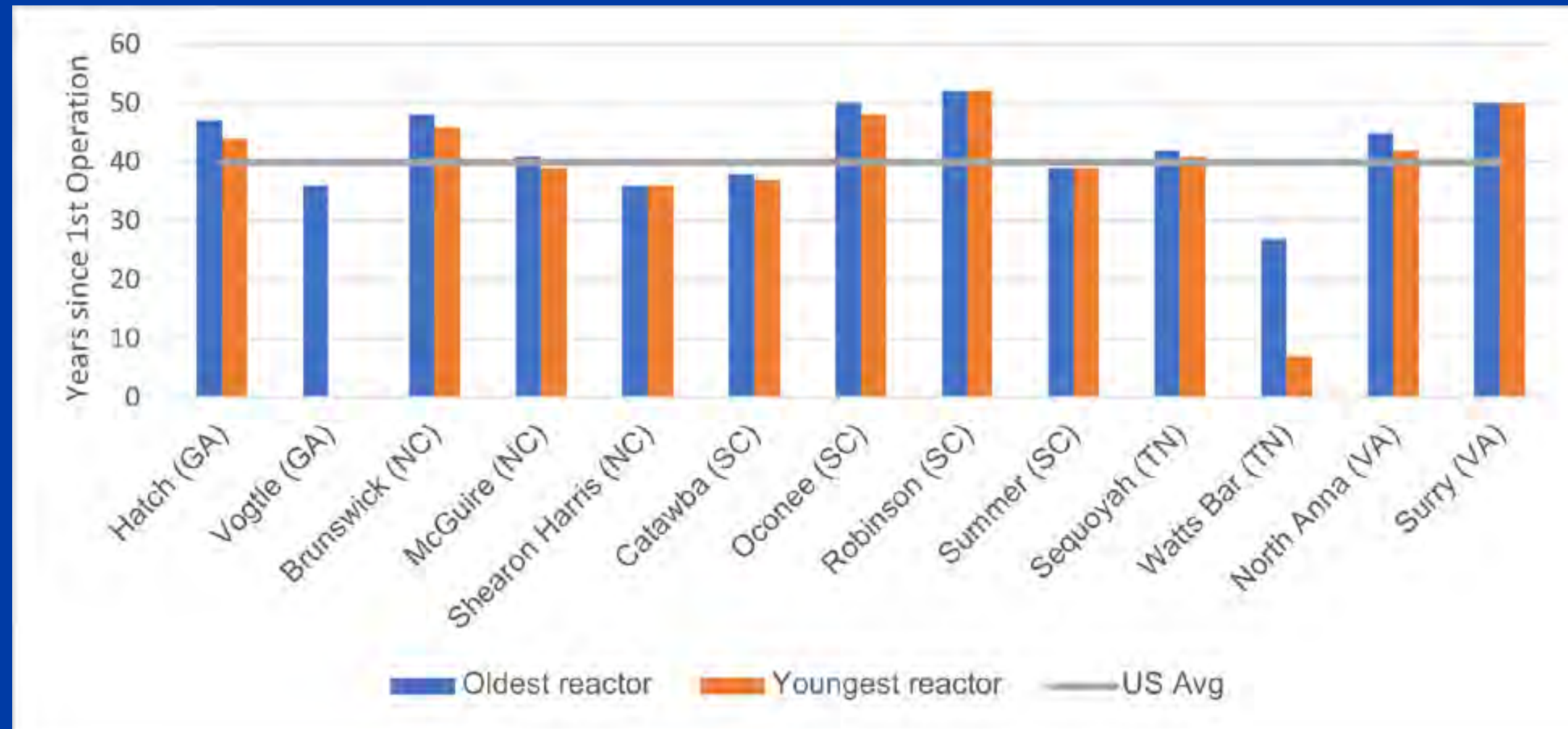
Source: U.S. Energy Information Administration, U.S. Energy Atlas, June 2023 

Nuclear as Percent Net Electricity Generation, by SE State



Source: calculated from EIA 2022 [Electric Power Annual](#), Tables 3.7 and 3.13.

Average Age of SE Nuclear Power Reactors



Note: Vogtle-4 in-service date anticipated in 2024. Source: Calculated from [IAEA 2021 Reactor Database, Table 14](#)

- Majority of operating reactors in SE built in 1970s and 1980s. Only 2 reactors (TVA Watts Bar-2 & Southern Vogtle-3) entered into service this century.
- New reactor construction must exceed reactor decommissioning if nuclear is to help achieve zero-carbon energy goals.

SE Nuclear Companies



Inputs

Components & Subsystems

System Integration

End user

Post-Sales Services

End-of-Life

Minerals (rare earths, uranium, cobalt, other)

Metals & Alloys

Nuclear Fuel

Construction materials & equipment

Nuclear Island (NSSS)

- Containment structure
- Nuclear reactor (RPV & Internals, Fuel Assembly, Cooling System)
- Instrumentation & controls

Conventional Island

- Turbine Generation System (Turbine, Generator, Condenser)
- Service water system
- Secondary cooling system

Balance of Plant

- Cooling tower
- Auxiliary systems (NSSS & TGS)
- HVAC
- Staff training/welfare & security facilities

Power generation (centralized)

Industrial Heat & Power

Transportation (marine & aerospace)

Other (radio-isotopes & research)

Operations & Maintenance Services (includes refueling)

Training & Simulations

Life-extending modifications

De-commissioning & disassembly

Fuel storage & disposal

Materials recycling & disposal

Engineering, Procurement, and Construction (EPC) Services (includes design & project mgmt.)

Production Support Services

Support Services (siting, legal, financial, strategy & market information)

Supporting Institutions & Organizations

Policies & regulations

Governments & IGOs

R&D ,Education & Training

NGOs

Southeast Nuclear Business Directory

Business Inventory

Purpose: Identify firms active in nuclear industry and presence in Southeast U.S.

Selection criteria: 1) Active in nuclear value chain; 2) location in the SE US.

Top-down: Look globally for firms active in nuclear, What do they do? Where are they located (HQ & branches)?

Bottom-up: Who did we miss? Search for additional companies (industry news sources, Reference USA, LinkedIn)

Results

- Identified **494** firms active in the nuclear industry with locations in Southeast U.S. with **1,632** unique locations
- South Carolina: **133** firms, **227** unique locations
- Companies were positioned in the **nuclear value chain** based on their specific products or services.
- Visualization of database

The Nuclear Value Chain in South Carolina

Inputs

Number of Companies: **15**
Number of Locations: **23**

Examples include:

- Graybar Electric Co.**
- Honeywell International**
- Tindall Corp.**

Components and Sub-Systems

Number of Companies: **19**
Number of Locations: **27**

Examples include:

- Consolidated Pipe & Supply**
- General Electric Co.**
- ThyssenKrupp**

System Integration

Number of Companies: **4**
Number of Locations: **13**

Examples include:

- BWX Technologies Inc.**
- GE-Hitachi**
- Westinghouse Electric Co. LLC**

End User

Number of Companies: **5**
Number of Locations: **8**

Examples include:

- Central Electric Power Cooperative**
- Dominion Energy**
- Duke Energy**

Post Sales Services

Number of companies: **24**
Number of locations: **52**

Examples include:

- Allied Universal**
- S&ME Engineering Integrity**
- Thermo Fischer Scientific**

End-of-Life

Number of Companies: **7**
Number of Locations: **11**

Examples include:

- BHI Energy**
- Energy Solutions**
- Orano USA**

Production Support Services

Number of Companies: **44**
Number of Locations: **64**

Examples include:

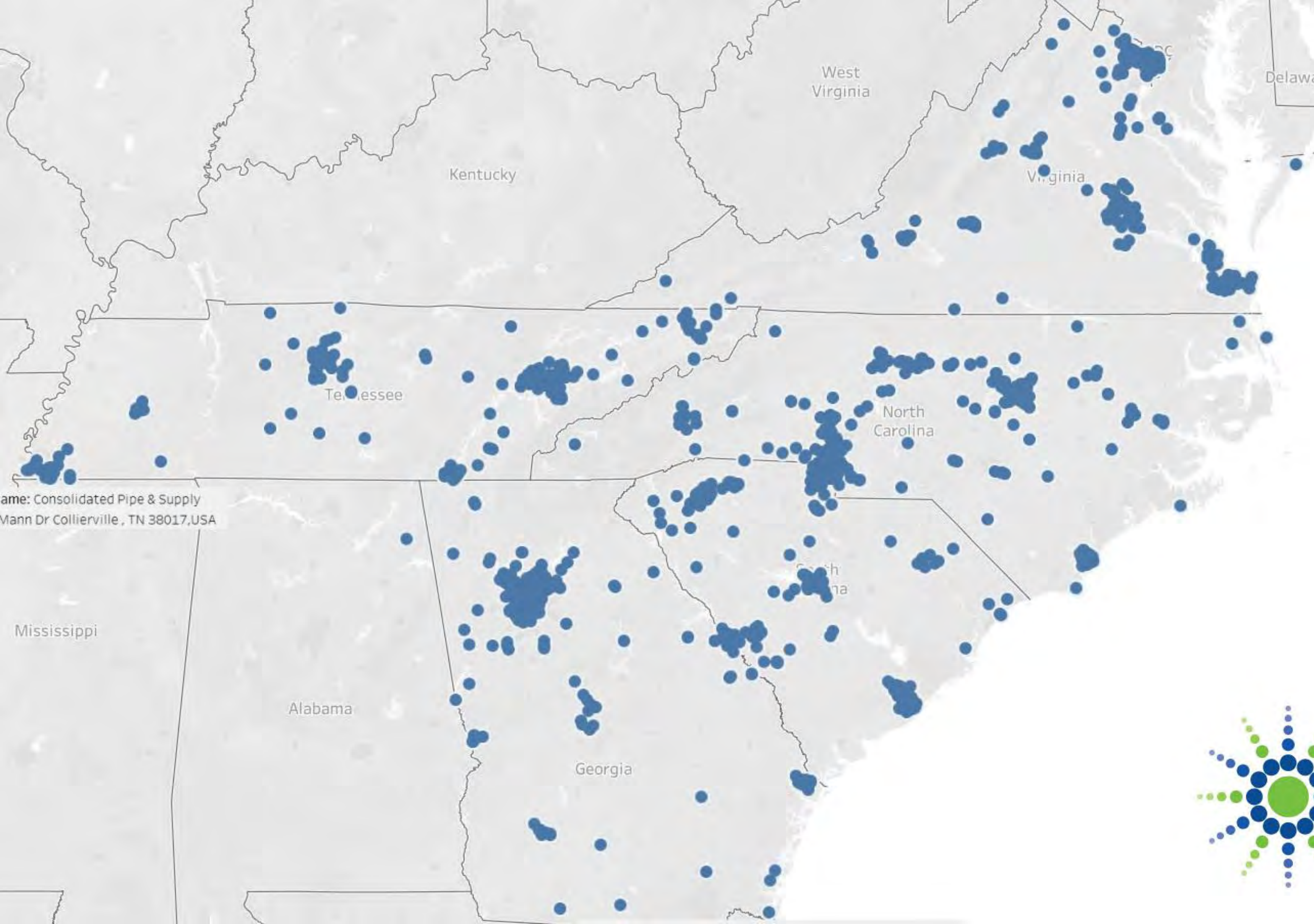
- Black & Veatch Corp.**
- Fluor Corp.**
- Geosyntec Consultants**

Support Institutions and Organizations

Number of Companies: **15**
Number of Locations: **29**

Examples include:

- Savannah River National Lab**
- Clemson University**
- University of South Carolina**
- South Carolina State University**



ame: Consolidated Pipe & Supply
Mann Dr Collierville, TN 38017,USA



Economic Impact of SE Nuclear Industry



Modeling the Nuclear Industry

Activity 1:

The total impact of all **current operations of nuclear power plants** within the Southeast region

Activity 2:

The total impact of all firms serving the nuclear industry as **suppliers for nuclear power plants and other nuclear-related activities located outside** of the Southeast region

Activity 3:

The **total impact of non-DOD federal facilities** engaged in nuclear-related R&D, waste remediation, and related activities

Effect types:

1 Direct

2 Indirect

3 Induced



Activity I:

Direct Employment in Nuclear Electric Power Generation

State	Employment
Georgia	2,040
North Carolina	1,950
South Carolina	2,830
Tennessee	2,000
Virginia	1,860
Five-State Total	10,680

Source: Authors' Calculations Based on U.S. BLS, QCEW, 2021

Activity 2:

Direct Employment of SE Establishments Serving non-SE Nuclear Industry

State	Employment
Georgia	3,213
North Carolina	3,434
South Carolina	3,070
Tennessee	2,796
Virginia	8,183
Five-State Total	20,703

Source: E4 Carolinas and ReferenceUSA

Activity 3:

Direct Employment of Selected Non-DOD Federal Facilities

Facility	Employment
SC – Savannah River Nuclear Solutions (SRNS)	6,041
SC – Savannah River Mission Completion (SRMC)	3,590
SC – Savannah River National Lab	1,112
TN – Oak Ridge National Lab	5,800
TN – Y-12 National Security Complex	6,000
VA – Thomas Jefferson National Accelerator Facility	766
Total	23,309

Source: E4 Carolinas and Federal Facilities Reports

Employment Results: SE Region

Direct employment: ~ 55,000

Supply chain & indirect: ~ 98,000 employees

Total: ~ 153,000

	Employment
Direct Impact	54,692
Indirect Impact	47,803
Induced Impact	50,104
Total Impact	152,598

Economic Output Results: SE Region

Direct impact: \$21.3B

Supply chain & indirect impact: \$21.6B

Total: \$42.9B

State & local taxes: \$3.7B

Average wage: \$89,972

	Economic Output
Direct Impact	\$21,260,047,121
Indirect Impact	\$12,629,515,435
Induced Impact	\$9,042,871,485
Total Impact	\$42,932,434,041

Results: South Carolina

Direct impact: \$6.2B

Supply chain & indirect impact: \$4.9B

Total: \$11.1B

State & local taxes: \$1.1B

Average wage: \$75,565

	Employment	Economic Output
Direct Impact	16,650	\$6,219,650,869
Indirect Impact	13,750	\$3,039,033,989
Induced Impact	11,549	\$1,865,236,871
Total Impact	41,949	\$11,123,921,729

Hypothetical Investment Scenarios: Construction vs. Operations



Nuclear Power Plant Construction *Avg. Wage: \$65,348*

	Employment	Labor Income	Economic Output
Direct Impact	7,790	\$514,266,871	\$1,000,000,000
Indirect Impact	2,177	\$165,942,983	\$450,767,007
Induced Impact	3,447	\$196,369,933	\$541,686,293
Total Impact	13,414	\$876,579,787	\$1,992,453,300

Nuclear Power Plant Operations *Avg. Wage: \$105,211*

	Employment	Labor Income	Economic Output
Direct Impact	1,022	\$227,222,165	\$1,000,000,000
Indirect Impact	1,669	\$147,310,665	\$629,640,501
Induced Impact	1,894	\$107,861,858	\$342,543,033
Total Impact	4,585	\$482,394,688	\$1,972,183,533

The Bottom Line

- The current economic impact of the nuclear industry in the 5-state region of GA, NC, SC, TN, and VA totals **\$42.9 billion**. This level of economic activity supports **152,598 jobs** and contributes **\$3.7 billion** annually in state taxes.
- For South Carolina, the economic impact of the nuclear industry is estimated at **\$11.1 billion**, supporting **41,949 jobs** and **\$1.1 billion** annually in state and local taxes.
- For every **10** jobs created in the nuclear industry, another **18** jobs are created elsewhere within the region!
- For every **\$100 in revenue** generated by a new nuclear power plant in the five-state region, approximately **\$200 in total economic output** would be created, representing a **2:1 ratio**.
- New nuclear power plants have the potential to generate significant impacts on the local region!
- The nuclear industry **supports** high job *quantity* and high job *quality*.



Thank you!

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