Fuel and Power Sources

Definition: Ensuring access to fuel and power sources in support of the forces are critical to the operations of the DoD. Fuel and power sources provide energy to vehicles, electronic equipment, buildings, and temporary structures. The DoD Energy Strategic Plan outlines the reduction of the use of fuel through energy efficiency as well as shifting dependence on non-domestic sources such as oil to renewable and alternative sources.

Technologies in this area include research into alternative sources of fuel including biomass, wind, solar, geothermal, wave power, vibration power, and Fischer-Tropsch processing of coal. Lighter, longer-lasting fuel cells in support of mobile missions using solid oxide batteries and solar cells are included, as well as power distribution software and energy demand management. This area also includes efficient engine technologies such as hybrid engines.

Critical skills and education required by companies engaged in this market include chemical, mechanical, and electrical engineering; materials and environmental science; physics; information technology; and computer programming.

Growth Potential: Underscoring the growing investment in energy security and related projects, the DoD's budget in these areas has grown from $440 million in FY 2006 to $1.3 billion in FY 2009. The American Recovery and Reinvestment Act provides $300 million to DoD for energy-related R&D. However, many states across the country are investing in alternative energy R&D. Therefore, North Carolina should focus on its areas of strength with direct military application such as biofuels and battery sources.

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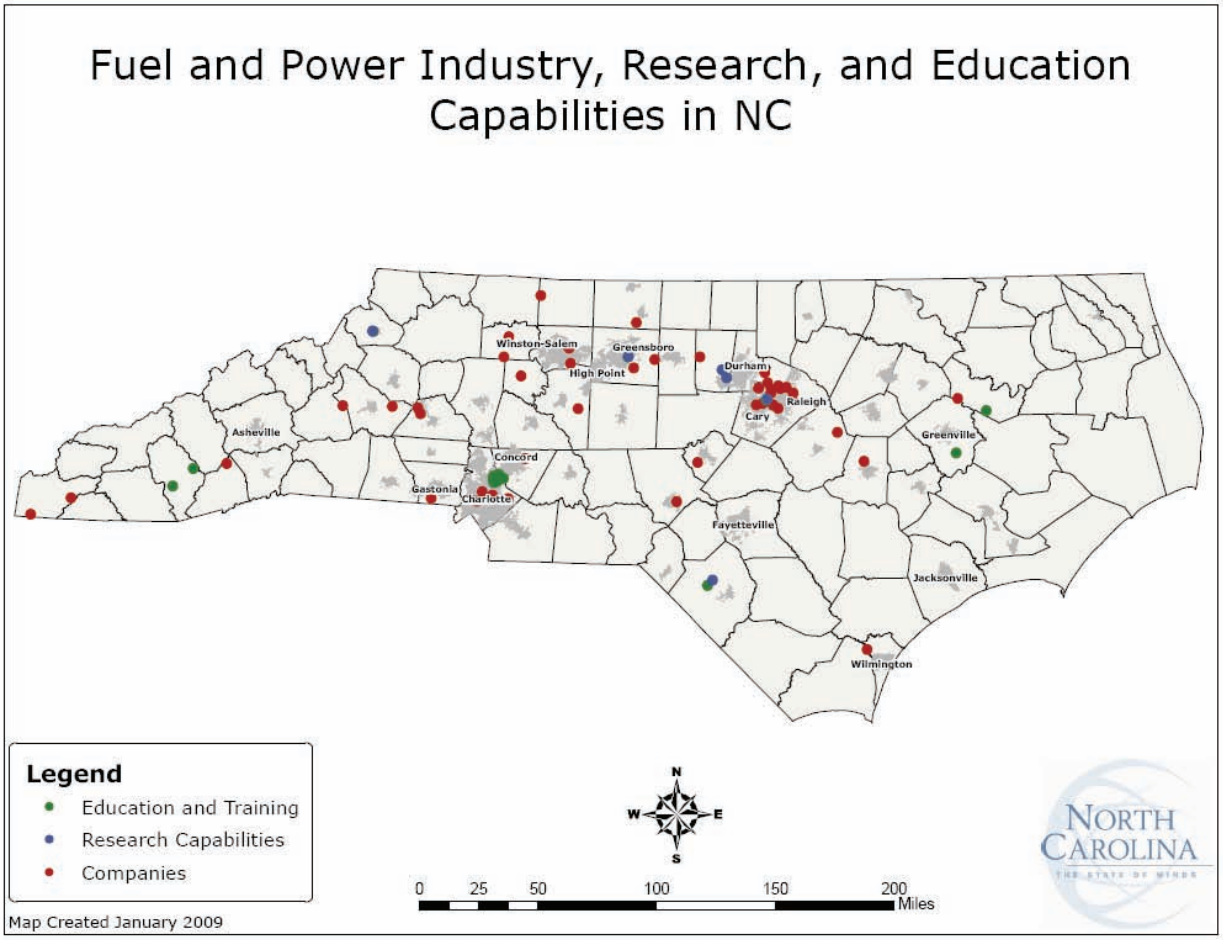
Business and Industry Capacity: RTI identified at least 16 core industries that comprise the Fuel and Power Sources market area, and recommended three critical industries for initial supply chain analysis in North Carolina: Storage Battery Manufacturing; Other Electric Power Generation, Transmission, and Distribution; and All Other Miscellaneous Electrical Equipment and Component Manufacturing. As of 2007, North Carolina had approximately 13,000 people working in these three core industries.

The analysis shows that Fuel and Power is an area where North Carolina has significant R&D capacity, but the industry is not as well developed as in other areas analyzed, such as C4ISR and Performance Materials. The cluster analyses suggest that North Carolina has the industrial presence to support the development of select aspects of products and services under this market area, especially in the manufacturing industries related to batteries and motors/turbines. These two industries are far more concentrated in North Carolina than the national average.

Snapshot: Fuel and Power Industry Cluster Analysis

Core Industry	Employment (2007)	Empl. Growth (since 1992)	Avg. Annual Wage (2007)	Value Added LQ (2006)	Employment LQ (2007)
Storage battery manufacturing	657	-34%	$52,624	1.44	1.42
Other electric power generation, transmission, and distribution	11,106	-53%	$81,592	0.71	0.92
All other miscellaneous electrical equipment and component manufacturing	1,022	382%	$37,232	0.98	1.17



Note: Companies mapped using the following NAICS codes and are indicative of capacity **335911:** Storage Battery Manufacturing; **221119:** Other Electric Power Generation; **335999:** All Other Miscellaneous Electrical Equipment and Component Manufacturing.

Underscoring this potential, in recent years North Carolina has experienced new investment in the development of alternative energy—primarily through biofuels, solar, wind, and fuel cell technologies. North Carolina ranked as the fifth leading state nationwide in 2008 for new corporate alternative energy investment, totaling 44 new projects (Conway Data, April 2009). According to the Energy Center at Appalachian State University, over 2,200 new jobs have been announced along with $800 million in new investment to support alternative energy projects in recent years. As of December 2008, North Carolina was home to over 100 companies involved in either manufacturing or developing green energy technology.

The jobs associated with this market also tend to be well-paid: of the 16 core industries associated with this market area, 12 of them have wages that are significantly higher than the state average. In addition to North Carolina's attractive manufacturing and business climate, the state's increasing focus on developing alternative fuels and energy efficiency technologies has spurred development of new projects and attracted

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investors. In 2007, Microcell opened a new fuel cell manufacturing facility in Eastern North Carolina to produce its patented microfiber design to take advantage of the state's talented workforce and competitive cost structure.

In addition to new energy technologies for vehicles and other equipment, the DoD continues to define alternative power and energy reduction initiatives for military installations. The large-scale expansion of Army and Marine Corps installations in North Carolina may provide opportunities for alternative power technologies and products.

Higher Education Capacity: North Carolina has significant education and R&D capacity to support this technology area. Leading R&D centers include the Energy Center at Appalachian state University, which was established in 2001 to conduct energy research and applied program activities in the areas of energy efficiency, renewable energy technology, biofuels, policy analysis, forecasting, and economic development. In April 2009, UNC-CH announced a major award through the Department of Energy and American Recovery and Reinvestment Act funding to advance the development of solar fuels and next generation photovoltaics. Expected to total $17.5 million over five years, the UNC center is the only Energy Frontier Research Center funded in North Carolina, and one of 16 nationally that received Recovery Act funds for job creation.

Supported by a five-year, $28.5 million investment, NCSU announced in 2008 that it will lead the Future Renewable Electric Energy Delivery and Management Systems Center, which is a national research center that aims to revolutionize the nation's power grid and speed renewable electric-energy technologies into every home and business. In 2007, RTI, UNC-CH, NCSU, and Duke University launched the Research Triangle Energy Consortium to address major technical, environmental, economic, societal, and public policy problems related to the use of energy. Finally, the North Carolina A&T Center for Energy Research and Training collaborates on projects with Army installations, including Fort Bragg, as well as the Army Engineering Research & Development Center.

The Biofuels Center of North Carolina, established by the North Carolina General Assembly in 2007, seeks to develop a statewide biofuels industry to reduce the state's dependence on imported liquid fuels.

In addition to major research efforts, the UNC system offers a variety of degree programs in areas that contribute to a fuel and power source workforce. UNC-C, in particular, is focused on producing a new generation of highly trained energy professionals by building the Energy Production and Infrastructure Center, which will train students to manage traditional and emerging energy sources and infrastructures. The North Carolina Community College System launched the "Code Green Initiative" in 2009 to provide enhanced curriculum and training for "green collar jobs" and is working with the UNC system to outline a comprehensive curriculum for green job training.

Industry growth is also supported by innovative statewide programs, such as North Carolina GreenPower, an independent nonprofit corporation with a goal to supplement the state's existing power supply with more green energy. Finally, the state is investing heavily in the development of alternative fuels. The Biofuels Center of North Carolina, established by the North Carolina General Assembly in 2007, seeks to develop a statewide biofuels industry to reduce the state's dependence on imported liquid fuels. The Center's goal is to source 10 percent of North Carolina's liquid fuels from biofuels locally produced by 2017.