

What Federal Funding Applications in Innovation Tell Us About the Future of Economic Development in North Carolina

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Abbreviations

AI	artificial intelligence
BBBRC	Build Back Better Regional Challenge (of the Economic Development Administration)
CHIPS	Creating Helpful Incentives to Produce Semiconductors
COG	Council of Government
DEIA	diversity, equity, inclusion, and accessibility
EDA	Economic Development Administration
NSF	National Science Foundation
R&D	research and development
RTI	RTI International (registered trademark and trade name of Research Triangle Institute)
SITE	Strengthening Innovation, Talent, and Equity
UNC	University of North Carolina

Introduction

Since 2021, there has been an unprecedented level of federal funding opportunities for place-based economic development to strengthen national competitiveness and regional economic resiliency. These large-scale funding opportunities have inspired and incentivized regional economic development leaders to pursue transformative and innovative projects across the country. Two of these new federal programs include the Economic Development Administration's (EDA's) \$1 billion Build Back Better Regional Challenge (BBBRC); and the National Science Foundation's Regional Innovation Engines program (NSF Engines), which will provide up to \$160 million to individual coalitions across the United States over the next 10 years.

As of mid-2023, over 1,000 coalitions from all 50 states plus Puerto Rico had applied for funding through the NSF Engines and BBBRC programs. Although fewer than 10 percent of these competitive applications resulted in a financial award, the strategies outlined in the proposed projects signal priorities and promise for a new era of economic development in North Carolina.

These proposals provide insight into how regional partners collaborate; local leaders view industry and technology growth potential in their regions; and professionals in the economic development field prioritize entrepreneurship, equity, technology, and network building for regional development. The proposals also demonstrate the breadth and scale of creative tactics economic development leaders are employing in the years following the economic disruptions of the 2020 COVID-19 pandemic.

These coalition-driven programs are promoting the formation of innovative and internationally competitive industrial clusters and increasing more business and job opportunities across diverse geographies and populations. These federal programs have sparked a national conversation about the importance of innovation as a driver for broad based growth, as well as an outpouring of new strategies and ideas from regions about how to achieve these goals.

In this new era of place-based development, RTI wanted to understand what the promising ideas and strategies are for North Carolina, as determined by the innovators, entrepreneurs, and policymakers at the local and regional levels. Using application records from the NSF and the EDA, RTI reviewed the 39 applications from North Carolina-led coalitions and analyzed 1) the location of proposal leads, 2) the geographic reach of proposed projects, 3) the type of organizations included in the proposals, 4) the industries of focus, and 5) the extent to which applications centered equity or entrepreneurship (see **Appendix A** for the methodology used) to understand how regional leaders from across the state and in different types of organizations view North Carolina's economic development potential through a lens of innovation.

Programs Overview

In 2022 and 2023, North Carolina-led coalitions submitted 39 applications to NSF Engines and the BBBRC. These two programs were similar in their intent to support large-scale, regional, multi-stakeholder coalitions to drive innovative economic development programs. They required

a mix of stakeholders—including academic, private sector, government, and community organizations—to come together to address various challenges related to economic development. While the BBBRC did not specify an industry of focus, the NSF Engines program called for proposals to bolster and grow technology and innovation industries. More background on each of these programs is described below to provide the parameters in which North Carolina applicants were working within.

NSF Engines

NSF Engines, funded through the CHIPS and Science Act of 2022, awards technology-based regional economic development grants that aim to increase innovation capacity, support sustainable innovation ecosystems, and create inclusive economic growth.¹ The Engines program offers two phases of awards. A first round of “Type-1” *development* awards, of up to \$1 million, was issued in May 2023 to help coalitions plan and lay



the groundwork for collaborative economic development efforts. Larger “Type-2” *finalist* awards will make substantial investments in regional initiatives across the projects’ nascent development, ecosystem emergence, and growth phases. The NSF announced 16 Type-2 finalists in August 2023, and will disburse up to \$160 million over 10 years to winning coalitions.

NSF Engines regions can range from a single urban metropolitan statistical area or ecosystem to broad multi-state coalitions. Nationally, the Type-1 winners of the May 2023 awards are concentrated in industries such as sustainable energy, bioeconomy, climate resiliency, advanced agriculture, forestry, food security, and advanced manufacturing. Several specialize in cutting-edge technology such as quantum computing, optics, microelectronics, and aerospace applications.

Across both NSF Engines phases, North Carolina-based institutions led the submission of 16 applications. Another 22 out-of-state coalitions—one of which received Type-1 funding—listed North Carolina as a potential area of impact. Out of 488 initial applications from a wide range of regional areas, technology, and development strategies, 44—including two with lead organizations in North Carolina—received Type-1 grants of up to \$1 million. The first is led by the University of North Carolina (UNC) Wilmington and focuses on systems for the sustainable and productive use of ocean resources (the “blue economy”) and sustainable climate technology. The second, led by UNC Charlotte, features the future of energy grid technologies.

¹ National Science Foundation. (2022, May 3). *NSF Regional Innovation Engines (NSF Engines) Program*. Dear Colleague Letter. <https://new.nsf.gov/funding/opportunities/nsf-regional-innovation-engines-nsf-engines>

Additionally, North Carolina is home to two of the 16 Type-2 finalists. The Industrial Commons in Morganton leads a project based on circular economy investments, especially in advanced textiles. The coalition's proposed geographical area is wide, covering much of central and western North Carolina. The second coalition, Wake Forest Regenerative Medicine Biomufacturing, is based in the Triad and is led by the Wake Forest University School of Medicine.²

Build Back Better Regional Challenge³

The EDA's BBBRC is a \$1 billion program to support economic recovery from the COVID-19 pandemic, invest in and strengthen various regional economic clusters across the country, foster equitable growth, create good-paying jobs, and increase U.S. global competitiveness.⁴

Coalitions of organizations from regions across the country submitted 529 concept proposals to EDA for the two phased competition. Of the 529 proposals, 60 coalitions received \$500,000 Phase 1 awards to further develop their concepts and project plans for Phase 2 of the competition. In September 2022, 21 of the 60 coalitions learned that they would receive Phase 2 awards of between \$25 million and \$65 million to implement all or a subset of their proposed projects.⁵

Twenty-three of the 529 applications were submitted by organizations based in North Carolina. Of these 23 applications, two coalitions received \$500,000 in seed funds (Accelerate NC – Life Sciences Manufacturing, led by the North Carolina Biotechnology Center; and SITE [Strengthening Innovation, Talent, and Equity] Next-Gen, a Piedmont Triad cluster strategy led by the Piedmont Triad Regional Council). One of these two coalitions, Accelerate NC – Life Sciences Manufacturing, began receiving its Phase 2 implementation funds in 2022, which will total \$25 million over 10 years.



² RTI International is a partner on the UNCW and Industrial Commons NSF Engines projects or proposals.

³ RTI International leads the EDA-funded Community of Practice for all BBRC Phase 1 and 2 winners. The "Building Better Regions Community of Practice" provides CoP members with capacity building, peer learning, and technical assistance opportunities.

⁴ U.S. Economic Development Administration. (n.d.). *\$1B Build Back Better Regional Challenge: Supercharging local economies* [Web page]. Accessed August 25, 2023, <https://www.eda.gov/arpa/build-back-better>

⁵ U.S. Economic Development Administration. (n.d.). *Build Back Better Regional Challenge awardees: Frequently asked questions* [Web page]. Accessed August 25, 2023, <https://www.eda.gov/funding/programs/american-rescue-plan/build-back-better/awardees-frequently-asked-questions>

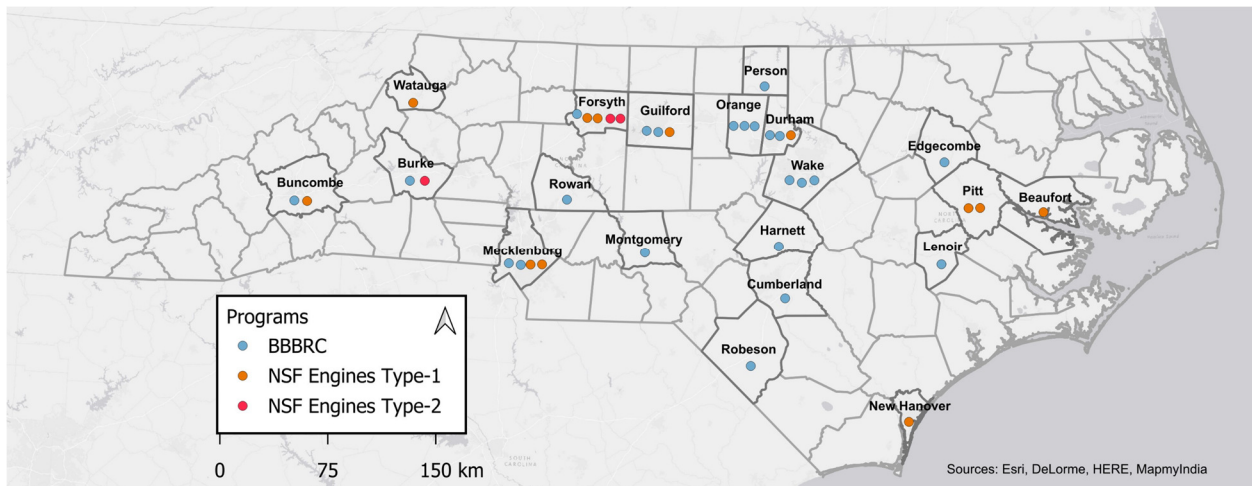
Overview of North Carolina-Led Applications

The 39 applications from North Carolina-based coalitions offer insight into the priorities and visions for regional economic development in the state. Although in some cases, coalitions brought together long-standing partners to pursue a goal, other groups formed new partnerships to meet the requirements of the program or to bring together distinct capabilities, having been motivated to pursue the programs' potentially transformational funding. Applications were led by many different types of organizations across the state and covered a wide spectrum of industries.

Geography

North Carolina's 39 applications represent nearly every region of the state, as shown in **Figure 1**. Although organizations in Forsyth County led five total applications—the most of any county in the state—the regional mix of applicants shows the breadth of coalition-led economic development planning happening across the state.

Figure 1. North Carolina-Led Applications: Geographic Distribution of Lead Organizations



Source: RTI analysis of BBBRC and NSF Engine applications.

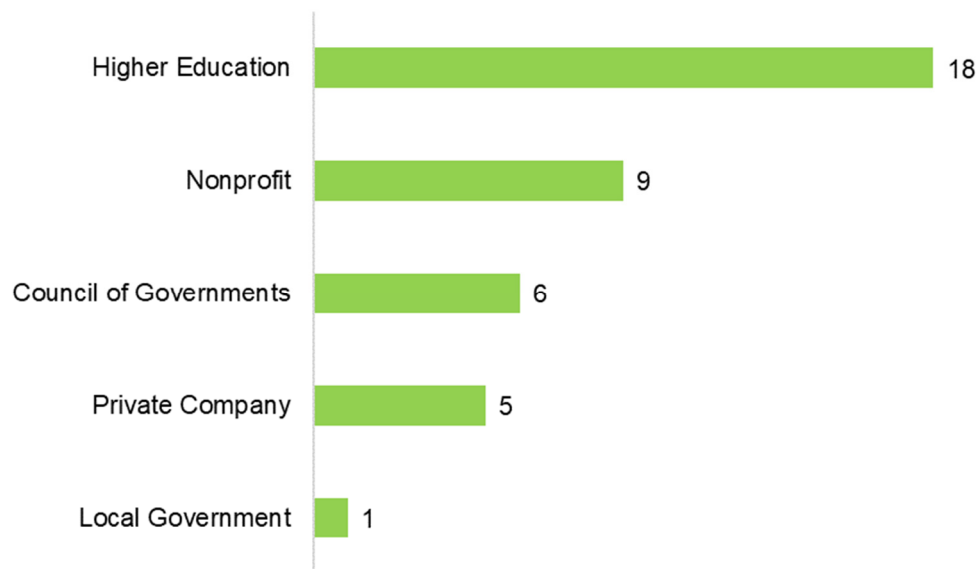
- The Piedmont Triad region submitted eight applications and had a high concentration of applications from Forsyth and Guilford Counties.
- The Charlotte Metro region submitted four applications in Mecklenburg County plus applications from Rowan and Montgomery Counties.
- Western North Carolina submitted five total applications from Buncombe, Burke, and Watauga Counties.
- Eastern and southeastern North Carolina submitted eight applications across seven counties.

- The Research Triangle, North Carolina’s leading innovation hub, submitted 11 applications, including three each from Durham, Orange, and Wake counties and one each from Harnett and Person Counties.

Lead Organization Type

Nearly half (18 of 39) of North Carolina-led proposals originated from higher education institutions, including universities, Historically Black Colleges or Universities, a community college, and a university-affiliated research lab. Nine were led by nonprofits, including some public–private partnerships for development, such as the North Carolina Biotechnology Center. Six were led by multi-jurisdictional Councils of Government (COGs), and five were led by private companies.

Figure 2. North Carolina-Led Applications: Lead Organization

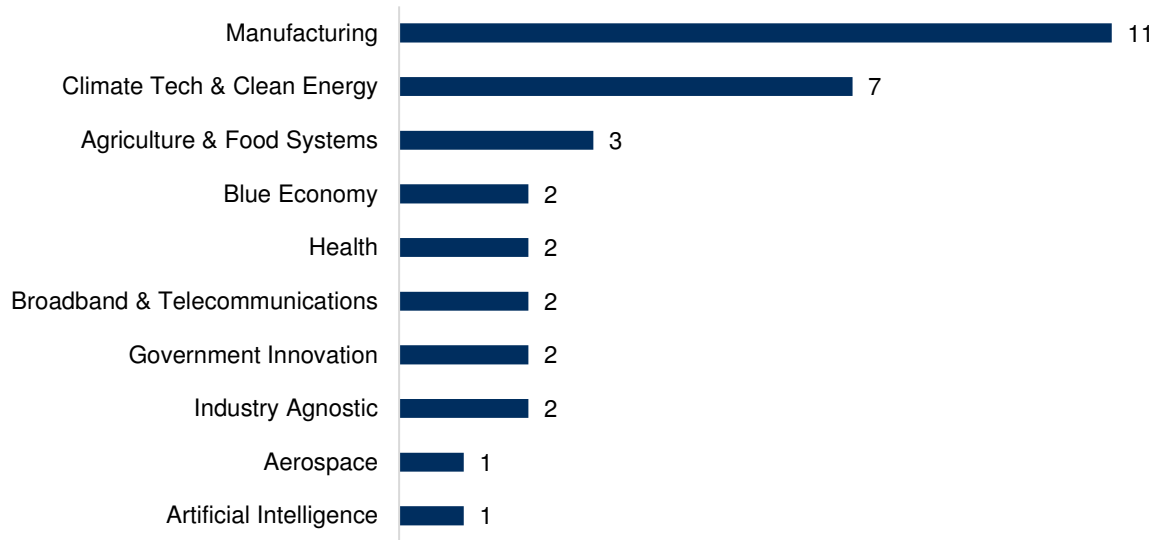


Source: RTI analysis of BBBRC and NSF Engine applications.

Industry Focus

Of the 39 applications, 31 had a specific industry focus, as seen in **Figure 3**. Despite the broad range of industries, the categories of manufacturing and climate tech & clean energy comprised over half of North Carolina’s proposals. Industry focus reflects both comparative strengths and growth potential within the state, as well as the stated goals of the EDA and NSF programs.

Figure 3. Industry Focus of Applications



Source: RTI analysis of BBBRC and NSF Engine applications.

Manufacturing

Manufacturing has changed significantly in the past four decades due to digitalization, robotics, advanced materials, artificial intelligence (AI), and many other rapidly emerging processes. These innovations, combined with supply-chain challenges and new economic policies, are contributing to the reshoring of jobs and an increased focus on servitization (i.e., a transformation from products to services) and maintenance.⁶ Since the 1990s, the decline of traditional manufacturing sectors in North Carolina has led to a sharp divide across geographies and industries in the state, and new technologies have the potential to change the trajectory of regions that built their economies around manufacturing.⁷

Many BBBRC and NSF Engines proposals focused on building, fostering, and supporting various manufacturing industries. Of the 39 North Carolina-based BBBRC and NSF Engines applications submitted, 11 (28%) proposed projects in the manufacturing sector. Three of the manufacturing proposals focused on biotechnology and life sciences, where North Carolina is a leader in both research and manufacturing. Two proposals focused on textiles—a legacy industrial sector for North Carolina.

Some proposals sought to harness innovation at the intersection of two or more sectors. The NSF Engines-finalist Industrial Commons proposes to grow their regional manufacturing sectors related to textiles, recycling, and climate technology. Other proposals sought to develop manufacturing capabilities that could link agricultural products to automotive manufacturing, or to develop regenerative medicines that could be produced in low-earth orbit.

Of the six North Carolina-based proposals that won BBBRC or Engines awards or were named Engine finalists, four involved manufacturing (SITE-Next-Gen, Accelerate NC – Life Sciences Manufacturing, Wake Forest Regenerative Medicine Biomanufacturing, and The Industrial Commons Circular Textile Engine).

North Carolina-led proposals related to manufacturing were well represented in both BBBRC and Engines competitions, with six of 23 BBBRC and five of 16 Engines proposals featuring projects in the manufacturing sector. A variety of organizations led these proposals, including COGs (two), institutes of higher education (four), nonprofits (four), and a private company.

Climate Technology and Clean Energy

Second only to manufacturing, seven North Carolina proposals (18%) focused on climate technology, climate resiliency, and clean energy. NC-based proposals aimed to replace conventional energy generation methods with emerging clean-energy technologies, including solar and offshore wind. Coalitions also proposed developing a carbon-neutral energy grid, fueling innovation around industrial decarbonization, and creating green-economy jobs.

Five of seven climate-related proposals originated from universities, indicating a regional focus on translating university research into local economic activity. Many publicly funded research

⁷ Mullin, J. (2020). The rise and sudden decline of North Carolina furniture making. *Econ Focus*. Federal Reserve Bank of Richmond. https://www.richmondfed.org/publications/research/econ_focus/2020/q4/economic_history

projects at universities lead to ideas that could become start-ups, yet without support for scaling up, these concepts frequently never translate into technologies that exist outside of a lab.

Some proposals used the language of clean energy as an economic disruption. If commercialized, emerging climate technologies could become a powerful economic engine, given the global demand for solutions to these problems. Regional leaders seem to see promise in the clean technology industry's ability to provide economic benefits in addition to improving environmental quality and mitigating the impacts of human-made climate change.

Other Industries Represented

Of the remaining applications, proposals focused on expanding North Carolina's current economic activity in emerging industries such as AI, aerospace, and wearable health technologies. Two proposals included efforts to extend broadband to underserved areas in North Carolina. Another sought to fuel innovation within government to improve responsiveness and better deliver services to residents.

Other subsets of coalitions addressed food systems (three proposals) and the blue economy (two proposals). Two agricultural proposals both sought to increase innovation in agriculture in eastern North Carolina and to improve the resiliency of agricultural systems in the face of threats from climate change and natural disasters.

Both of the blue economy coalitions are hosted by higher education institutions in the eastern part of the state, and both contain elements of clean, renewable energy generation alongside sustainable management of coastal resources and fisheries.

Eight proposals did not have a specific industry concentration. Two of these explicitly noted that they were industry agnostic. Their objectives included encouraging entrepreneurship and innovation and improving equity and inclusion in local economies. Others focused specifically on how to use community resources to support economic recovery in the post-COVID era.

Entrepreneurship Focus

Of the 39 NSF Engines and BBBRC applications from North Carolina-led coalitions, seven explicitly incorporated or emphasized entrepreneurship. Proposals sought to widen the scope of entrepreneurship in the state, based on industry area, geographic footprint, or who is included in entrepreneurship. One envisioned creating an entrepreneurship and innovation center, and four specifically mentioned supporting or working with entrepreneurs throughout their program or via a program component in their strategy. Proposals that aimed to support entrepreneurs came from a variety of sectors including climate technology development, the public sector, and manufacturing.

Equity Focus

The proposals reveal that regional coalitions can play a key role in promoting equity. They can offer systems-level support, provide targeted resources, and forge networks and connections in service of equitable economic development. Moreover, these organizations have the potential to

promote not just fairness but also the overall competitiveness of the region, understanding that diverse talent in key industries supports a region's collective ability to compete.

Many recent federal funding programs require applicants to address how their planned programs will advance equity in their communities of focus. This government-wide focus on equity stems from Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, signed by President Biden on January 20, 2021.⁸ As such, all 39 NC-based proposals likely incorporated equity into their plans in some way. Eight explicitly centered their efforts on increasing equity or inclusion or named equity as a primary goal of their proposed projects.

One project from UNC Chapel Hill aimed to grow the Indigenous Climate Tech Cluster by funding the creation of Tribal research centers to support and share Indigenous practices and strategies for climate resilience. Another NC-based proposal aimed to create a national hub for ethical AI that that would democratize access to technologies and ensure that generative technologies reflect human-centered ideals for equity and inclusion.

Half of the equity-focused proposals originated from nonprofits and half were led by private companies or universities. Although some were industry agnostic, others dealt with increasing equity and inclusion in specific areas such as life sciences, AI, and advanced manufacturing. Three proposals strongly stressed climate change innovation and resiliency, emphasizing that climate change has an unequal impact on disadvantaged members of society, and that diverse perspectives are needed to solve complex challenges.

Successful Coalitions

Among North Carolina's applications, two received Type-1 Engines Awards (of 44 national winners) and two received BBBRC Phase 1 grants (of 60 national winners). In August 2023, two North Carolina coalitions were named among the 16 national finalists for NSF Engines Type-2 awards. North Carolina-led coalitions were overrepresented, with 5% of national awards over these three categories compared to 3.2% of the U.S. population.

Three of North Carolina's winning proposals are led by universities outside of the major Research Triangle institutions. UNC Charlotte, UNC Wilmington, and the Wake Forest

NSF Engines and BBBRC applicants were required to include equity in their proposals to be considered for funding. The NSF Engines website explicitly states that funded programs should have "inclusion at all levels" by saying "Diversity, equity, inclusion, and accessibility, or DEIA, are intentionally and meaningfully embedded at all levels in leadership, R&D [research and development], and workforce development activities." The BBBRC Challenge required all applicants to include an equity plan for "sharing the benefits of the cluster equitably across all affected communities, both urban and rural, including efforts to reach historically excluded populations, racial minorities, and women."

⁸ The White House. (n.d.). *Advancing equity and racial justice through the federal government* [Web page]. Brief on President Joe Biden's Executive Order 13985. Accessed August 29, 2023, <https://www.whitehouse.gov/equity/>

University Medical School all led successful coalitions. Other lead organizations included the Piedmont Triad Regional Council and two nonprofit organizations, the North Carolina Biotechnology Center, and the Industrial Commons.

Winners tended to have broader geographic focus areas (see maps in **Appendix B**). The six winning coalitions claimed 242 counties, ranging from 12 (the Piedmont Triad Prosperity Zone) to 79 of North Carolina's 100 counties (the North Carolina Biotechnology Center). Counties located centrally were more likely to fall within areas of impact. In fact, some counties in the Triad and between the Triangle and Charlotte were covered by five networks. Ten counties in the Western and Northwestern Prosperity Zones were not covered by a network, and another 10 western counties were represented only by the Industrial Commons project centered in Morganton in Burke County.

How Regional Leaders are Envisioning the Future of Economic Development in North Carolina

Pairing Assets with Emerging Technologies to Meet Key Challenges

Across the state, coalitions prioritized connecting and leveraging regional assets with cutting-edge technologies to transform their economies and address key social challenges. The proposals explored how existing assets and resources can be built upon to create good jobs and address pressing challenges.

Coalitions propose diverse, customized strategies that build on North Carolina's existing biotech cluster, bolster systems of existing agriculture economies, harness the state's textile legacy, and employ natural and renewable resources for advanced energy projects. In all cases, the coalitions substantiate their lofty goals by connecting partners, physical spaces, existing work, cultural heritage, and local priorities to shape a collective vision of what is possible for the region.

Regional economic development leaders chose to pursue many strategies that advanced manufacturing and nature-related industries such as clean energy, climate tech, and the blue economy. Fifty-one percent of North Carolina-based applications featured these industries, demonstrating their importance to statewide and regional economic development leaders.

Forming Regional, Cross-Institution Coalitions

Across the state, proposals featured partnerships between a variety of organizations including COGs, institutes of higher education, private companies, and nonprofits to address known industry challenges and proactively fill gaps related to workforce, equity, and entrepreneurship. Coalitions aim to build sustainable, inclusive, dynamic local economic structures, not just generate economic growth, or improve profit margins. Coalitions described in their applications plans for improving the well-being and quality of life for residents through opportunities that would push families toward the middle class, enable greater opportunity and mobility for all, and strengthen industries that could serve as a backbone for long-lasting, sustainable development.

Even for North Carolina's coalitions that did not secure federal funding through the NSF Engines or BBBRC programs, the exercise of coming together, forging regional ties, and producing a collaborative vision for the future can be powerful. Through applying for funds, organizations, companies, leaders, and entrepreneurs identified allies and mapped resources that can lay the groundwork for future collaboration.

Emphasizing Opportunities Outside Charlotte and the Triangle

Traditional economic development thinking often assumes that for high-tech coalitions to succeed, there must already be dense concentrations of resources such as in the Triangle or Charlotte. However, coalitions from North Carolina showed surprising geographic diversity, with proposals from all over the state.

Many proposals were submitted by organizations from eastern and southeastern North Carolina as well as from the Triad. The Triad region submitted more proposals than either of its metropolitan Triangle or Charlotte counterparts, with applications focused on fortifying the burgeoning automotive industry and building on the already strong biomedical industry in the area. The eight proposals from eastern and southeastern North Carolina indicate that leaders in this region are examining opportunities to capitalize on emerging technologies in ways that address key regional challenges such as climate vulnerability, or to innovate within traditional industries such as agriculture, agribusiness, food production, and manufacturing. Many potential partners come from rural counties that have not significantly benefited from innovation and technology industries. The high number of applications from these two areas indicates strong regional partnerships and momentum, motivated leaders, and ready-to-go plans and strategies for innovative economic development programs.

The range of innovative strategies described by coalitions in the BBBRC and Engines proposals highlights the momentum and enthusiasm of North Carolina's regional leaders, from across sectors, for addressing the state's most pressing economic, social, and environmental challenges. Beyond energy and enthusiasm, the proposals reveal how regional economic development leaders are shifting their strategies to be less isolated and more collaborative, and to depend less on recruiting businesses and more on leveraging existing assets. Moreover, they are examining ways to harness new technologies to foster economic growth in parts of North Carolina that need it most.

Appendix A: Methodology

The RTI team downloaded and organized data on the following applications:

- 23 of the 529 BBBRC proposals that were selected for Phase 1 awards (and therefore as finalists for the Phase 2 competition)
(<https://www.eda.gov/sites/default/files/filebase/files/arpa/build-back-better/BBBRC-Phase-1-applicant-list.pdf>)
- 16 of the over 700 concept outlines submitted to NSF Engines for Type-1 or Type-2 consideration that advanced to the full proposal stage and that had a lead institution in North Carolina: Available at
(<https://airtable.com/shrnjX8J0qtHvgLEa/tblseKr1f3lGqZWWhQ>)

For each project, we identified the location of the project lead organization to map the distribution of projects across North Carolina. Many projects had a regional focus, suggesting that the region impacted by a project would stretch beyond the central county. We recorded regions that were part of an “area of impact,” indicating the counties or prosperity zone region described by the proposal. For COG-led proposals, we named counties in the COG as the area of impact and used the location of the COG’s headquarters as the lead county.

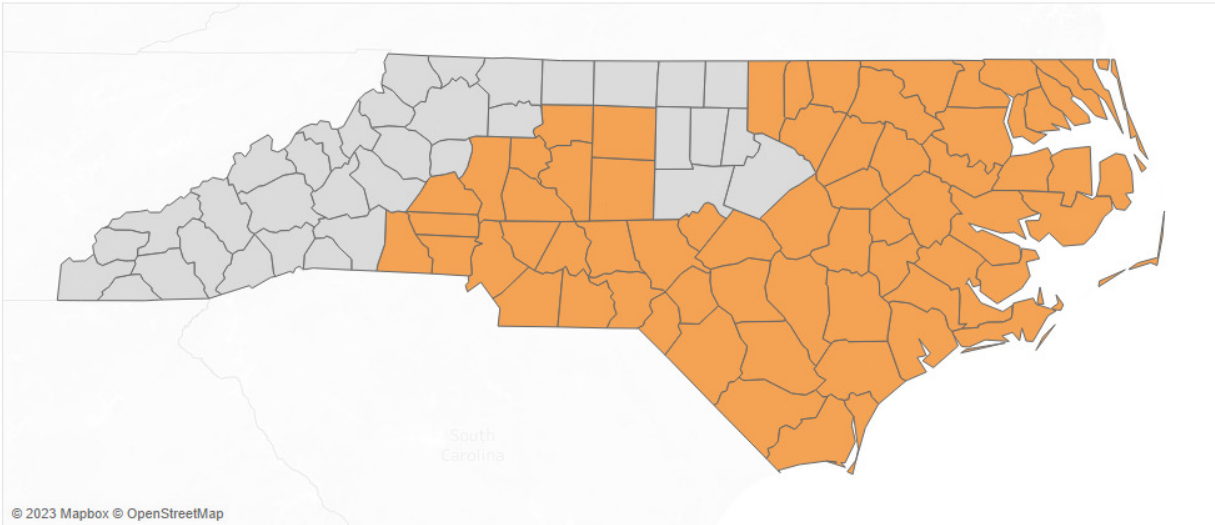
For the NSF Engines and BBBRC applications with publicly available project descriptions, we categorized projects by specific industry sector (including sectors as specific as precision agriculture, uncrewed aircraft, marine technology, and in-space manufacturing). To examine how frequently industries were featured in applications, as shown in Figure 3 above, we recategorized industries into 10 broad industry sectors (manufacturing, climate tech & clean energy, agriculture & food systems, blue economy, health, broadband & telecommunications, government innovation, aerospace, AI, and industry agnostic). For those applications that featured multiple industries, we chose the industry that seemed most dominant in the application. When we could not identify an industry, we left the field blank.

For most coalition proposals that were not selected for funding by the NSF or EDA, only limited information was available, derived from the lead organization, coalition titles, and follow-up research on individual projects. More information is available on winning proposals. For example, the EDA released documents only for the winning proposals, and for the two NSF Engines Awards funded in North Carolina, award records included abstracts that describe in depth the coalition, programmatic focus, and region.⁹

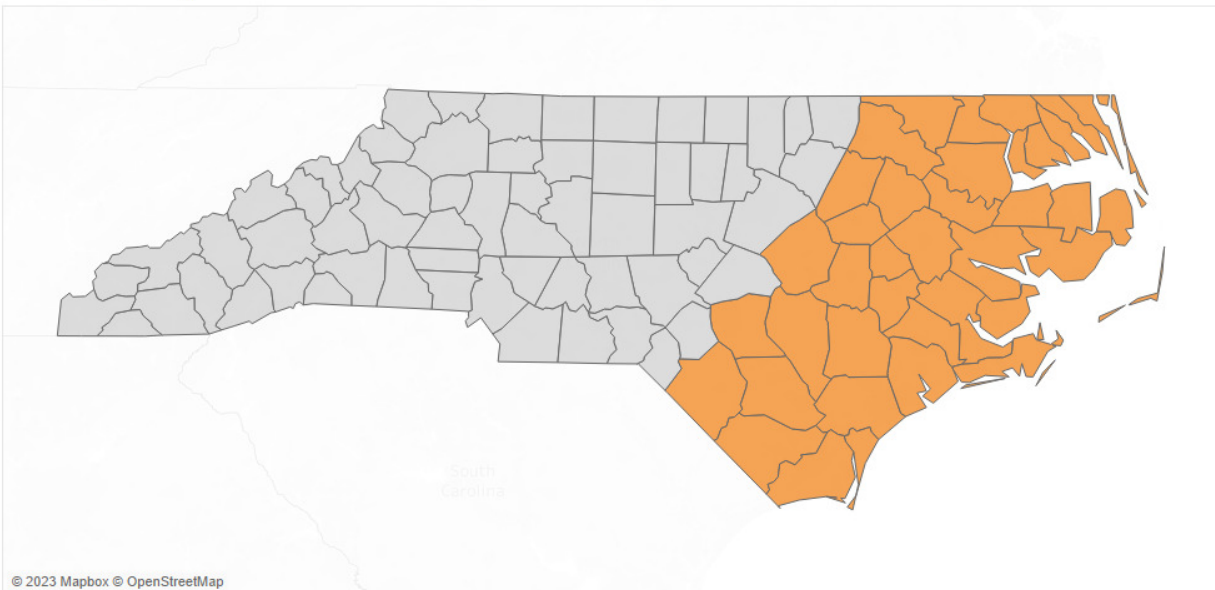
⁹ National Science Foundation. (n.d.) Advanced search results for “NSF Engines Development Award.” Accessed September 9, 2022.
<https://www.nsf.gov/awardsearch/advancedSearchResult?ProgEleCode=200Y&BooleanElement=All&Keyword=%22NSF+Engines+Development+Award%22&AwardTitleOnly=true&ActiveAwards=true>

Appendix B: Service Areas of Awarded Grants, by Lead Organization

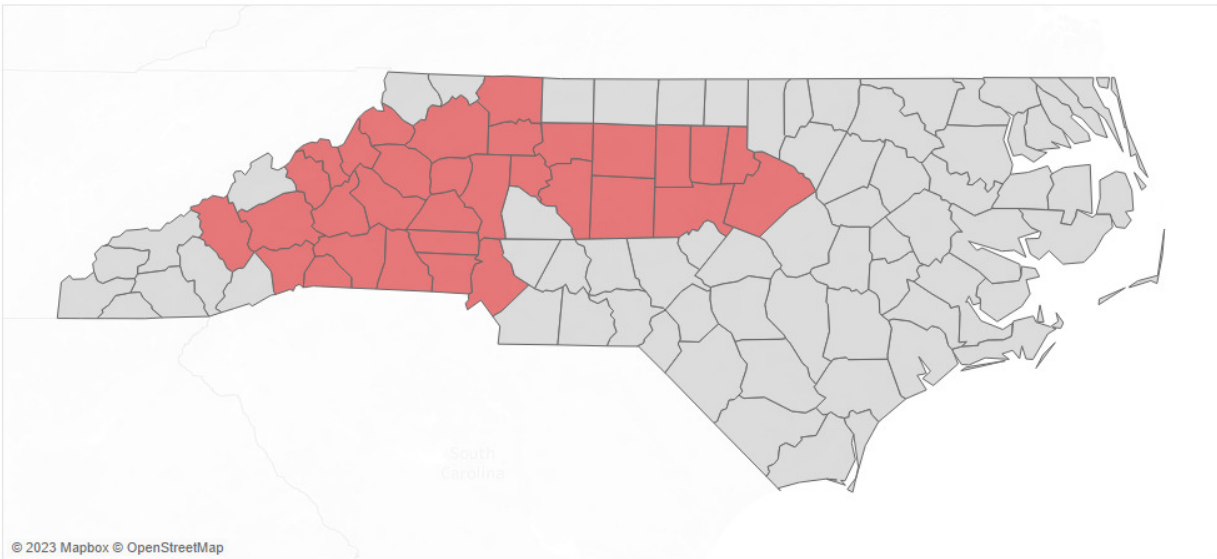
NSF Engines Type-1: Clean Carolinas



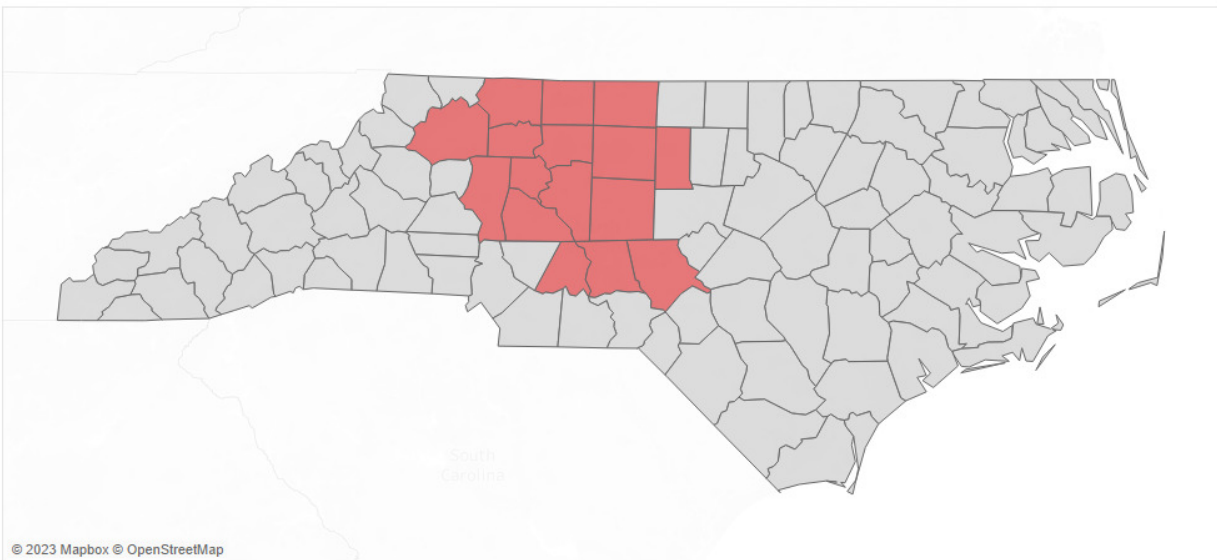
NSF Engines Type-1: North Carolina Ecosystem Technologies



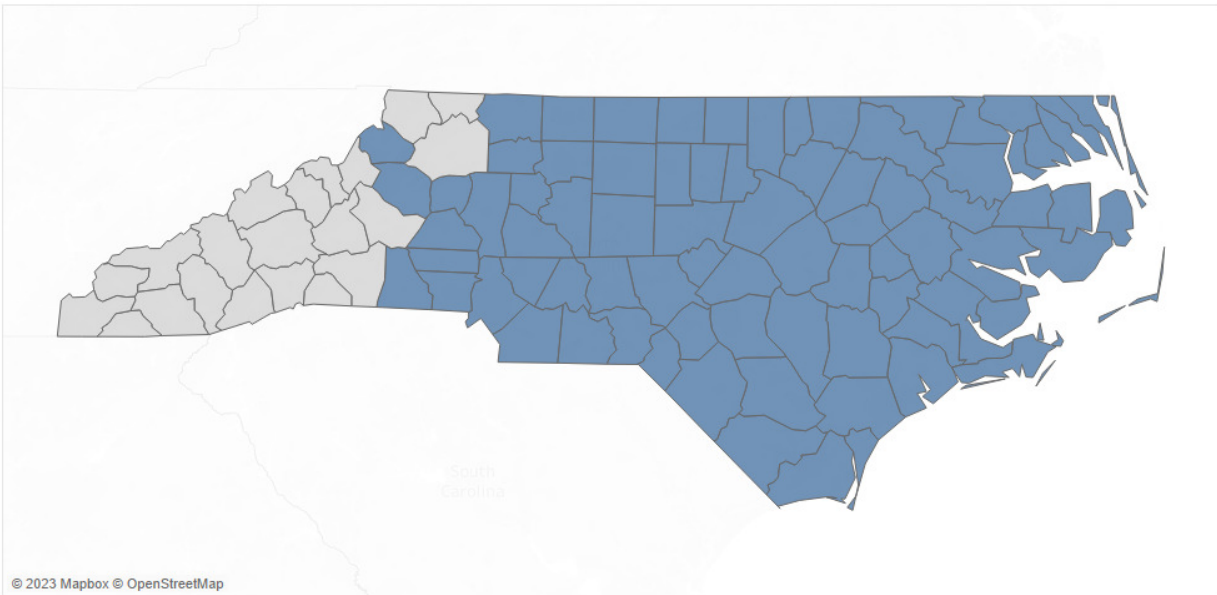
NSF Engines Type-2: Circular Textile Engine



NSF Engines Type-2: Central Carolina Engine for Innovation in Regenerative Medicine



BBBRC: Accelerate NC Life Sciences Manufacturing



BBBRC: SITE Next-Gen Cluster

