

NC STATE
UNIVERSITY



bteco
Biomanufacturing Training
and Education Center

NC Facility for Advanced Biomanufacturing (NCFAB)

Enabling the next generation of biomanufacturing – BTEC 2.0



<https://youtu.be/AOEyeNI68As?si=Sr5yDhzccHdVNIqo>

NC offers a unique competitive advantage for biopharmaceutical manufacturing

- BTEC: A premier center for education, training, partnerships for technical development — and key catalyst for economic development in NC
- Excellent biopharmaceutical educational and development landscape
 - Support from NC organizations, such as NCLifeSci and the NCBiotech
- Local universities provide favorable environment for work force creation and development
- Focus on research and technical development provides ample opportunities for collaboration
- Exceptional quality-of-life factors for employee recruitment and retention
- Excellent business climate

Unprecedented growth in life science manufacturing statewide

Over 4k new jobs and >\$6B investment

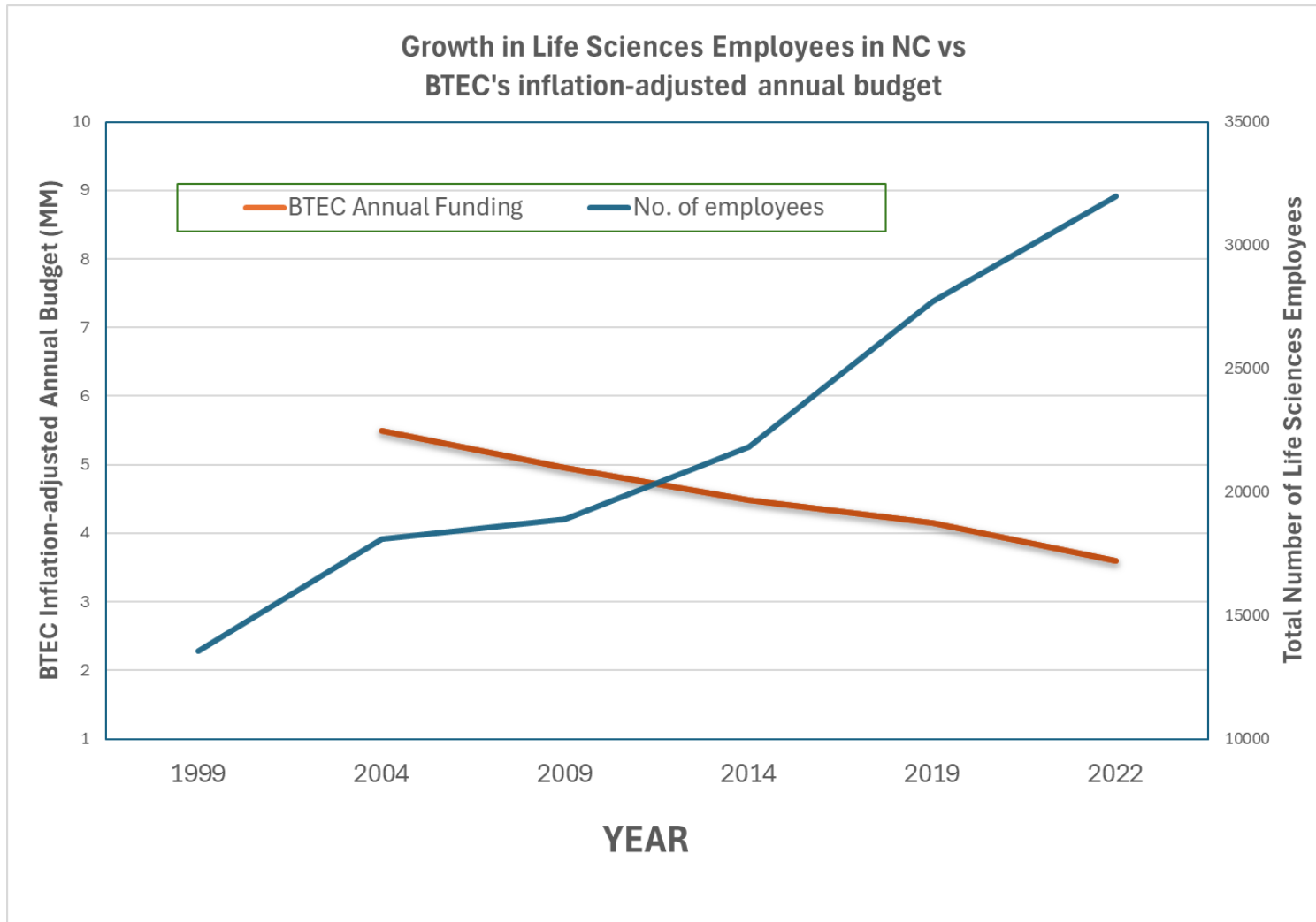


BTEC'S unique impact

- Over 700 biomanufacturing **graduates** since opening in 2007
- 98% **job placement** within 6 months (> 80% remain in NC)
- 6,000+ professionals have attended **professional development** courses (including investigators from FDA)
- More than 200 **Bioprocess Services projects** completed
- **AIM-Bio** program launched with DTU with a \$27MM grant from the **Novo Nordisk Foundation**
- Instrumental in the creation of the **National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL)** with > 150 industry members



BTEC's inflation-adjusted budget has not kept pace with NC's biomanufacturing industry growth



Maintaining NC's competitive edge requires proactivity and intention

- **Biomanufacturing growth in NC will require unprecedented levels of new hires at technical, graduate, and post-graduate levels**
 - NC biopharma manufacturing sites will grow by 8,000 more employees between the end of 2022 and the end of 2026 (Window on the Workplace 2023)
- **The development pace of biotechnology has accelerated, requiring adaptation to avoid obsolescence**
 - Fundamentally new therapeutic modalities and platforms
 - Novel analytical and processing methodologies
 - Big data, data-intense approaches, and use of AI

**Investment is required to grow training infrastructure and capabilities to
meet industry expectations
and enable continued growth of the industry in NC**

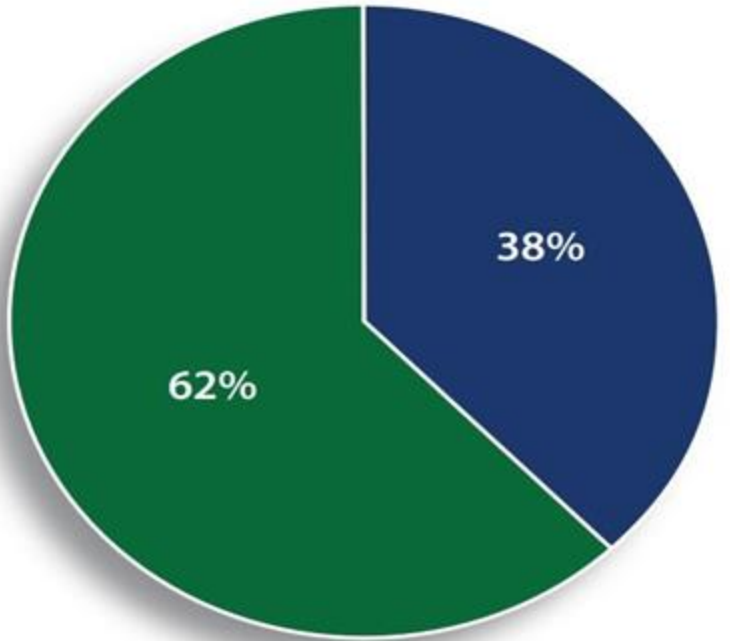
Increased competition

from other states and countries making large investments in biopharmaceutical manufacturing, bioprocess innovation, and training

- National Center for Therapeutics Manufacturing, Texas A&M
- The National Institute for Innovation in Biomanufacturing, University of Delaware
- CBET, Albany College of Pharmacy and Health Sciences
- BETC, Worcester Polytechnic Institute
- Jefferson Institute for Bioprocessing, Thomas Jefferson University
- SABRE cGMP Center, University of Delaware
- NIBRT, Ireland
- Advanced Therapies Skills and Training Network (UK)
- Association for the Advancement of Blood and Biotherapies, The George Washington University
- Biotalent, Canada
- Biotech Training Facility, Nederland

Industry trends will accelerate demand for specialized technical training and advanced professional degrees

Employment by highest level of educational attainment



- AA/AS or below
- BA/BS or above

Window on the Workplace 2023

Workforce Training Needs for North Carolina's Biopharma Manufacturing Industry

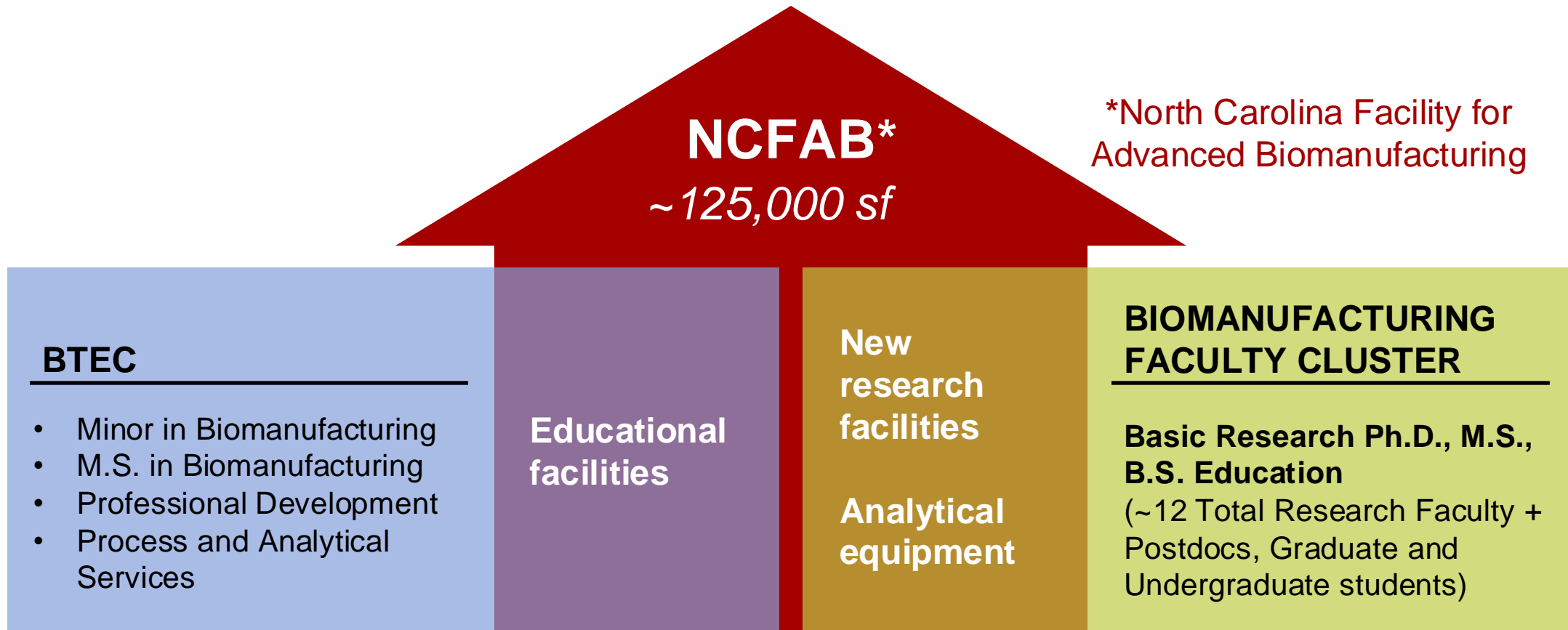
North Carolina Biotechnology Center.

Created in partnership with NCLifeSci

BTEC needs to evolve to meet needs of the industry in NC

- Current resources (building, staff and budget) constrain expansion and support of new manufacturing modalities
- Biomanufacturing in NC is expanding rapidly beyond biopharma, including production of industrial enzymes, and precision fermentation of advanced proteins for human food and animal health
- Increased competition exists from other states making large investments in biopharmaceutical manufacturing
- Opportunities exist to develop large(r) strategic initiatives, beyond BTEC, to address economic development of NC through research, education, training and outreach throughout the state

Enhanced biopharmaceutical manufacturing ecosystem for NC



Goal: Maintain North Carolina's leadership and competitive edge in the fast-evolving Biomanufacturing sector

NC Facility for Advanced Biomanufacturing

Increase the training & educational impact across the state

Increase the capacity for teaching undergraduate, graduate, & professional development courses, including enhanced online education & training

Develop training opportunities throughout the state through online options, virtual training, & on-site at BTEC in **regions with NCBC partner sites**

(RTP, Greenville, Charlotte, Triad, Wilmington, Asheville)

Infrastructure and capabilities to meet new technological developments, therapeutic modalities, and new biomanufacturing trends



Update the bioprocess and analytical capabilities

at NC State to focus on next-generation technologies and modalities, drug product manufacturing and precision fermentation processes

Become a Center of Excellence for

Biomanufacturing, not only for biotherapeutics, but also production of proteins by precision fermentation, including enzymes and advanced proteins for human food and animal health

Enhance BTEC research efforts

— from drug development to drug **manufacturing** — by establishing a **multi-disciplinary Biomanufacturing Faculty Cluster** to address global health challenges

Investments required to meet objectives

- Expanded space on Centennial Campus (~ **125,000 gsf**)
- Additional process equipment and analytical instrumentation
- Additional staff
 - Professional development and academic courses
 - Analytical and process support
 - Enhanced educational capabilities
- Additional faculty members and disciplines to support advancing biopharmaceutical manufacturing through research programs

Preliminary budget

- Building and equipment: ~ **\$160 M**
- Recurring costs: ~ **\$8 M/y**
 - BTEC staff, supplies, equipment maintenance
- Multidisciplinary **strategic faculty cluster** for biopharmaceutical manufacturing (**already approved by NC State**)
 - Enhance research collaborations
 - Promote BTEC impact (NC State contribution)
 - Five faculty hires in 2 – 3 years
 - Cross-cutting technologies: IT, digitalization, fundamental & applied molecular and cellular biology, process sciences and engineering

How you can help

- **Provide your expert feedback/input on the proposal**
 - Steering committee made up of Gary Gilleskie, Ruben Carbonell, Juan Torres, Jennifer Pancorbo, Rodolphe Barrangou, Bala Rao
- **Mobilize support within your organization for this initiative**
 - We would be happy to meet with your organization's leadership
- **Help us raise broad awareness** of how NCFAB will support continued growth of biomanufacturing in NC, and help your company in particular

Together let's keep NC in the forefront of biomanufacturing!



Thank you!