

North Carolina Biotechnology Center
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Testimony of the North Carolina Biotechnology Center
Dr. Ken Tindall, Vice President of Science and Business Development
For the hearing “Where the Jobs are: Can American Manufacturing Thrive Again?”
Before the House Energy and Commerce Committee’s
Subcommittee on Commerce, Manufacturing and Trade
April 19, 2012

One-page Summary

In response to the subcommittee’s question “Can American Manufacturing Thrive Again?” my answer is a strong “yes.” This testimony outlines North Carolina’s success in creating biomanufacturing jobs following steep losses in traditional manufacturing.

Biomanufacturing jobs require a different skill set than the assembly line jobs created at the turn of the previous century. Biotech is a knowledge-based industry that creates a sophisticated product. Its workers must execute complex steps in a highly regulated environment.

In North Carolina, we combined the resources of North Carolina’s university and community college systems with industry expertise to form a unique academic, industry and government partnership. It’s called NCBioImpact, and this program is training hundreds of future workers, current employees and even FDA inspectors today.

The North Carolina Biotechnology Center worked to help create this partnership, and the right environment for biomanufacturing to thrive in North Carolina. We’ve worked since 1984 to support biotechnology research, business and education. We also foster innovation, technology commercialization and company creation through our universities. A robust manufacturing economy relies on new ideas that lead to new products to create an environment for company growth and new jobs.

In summation, competition for these jobs, like all manufacturing, is global. To support these high tech manufacturing centers, the U.S. needs a strong education infrastructure and the capability to innovate and develop new products. Strengthening math and science education, linking workforce training programs with industry, and supporting new ideas will continue to improve the environment necessary for the creation and manufacture of specialized biotechnology products here in the U.S.

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Good morning, Madam Chairman, and Members of the Committee. I am Dr. Ken Tindall, Senior Vice President for Science and Business Development at the North Carolina Biotechnology Center. My organization is a state-funded non-profit that works to create an environment conducive to innovation, company creation, recruitment and growth resulting in biotech jobs.

Thank you for the invitation to share my experience at your hearing today on "Where the Jobs Are: Can American Manufacturing Thrive Again?" I absolutely believe the answer to that question is yes. In my testimony today, I will describe pharmaceutical and biomanufacturing jobs and how North Carolina became a hub for biomanufacturing. Finally, I will discuss the opportunity that we, the United States, have to replicate that success and create even more high tech manufacturing jobs.

Critical to the biotechnology industry is biomanufacturing, or using cells or their natural processes to produce products. Biomanufacturing jobs are specialized. Employees work in a clean environment, usually filled with stainless steel tanks from 20 to 40 feet tall. Hundreds of feet of piping run from the supply source to the tanks and from the tanks to more processing and packaging equipment. All of these operations take place in temperature-controlled environments.

These factories make insulin, vaccines and treatments for various diseases like breast cancer and multiple sclerosis. These are complex molecules that are produced in a highly controlled environment. And, the handling is specialized. The products, some of our most advanced therapies and vaccines, often require refrigeration for transport and storage.

Technicians who run the processes to create these medicines may have Associate's or Bachelor's degrees. Engineers create the factory specifications and develop new processes, and also maintain the plants once they are up and running. Entire departments are staffed by

varying education levels from certificate to Ph.D. and all employees are dedicated to quality assurance and quality control.

These are great jobs. Salaries begin around \$30,000 to \$40,000 for a high-school graduate with some training and a certificate and go on to top six figures. The average salary for all biotech jobs in North Carolina is more than \$75,000, approximately twice that of our private sector.

These manufacturing jobs are a far cry from weaving cloth or assembling furniture. So how did North Carolina create these jobs?

Let me give you some background about North Carolina. When scientists 40 years ago developed techniques that later allowed us to manufacture human insulin – the first approved biotech product – North Carolina’s economy revolved around tobacco, textiles and manufacturing.

Like other manufacturing locations in the U.S., technology replaced human labor. Unskilled jobs went overseas. From 1996 to 2006, North Carolina’s employment dropped:

- 10 percent in furniture
- 23.5 percent in tobacco
- 51 percent in traditional textiles.¹

In 1984, North Carolina created my organization, the North Carolina Biotechnology Center. NCBiotech was established to support biotechnology research, business and education across the state for long-term economic development.

We take a systematic approach to job creation. We fund researchers to identify and develop ideas with commercial application. We help spin the ideas out of universities and into companies, and then we fund critical points in their growth. And, we work with partners – notably the North Carolina Community Colleges System, public and private universities, and industry – to make sure those companies have workers with the right training.

Today, some 58,000 people work at about 500 North Carolina biotech companies. Of these, 18,000 to 20,000 work in pharmaceutical and biotech manufacturing. While other manufacturing sectors in North Carolina have experienced a significant decline, the state’s pharmaceutical and biomanufacturing sector has shown modest growth since 2002. Much of

¹ Duke University Center on Globalization, Governance & Competitiveness, *North Carolina in the Global Economy*, http://www.soc.duke.edu/NC_GlobalEconomy/index.shtml, (Accessed April 17, 2012).

this growth can be attributed to the state's biomanufacturing companies which showed 3.5% annual growth since 2002 and are projecting 6.2% annual growth between 2011 and 2014.²

To meet the growing workforce demands of the bio- and pharmaceutical manufacturing industries, the state established a sector-specific training consortium. This partnership, called NCBioImpact, combines the resources of North Carolina's university and community college systems with industry expertise to form a unique academic, industry and government collaborative.

This collaboration has produced curricula among three training partners that directly support industry needs, including:

- BioNetwork, the North Carolina Community College System's statewide initiative with seven centers providing expertise and support to all 58 community colleges. BioNetwork trains at all levels of this industry, upgrading the skills of incumbent workers, from entry level to management.
- BTEC (Golden LEAF Biomanufacturing Training and Education Center) at North Carolina State University, an 82,500-square-foot facility featuring high-tech classrooms and laboratories with bench-scale and multi-scale bioprocessing equipment. Many laboratories simulate a production facility that must meet strict regulatory requirements, such as current Good Manufacturing Practice (cGMP) required by the United States Food and Drug Administration (FDA).
- BRITE (Biomanufacturing Research Institute and Technology Enterprise) at North Carolina Central University provides undergraduate and graduate training programs in the Pharmaceutical Sciences. BRITE has a strong research focus, particularly in the areas of drug discovery and manufacturing process technology.

The practical impact is that multiple companies have located their biomanufacturing facilities in the state, at least in part, because of the comprehensive training capabilities of the NCBioImpact partnership. For example, Canadian-based Medicigo opened in 2011 and was able to fill nearly all of their initial 56 vacancies from within the state. Likewise, Novartis Vaccines began initial operations in 2010 with a large contingent of North Carolina-trained staff. Novartis, Merck, Grifols, Pfizer, Biogen Idec, Eisai and others have sustained and expanded operations in the state. Across the board, site managers are able to fill most entry-level vacancies from within North Carolina.

² North Carolina Biotechnology Center, *Window on the Workplace 2012*, <http://www.ncbiotech.org>, (Forthcoming, June 2012).

Finally, how does North Carolina's challenge from the early 1980s reflect the challenge the United States faces today? What lessons have we learned?

First, we need a strong pipeline of products in order to increase manufacturing. Second, training programs must produce workers who are job-ready, day one. Third, we must recognize that other countries are beginning to affect our competitiveness in this sector.

Increasing manufacturing jobs requires that we create more products and then manufacture them here in the U.S. In North Carolina, we started by stimulating innovation in the universities, working to commercialize those research ideas and ultimately creating companies.

Quite simply, more ideas in the pipeline provide more chances for a product to be developed to a point of manufacture. Certainly, this concept holds for biotech products, but also can be applied to many of the new knowledge-based industries that will require advance manufacturing to develop and produce new products for their industries.

Second, these biomanufacturing jobs require a different skill set than the assembly line jobs created at the turn of the previous century. Biotech is a knowledge-based industry that creates a sophisticated product. Its workers must execute complex steps in a highly regulated environment. In North Carolina, our training programs work to complement each other and stay in sync with industry needs. But success in these jobs also requires STEM education – Science, Technology, Engineering and Math – as early as possible. To address some of these needs, NCBiotech grants help teachers to bring these biotechnology lessons into the classroom.

Third, the competition and pressures for this industry are global. In North Carolina, one biotech job yields 4.6 total jobs according to the Battelle Institute.³ Everyone wants these high-impact jobs.

Because I've talked largely about North Carolina, one might think that it's other U.S. states in competition for these jobs. However, that's not how we at the North Carolina Biotechnology Center see the world. While some products, like vaccines, are best manufactured in the U.S. for reasons of safety and availability, increasingly all of our states are competing against growing international biotechnology clusters in Spain, Ireland, Singapore, Brazil, and more. Plus, other countries are devising creative ways to attract these jobs:

- Great Britain has created the patent box, which puts a reduced tax rate on profits generated from intellectual property developed in the UK.
- Singapore has invested billions in research and development infrastructure, and is now attracting more firms and biomanufacturing facilities.

³ Battelle Technology Partnership Practice, *Battelle/BIO State Bioscience Initiatives 2010*, http://www3.bio.org/local/battelle2010/Battelle_Report_2010.pdf, May 2010, (Accessed April 17, 2012).

- Brazil targeted alternative fuel from sugar cane with billions of dollars in government-sponsored research.

In summary, Madam Chairman, I believe biomanufacturing can continue to create jobs in the U.S. As mentioned previously, these factories are not the assembly lines of the previous century. The infrastructure that supports these high tech manufacturing centers lies in our education system and capability to innovate and develop new products. Strengthening math and science education, linking workforce training programs with industry, and supporting new ideas will continue to improve the environment necessary for the creation and manufacture of specialized biotechnology products here in the U.S.

Thank you, Madam Chairman and committee members, for the opportunity to speak with you today. I will answer any questions that you have.