



## Overview and Summary of Recent Initiatives

In 2002, the Department of Resources and Economic Development (DRED) funded a feasibility study that assessed the need for facilities and technology parks to support the development of New Hampshire's technology industries, emphasizing biotechnology. The study recommended developing two high-technology business incubator facilities that would build on the expertise of the state's colleges and universities. The first incubator, being developed in partnership with Dartmouth University, is under construction and expected to open in 2006.

New Hampshire became a member state in the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR) on August 15, 2004. The EPSCoR committee cites four enabling technology clusters as high priority and high potential for New Hampshire:

- Nanotech/Materials/Precision Engineering/Robotics
- IT/Bioinformatics/Medical Technologies
- Optics/Sensors/Environmental Technologies
- Computational Tools/Geospatial Analysis.

## Building Bioscience R&D Capacity

### Recent state investments in facilities

The incubator being developed at Dartmouth College will also house R&D functions (see below).

## Encouraging Academic/Industrial Interaction

In 1991 the **New Hampshire Industrial Research Center (NHIRC)** was created by the New Hampshire Legislature for the purpose of providing a mechanism to promote applied and basic scientific, engineering, and associated marketing research and technological transfer to support the New Hampshire industrial and business community.

This center fosters cooperative industry and university research partnerships to increase the pace of innovative technology development. The NHIRC grants "Innovation Investment" competitive contract awards and provides other developmental support to New Hampshire business. These grant awards allow

researchers at the University of New Hampshire, Dartmouth, and Dartmouth Medical School to conduct applied research or provide engineering and marketing services for New Hampshire companies. To be eligible to receive grant-funded services, businesses and industries must have an ongoing business within the state or an announced intention to locate a business in the state. The NHIRC may provide services other than grants including, but not limited to, training regarding the capture and protection of intellectual property, strategic thinking and strategy development, and writing better proposals.

Companies may apply for up to \$25,000 of state funding to match company funds at least dollar for dollar. Companies may receive more than one award. A 5 percent fee on the total project is charged to help cover administrative expenses. The NHIRC is funded by the State of New Hampshire through its DRED at an annual level of \$500,000.

## Moving Technology into the Marketplace

### Commercializing university technology

Both Dartmouth and the University of New Hampshire have offices whose mission is to promote the transfer of research into commercial products.

### Supporting bioscience entrepreneurs and emerging companies

The **Dartmouth Entrepreneurial Network (DEN)** will provide business development services to companies that locate in the bioscience incubator that is under development with state support. DEN offers a range of services to entrepreneurs and start-up companies, including strategic advising, mentoring, and providing networking opportunities, as well as providing infrastructure and office space.

## Making Capital Available

### Venture capital

The **DEN** seeks to link entrepreneurs to sources of venture capital. Also, the state has begun organizing diversified angel investors into a statewide referral network.

## Providing Space for Bioscience Companies

### Incubators

#### *Under development*

Dartmouth College donated land to help build the **Dartmouth Regional Technology Center** in Lebanon. The estimated cost of the incubator is \$4 million. The incubator was awarded \$2.6 million by the U.S. Department of Commerce's Economic Development Administration in January 2004. The New Hampshire Community Development Finance Authority is providing \$1 million in tax credits. The facility will have a biotechnology and high-technology machining infrastructure. Construction of the Dartmouth Regional Technology Center commenced in August 2005 and is progressing toward an expected second quarter 2006 opening. The business incubator facility will have 34,000 square feet, including laboratory, manufacturing, and office space. The space in the building is already more than two-thirds committed.

## Addressing Talent Needs

### Specialized postsecondary programs

**The New Hampshire Community Technical College's (NHCTC's) Industrial Biotechnology Education and Training** program, located at NHCTC at Stratham/Pease, offers an entry-level biotechnology education and training program to support the biomanufacturing industry. With financial support from a National Science Foundation (NSF) Advanced Technology Program grant, matching funds from the state, and a federal earmark through a Veterans Affairs/U.S. Department of Housing and Urban Development 2002 appropriation, a fully equipped bench-top biotechnology research, development, and manufacturing laboratory was built at the NHCTC-Stratham/Pease Center. This laboratory provides students, college and high school faculty, and business professionals experiential instruction in a state-of-the-art biotechnology laboratory. At NHCTC's Biotechnology Program, students can receive a 2-year biotechnology associate in science degree, a biotechnology diploma, or a biotechnology certificate.

The **New Hampshire Biotechnology Education and Training (NH BET) Center** at NHCTC was recently awarded three federal grants to build the education and training infrastructure for biotechnology and biomanufacturing education and training locally, statewide, and throughout the Northeast region.

The first grant was a High Growth Job Initiative Department of Labor grant of \$775,000 to create the **Center of Expertise in Biomanufacturing**, one of five Centers of Expertise forming the National Center for the Biotechnology Workforce. This grant is helping "build capacity" by facilitating hiring of staff and purchase of biomanufacturing equipment. The grant also supports an apprenticeship program for high school students entering the associate of science in biotechnology program and the development of short courses for incumbent workers.

Another Department of Labor grant, a Community Based grant entitled, "**bioCONNECTnh**" was awarded to NHCTC's Biotechnology enterprise in November 2005. This 3-year grant supports the development of the state's biotechnology infrastructure, adding a focus on discovery research with outreach to New Hampshire's high schools and including \$750,000 for companies to access for incumbent worker training.

Finally, an NSF Advanced Technological Education regional center grant was awarded in August 2005. This \$3 million, 4-year renewable grant entitled, "**The Northeast Biomanufacturing Center and Collaborative: Building a Sustainable Infrastructure for Biomanufacturing Jobs and Education,**" provides funding to six Hubs in Northeast region states to work with industry to develop curricula, instructional materials, and other resources to support education and training for biomanufacturing jobs and provides funding for faculty and teacher development workshops at the Hubs and an annual Biomanufacturing Conference at the NH BET Center in the summer.

Plymouth State College offers a bachelor of science degree in biotechnology.

### K-12 outreach programs

**The University of New Hampshire's Advancing Science Program** encourages hands-on learning for high school science students in molecular biology, spectroscopy, and molecular modeling. To date, more than 2,000 students have developed their problem-solving skills and team communication skills to solve current problems posed by their teachers. The goal of the program is to improve teachers' knowledge of modern analytical methods and tools used in research and industrial laboratories. Participants develop

strategies for engaging students in experimental design utilizing current scientific applications. Students use these instruments and methods in their own high school classrooms.

NHCTC biotechnology college-level courses are taught at the state's high schools through NHCTC's **Project Running Start Program**. NHCTC college courses offered at the state's high schools include anatomy and physiology, biotechnology, biology, and medical terminology.

Milford High School's Applied Technology Center, Nashua High School, and the Seacoast School of Technology offer 3-year courses in biotechnology that cover a wide range of biotechnology topics. Under these programs, high school students complete Biotechnology I and receive four credits from NHCTC in microbiology. Students who complete Biotechnology II receive four credits in college-level biology, and those who complete Biotechnology III receive three credits toward a NHCTC-level internship.

The Eastern Region Partnership, Inc., a member of the New Hampshire Department of Education's Tech Prep consortium, created the **Biotechnology Career Pathway** for middle and high school professionals and students to expose middle and high school science classes to biotechnological concepts.

## Pending Proposals

Legislation is proposed to adopt a state R&D tax credit and is supported by the current administration. The legislation would allow companies to take an R&D tax credit equal to 15 percent of the federal R&D tax credit for R&D work conducted in New Hampshire. Companies could apply the R&D tax credit against New Hampshire's Business Profits Tax. New Hampshire had an R&D tax credit in the 1990s, but it was repealed as part of a larger overhaul of the New Hampshire business tax structure.

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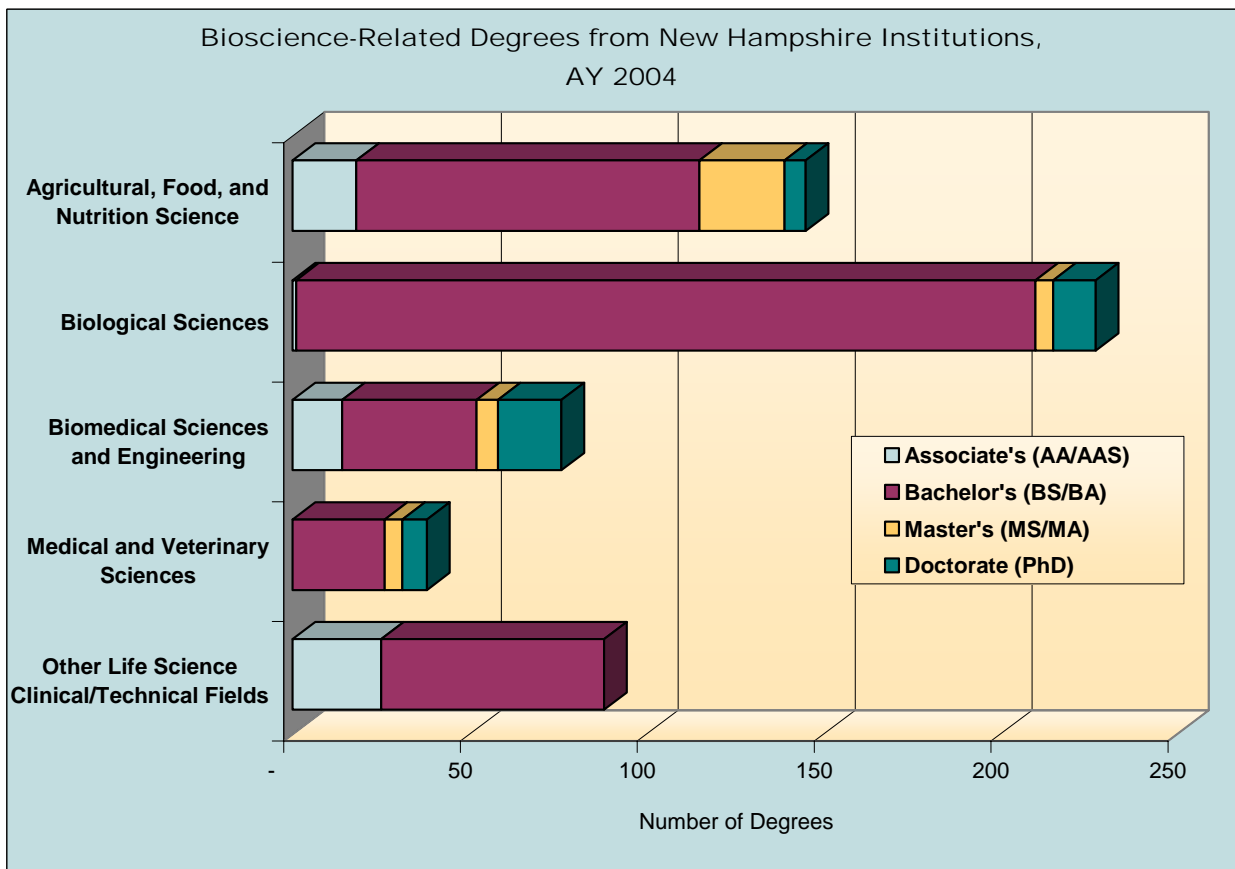
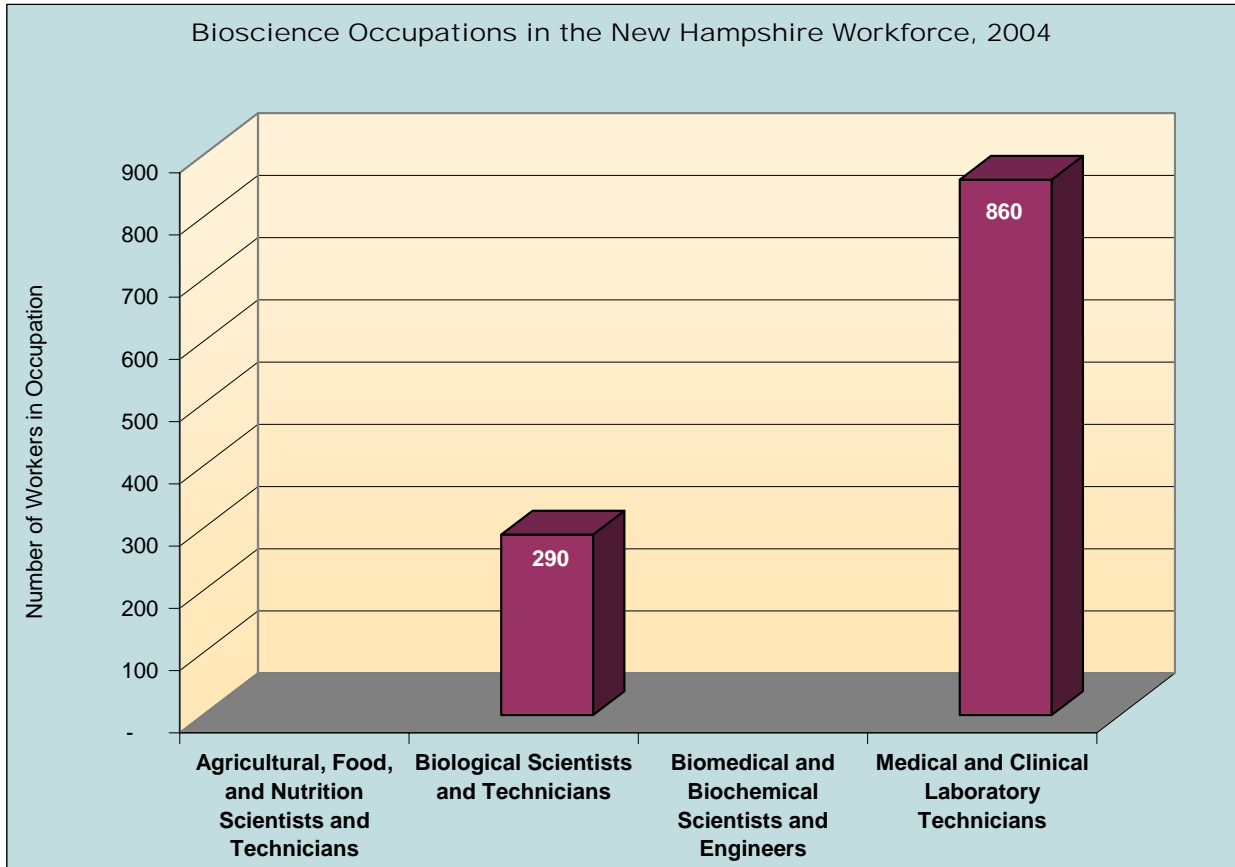
The New Hampshire Biotechnology Council's mission is to develop the biotechnology, medical device, diagnostics, and life science industry within the state by providing information and assistance to companies in these sectors, from start-ups to those planning to relocate in New Hampshire; increase the education level within and outside of the industry by supporting the creation of new initiatives for basic knowledge as well as job training activities for companies; represent the industry to government and the local public; and serve as a local clearinghouse resource for council members.

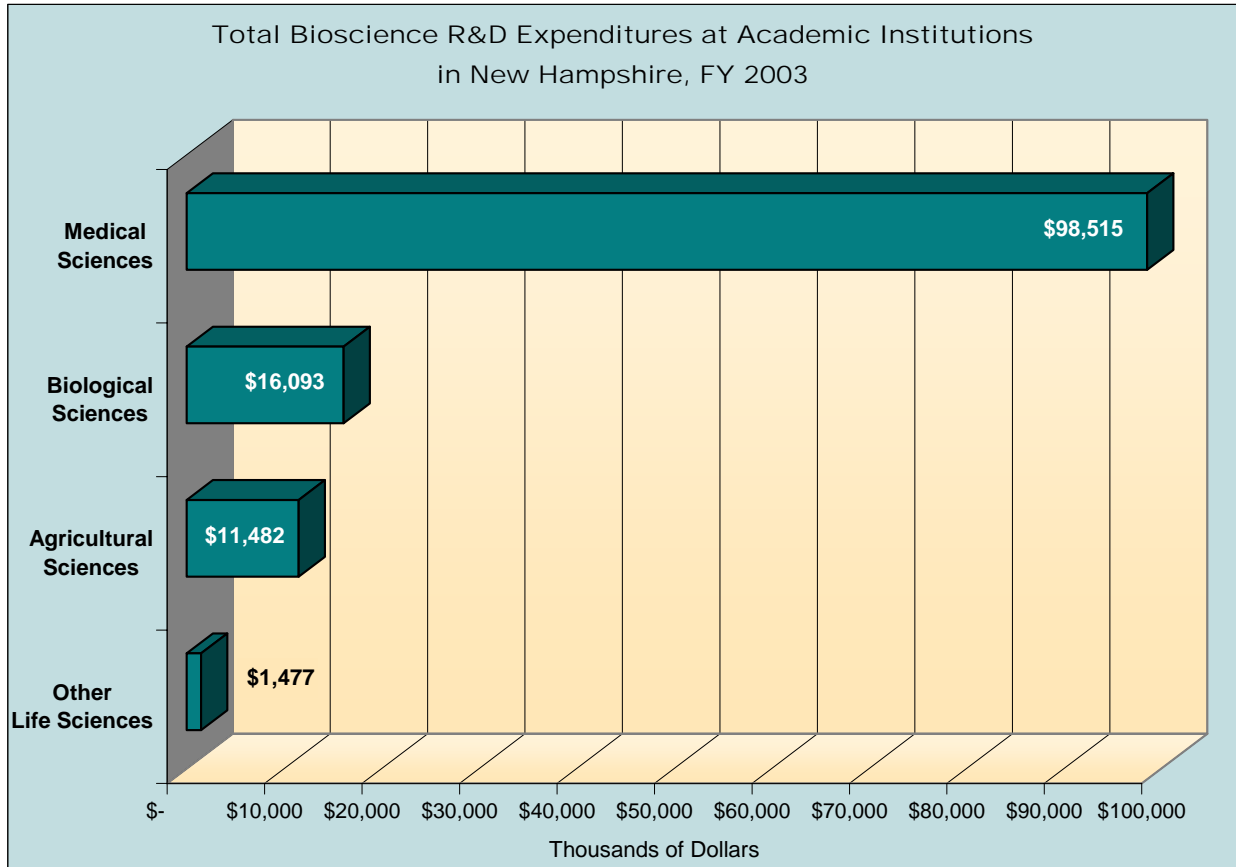
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Industry Subsector	New Hampshire	United States
<b>Agricultural Feedstock &amp; Chemicals</b>		
Establishments 2004	2	2,111
2001-2004 Establishment % Change	-51.6%	0.4%
Employment 2004	60	104,893
2001-2004 Employment % Change	-68.7%	-6.9%
Share of U.S. Employment	0.1%	100.0%
Location Quotient	0.12	n.a.
Average Annual Wage 2004	\$80,646	\$63,383
Direct-Effect Employment Multiplier	5.57	10.91
Total Employment Impact	334	1,212,094
<b>Drugs &amp; Pharmaceuticals</b>		
Establishments 2004	12	2,589
2001-2004 Establishment % Change	50.0%	-0.6%
Employment 2004	671	313,207
2001-2004 Employment % Change	-1.2%	2.7%
Share of U.S. Employment	0.2%	100.0%
Location Quotient	0.44	n.a.
Average Annual Wage 2004	\$54,366	\$79,303
Direct-Effect Employment Multiplier	3.66	9.51
Total Employment Impact	2,454	2,731,321
<b>Medical Devices &amp; Equipment</b>		
Establishments 2004	95	15,190
2001-2004 Establishment % Change	16.6%	0.2%
Employment 2004	3,076	411,460
2001-2004 Employment % Change	6.2%	-3.6%
Share of U.S. Employment	0.7%	100.0%
Location Quotient	1.54	n.a.
Average Annual Wage 2004	\$46,774	\$56,449
Direct-Effect Employment Multiplier	2.51	4.56
Total Employment Impact	7,726	1,817,705
<b>Research, Testing, &amp; Medical Laboratories</b>		
Establishments 2004	104	20,565
2001-2004 Establishment % Change	-2.0%	19.4%
Employment 2004	1,041	413,550
2001-2004 Employment % Change	-2.4%	8.2%
Share of U.S. Employment	0.3%	100.0%
Location Quotient	0.52	n.a.
Average Annual Wage 2004	\$50,146	\$65,414
Direct-Effect Employment Multiplier	1.99	3.15
Total Employment Impact	2,071	1,272,936
<b>TOTAL PRIVATE SECTOR</b>		
Establishments 2004	45,060	8,156,137
2001-2004 Establishment % Change	2.0%	4.8%
Employment 2004	529,349	109,249,195
2001-2004 Employment % Change	-0.3%	-0.7%
Share of U.S. Employment	0.5%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	39,545	\$39,003

Source: Battelle calculations -- based on Bureau of Labor Statistics QCEW data from the Minnesota Implan Group, RIMS II Employment Multipliers from the Bureau of Economic Analysis, and the Census Bureau's Economic Census.

Note: n.a. = metric is not applicable.





	New Hampshire	United States	Rank
<b>University R&amp;D Expenditures, FY 2003</b>			
Total (\$ thousands)	\$252,210	\$40,104,621	37
Life Science R&D (\$ thousands)	\$127,567	\$24,062,088	36
Percent of Total R&D	50.6%	60.0%	
Life Sciences Per Capita	\$99.07	\$82.74	
Change in Life Sciences FY 1999–2003	92.4%	52.7%	
<b>NIH Support to Institutions, FY 2004</b>			
Total (\$ thousands)	\$99,352	\$22,556,459	33
Per Capita Expenditures	\$77.16	\$77.56	
Change in Expenditures FY 2000–2004	73.6%	53.2%	
<b>Higher Education Degrees in Bioscience Fields, AY 2004</b>	574	111,329	42
<b>Bioscience Occupations in the Workforce, 2004</b>	1,150	616,140	49