



Overview and Summary of Recent Initiatives

In his FY 2007 budget request, Governor Jim Douglas proposed investing \$3 million in technology transfer and job creation in the field of sustainable environmental technologies. These funds would be used to support technology transfer at the **University of Vermont (UVM)** and workforce development programs focused on this field at Vermont's state colleges. Support would also be provided to the Vermont Student Assistance Corporation to encourage more high school students to attend college.

In the last several years, Vermont has received two awards from NIH's Centers of Biomedical Research Excellence program, which is funding research in lung biology and neurosciences. The **Biomedical Research Infrastructure Network** in Vermont is funding the **Vermont Genetics Network (VGN)**, which is building a new microarray facility and enhancing bioinformatics services at UVM and five baccalaureate colleges.

Building Bioscience R&D Capacity

Recent state investments in facilities

In January 2006, UVM completed an addition to its **Marsh Life Science Building** providing space for faculty from the Food Science Program, part of the Department of Nutrition and Food Sciences. The additional space includes new biochemistry research laboratories.

Construction will begin in the spring of 2006 on a new **Plant Science Building** at UVM that will house programs in the Departments of Botany and Agricultural Biochemistry and Plant and Soil Science within the College of Agriculture and Life Sciences.

Research programs

UVM was recently awarded a \$16.5 million NIH research grant to further biomedical studies and education. The money will be distributed to the VGN, which is a collaboration of UVM, St. Michael's College, Norwich University, Middlebury College, and Castleton and Johnson state colleges.

Moving Technology into the Marketplace

Commercializing university technology

UVM's Office of Technology Transfer provides assistance for efforts to commercialize UVM research.

Supporting bioscience entrepreneurs and emerging companies

The **Vermont Center for Emerging Technologies (VCET)**; an incubator at UVM, provides entrepreneurial support services. In addition, the Experimental Program to Stimulate Competitive Research (EPSCoR) and the state's traditional economic development programs have been used to assist bioscience companies. UVM faculty members also work closely with businesses on collaborative research projects and SBIR grant applications.

Making Capital Available

Pre-seed and seed capital

The EPSCoR program at UVM works closely with businesses to provide **SBIR phase 0** grants. These \$10,000 grants assist businesses in preparing full SBIR applications. Approximately one third of the grants given each year in Vermont are to bioscience initiatives.

Venture capital

Vermont offers an **Angel Investment Tax Carryover** that allows Vermont income tax to be deferred on the capital gain for an investment of up to \$200,000 by any one person when the gain is used for capital investment in an eligible business.

Providing Space for Bioscience Companies

Incubators

VCET at UVM was completed and opened in the summer of 2005. Its mission is to leverage UVM's science and technology expertise and specialty laboratories, facilities, and equipment to link client companies with faculty and private sector mentors and advisers, with sources of capital, and with staff and student interns. VCET offers traditional incubator services and received both federal and state support. An expansion is being contemplated.

Facilities financing

Although Vermont does not have a program specifically designed to assist with financing bioscience facilities, the state's economic development tools, e.g., tax credits, training programs, and low-interest loans, have been used to assist bioscience companies like PBM Nutritionals and Mylan Technologies.

Addressing Talent Needs

Recruiting management talent

The Vermont **Academy of Science and Engineering**, an honorary organization of the state's top scientists and engineers, supports the bioscience industry and talent by serving as a resource on a variety of issues, including issues of science and technology.

Specialized postsecondary programs

The VGN is a collaborative effort among UVM and five baccalaureate colleges throughout the state to build critical mass and infrastructure in the broad area of genetics and to increase the number of undergraduates who go on to biomedical careers. Among other activities, the network sponsors the Microarray Outreach project. This is a hands-on undergraduate microarray laboratory module that uses the Affymetrix microarray platform and travels to undergraduate schools in Vermont. The goal is to expose undergraduates in the state to microarray technology using hands-on laboratory experiences. The NIH grant includes \$1.25 million in funding for a five-year outreach education program in which UVM faculty will visit area colleges to share their technology and research expertise.

K-12 outreach programs

The VGN is part of a **High School Outreach Program** in which it partners with the UVM and EPSCoR to have representatives visit Vermont high schools and encourage youth to go into science and engineering careers.

Pending Proposals

As noted above, Governor Douglas has proposed investing \$3 million in technology transfer and job creation in the field of sustainable environmental technologies.

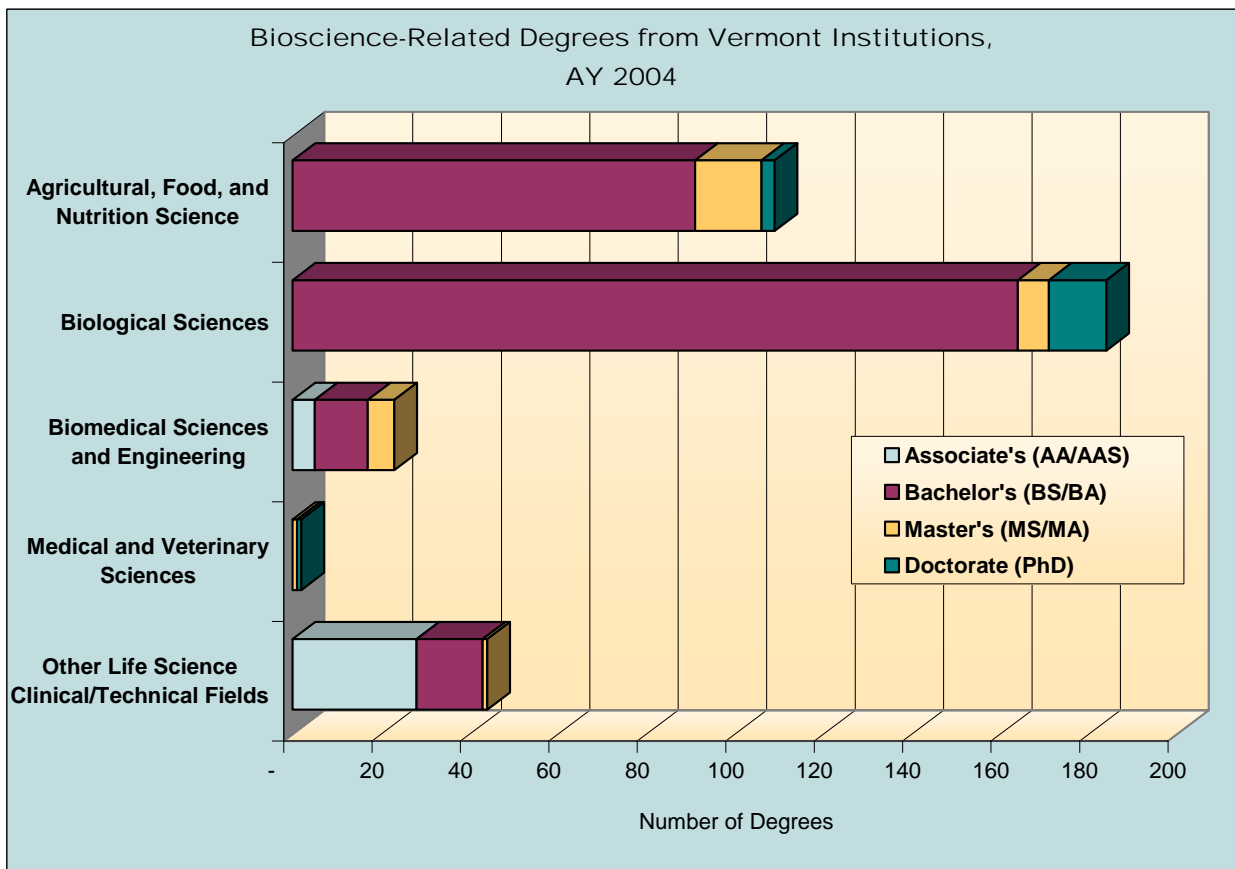
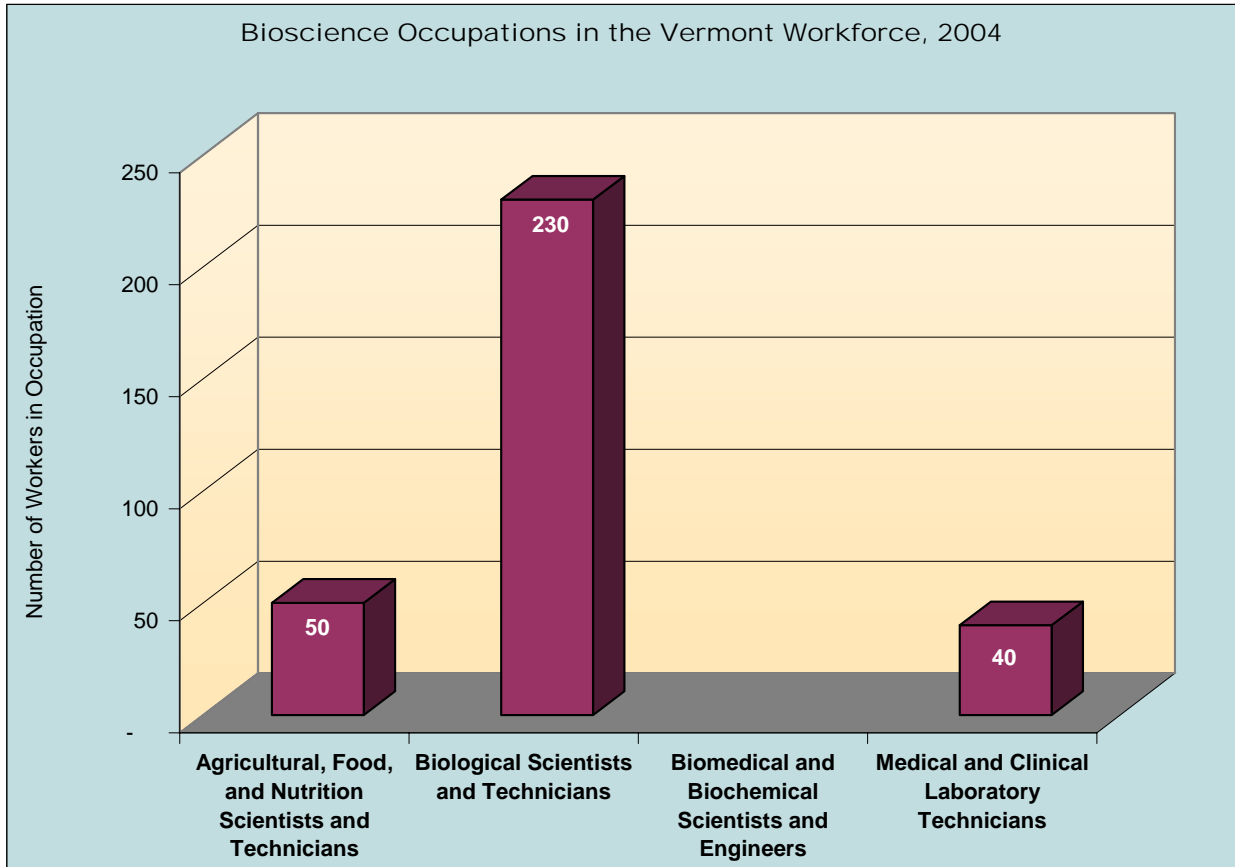
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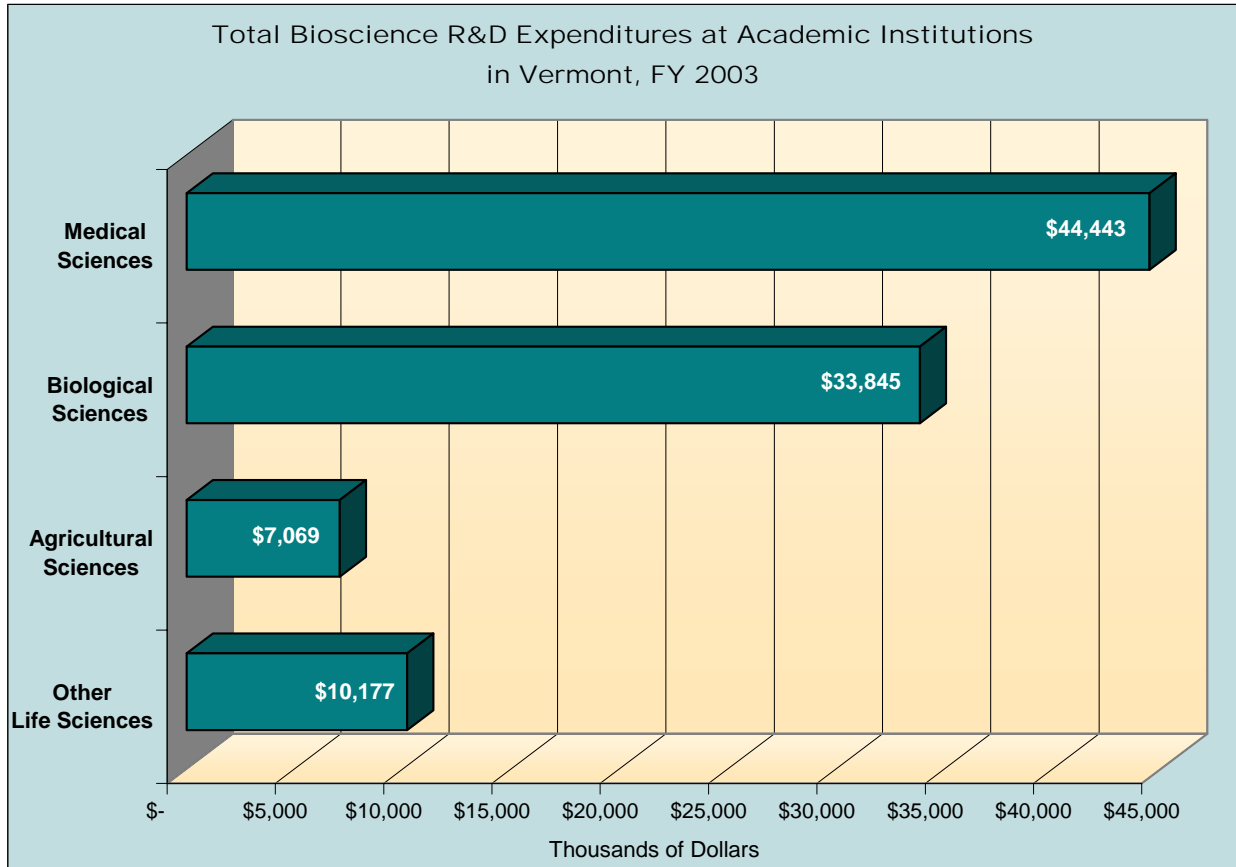
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Industry Subsector	Vermont	United States
Agricultural Feedstock & Chemicals		
Establishments 2004	4	2,111
2001-2004 Establishment % Change	33.3%	0.4%
Employment 2004	26	104,893
2001-2004 Employment % Change	30.0%	-6.9%
Share of U.S. Employment	0.0%	100.0%
Location Quotient	0.11	n.a.
Average Annual Wage 2004	\$24,625	\$63,383
Direct-Effect Employment Multiplier	2.31	10.91
Total Employment Impact	60	1,212,094
Drugs & Pharmaceuticals		
Establishments 2004	4	2,589
2001-2004 Establishment % Change	0.0%	-0.6%
Employment 2004	36	313,207
2001-2004 Employment % Change	24.1%	2.7%
Share of U.S. Employment	0.0%	100.0%
Location Quotient	0.05	n.a.
Average Annual Wage 2004	\$51,010	\$79,303
Direct-Effect Employment Multiplier	3.11	9.51
Total Employment Impact	112	2,731,321
Medical Devices & Equipment		
Establishments 2004	42	15,190
2001-2004 Establishment % Change	34.6%	0.2%
Employment 2004	608	411,460
2001-2004 Employment % Change	45.0%	-3.6%
Share of U.S. Employment	0.1%	100.0%
Location Quotient	0.65	n.a.
Average Annual Wage 2004	\$34,236	\$56,449
Direct-Effect Employment Multiplier	2.00	4.56
Total Employment Impact	1,217	1,817,705
Research, Testing, & Medical Laboratories		
Establishments 2004	34	20,565
2001-2004 Establishment % Change	23.4%	19.4%
Employment 2004	201	413,550
2001-2004 Employment % Change	43.1%	8.2%
Share of U.S. Employment	0.0%	100.0%
Location Quotient	0.21	n.a.
Average Annual Wage 2004	\$41,984	\$65,414
Direct-Effect Employment Multiplier	1.80	3.15
Total Employment Impact	362	1,272,936
TOTAL PRIVATE SECTOR		
Establishments 2004	22,590	8,156,137
2001-2004 Establishment % Change	0.3%	4.8%
Employment 2004	248,073	109,249,195
2001-2004 Employment % Change	-0.7%	-0.7%
Share of U.S. Employment	0.2%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$32,720	\$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.





	Vermont	United States	Rank
University R&D Expenditures, FY 2003			
Total (\$ thousands)	\$106,581	\$40,104,621	47
Life Science R&D (\$ thousands)	\$95,534	\$24,062,088	39
Percent of Total R&D	89.6%	60.0%	
Life Sciences Per Capita	\$154.31	\$82.74	
Change in Life Sciences FY 1999–2003	69.5%	52.7%	
NIH Support to Institutions, FY 2004			
Total (\$ thousands)	\$69,410	\$22,556,459	40
Per Capita Expenditures	\$112.11	\$77.56	
Change in Expenditures FY 2000–2004	39.8%	53.2%	
Higher Education Degrees in Bioscience Fields, AY 2004	362	111,329	49
Bioscience Occupations in the Workforce, 2004	320	616,140	52