

Biotech Boom



Area Development Site and Facility Planning

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What do you call an industry that generates sales of over \$50 billion each year? "REMARKABLE," "AMAZING," and "downright incredible" easily work as appropriate adjectives to describe the booming U.S. biotech business.

An estimated 17,200 biosciences-related organizations - including more than 1,500 biotech firms - pay an average of \$60,000 per year to their 900,000-plus employees according to a study conducted by Ernst & Young for the Biotechnology Industry Organization (BIO), a Washington, D.C., group representing over 1,100 companies, academic institutions, and biotech centers in the United States and other nations. No wonder decision-makers for U.S. economic development organizations, both large and small, have considered adding biotech to their long-term development plans. While many states and communities have already turned their thoughts into action, some are still debating the issue. And others wisely realize bio simply won't work for them no matter how it's packaged. Truth be told, not every U.S. community has the capacity to establish, grow, and/or support biotech activity, let alone a biotech cluster.

INGREDIENTS FOR BIOTECH SUCCESS

So what sets apart those locations with thriving biotech activity from those without it? It's a host of factors working in harmony. Apparently such fortunate communities offer these ingredients for success:

- * Universities, research institutions and centers with a life-science focus, and possibly a national or global reputation for innovation;
- * Incubators, business assistance, and lots of capital to help players grow in every stage of the business cycle;
- * A well-educated, abundant pool of scientists and others possessing skill sets and knowledge geared toward life sciences;

- * Direct, generous funding for basic academic research and ground-breaking R&D efforts;
- * A smooth technology-transfer system from the lab to commercialization;
- * Excellent networking and collaborative opportunities within the biotech sector and with other allied sectors;
- * Access to state-of-the art equipment and facilities; and
- * Full and long-term community support in the areas of regulatory issues and taxes, and a general pro-industry environment.

With all that said, every successful biotech community is unique, using its individualized strengths to build something special no place else in the world can duplicate.

"KING KONG" BIOTECH STATES

Information about how, why, and where biotech is being cultivated is becoming more abundant and focused. The reason is three-fold: First, as the industry ages, there are naturally more companies and data to analyze and track over time. Secondly, states are backing biotech big-time. At least 40 states have identified biotechnology as a target industry, 33 states have established bioscience associations, and 37 states support bioscience incubators (according to BIO). Thirdly, more monies are now invested to pay credible research groups to study the industry in a methodical fashion.

For example, the Milken Institute, a globally renowned think tank, provides an insightful state-by-state look at the biotech and pharma industries in "Biopharmaceutical Industry Contributions to State and U.S. Economies." The study, published October 2004, shows the industry has impacted all sectors of the economy with "more than 2.7 million jobs and \$172 billion in real output in 2003." It's obvious -why so many states want a piece of the bio pie, which is filled with dream-like levels of potential new income streams and jobs.

Specifically, the Milken report examines the biopharmaceutical industry's economic impact in four areas:

1. Industry Geographic Location and Performance: The report reveals the industry's economic importance in each state by measuring its concentration and growth of employment and output. According to these measures, the top states are New Jersey,

Indiana, Massachusetts, North Carolina, and Pennsylvania.

While it's true New Jersey and Pennsylvania are two states that capture the bulk of employment in the pharmaceutical industry, big pharma companies are "now trying to mitigate costs by learning to outsource," explains Perry Wong, a senior research economist for The Milken Institute and one of the report's authors. "In headquarter regions, employment gains aren't as robust." Employment growth of a sort is happening, however, in the form of pharmas making big investments in small and medium-sized biotechs, many of which are located in other states.

Wong calls North Carolina "a very interesting state.. .25 years ago it had no biopharma activity, but [its leaders] did the right thing by lobbying for biosciences to be a primary piece of the economy. Now it has the Research Triangle, a major biosciences center. Today, the state continues to leverage that growth rather rapidly."

Specifically, the University of North Carolina's decision to invest in building major computing sites beginning in the 1980s "has proven to be a very wise choice," Wong says, adding that these centers are renowned for their state-of-the-art modeling programs supporting many amazing bio tech initiatives. For example, this computing power is often tapped to simulate growth patterns of certain biocompounds so scientists can find out (without the cost/time of using human subjects) how they will impact human tissue.

2. Innovation Pipeline: The report measures a state's assets needed to produce a "strong and viable" biopharmaceutical industry, including the skills of its work force and how much R&D monies it gets. Top states are Massachusetts, Maryland, Connecticut, New Jersey, and Pennsylvania, according to this measure.

"Innovation is the key driver for iitech success," asserts Wong. "It'll be ike that for as long as we use bioproducts. Both biotechs and pharmas live or die according to how many products are in their pipelines. Innovation is definitely the most critical aspect of the industry." He singled out Massachusetts (notably Boston) for its "almost boutique R&D environment that most states can't duplicate. It has great quality research and a high level of commitment to supporting the industry."

Wong also is very impressed by Maryland's high-end, theoretical research and patent-creating track record. "Maryland is one unique location due to Washington, D.C., and Johns Hopkins University, which produces the most papers in terms of research," says Wong. And even though it may not have the infrastructure [necessary] to produce a large number of products, "many important trials originate in that state. It's good at developing 'frontier' ideas." He cites Maryland's "very good corporate and

financial structures" as being pillars for the region's biotech firms.

3. Multiplier and Tax Impact: This is a measurement of how much additional economic activity is created by the industry (including additional jobs and output created in other sectors, as well as tax revenues). States showing the most impressive activity in this respect are California, New Jersey, Pennsylvania, North Carolina, and Illinois.

4. 10-year Industry Projections: The report predicts likely growth of the industry in each state by employment and output. States with the biggest gains in absolute numbers in the next decade include California, Massachusetts, Pennsylvania, New York, and Maryland.

FIVE SECTORS TO EXPLORE

In June 2004 BIO published another comprehensive report, "Laboratories of Innovation: State Bioscience Initiatives 2004," which analyzed the scope of bioscience programs and employment in each of the 50 states. According to that report - prepared for BIO by the Battelle Memorial Institute, one of the world's largest nonprofit contract research organizations, and the State Science & Technology Institute - the bioscience industry is divided into five sectors: agricultural feedstock and chemicals; drugs and pharmaceutical; medical devices and equipment; research and testing; and academic health centers, research hospitals, and research institutes.

Renowned biotech industry consultant Dr. Walt Plosila, vice president of Battelle's Technology Partnership Practice, knows well the changing landscape of America's bio industry. In reference to the study, he was asked to identify states doing well in building their life science industries. Without hesitation he named Pennsylvania, Arizona, Utah, Colorado, and Maryland.

Why those states, most of which are not on the typical top-10 lists for the industry? "They are all trying to diversify in a smart way, picking their niches, and creating strong university structures, while still making sure they have ways to commercialize the products," says Dr. Plosila. In particular, Plosila is impressed with the fact that Pennsylvania spends in excess of \$60 million a year on life sciences, while Arizona is investing \$440 million in university research facilities.

While some states publicly proclaim they desire to build world-class biotech centers, they are unable to implement these plans as they lack the financial, academic, and technological resources - or the political will to back the procurement of said resources. Wisely or unwisely, notes Plosila, a few states are backing off from announced big plans to heavily invest in biotech.

However, in many states the lion's share of new biotech initiatives is now in the process of being funded courtesy of the tobacco industry, which agreed in 1998 to reimburse states \$300 billion for medical care given to smokers in poor health. Starting that year, and to continue over a 25-year period, individual states began to receive payments ranging from \$200 million to \$28 billion.

Already more than two dozen states are using such funds to fuel biotech initiatives. For example, Missouri has earmarked \$36 million annually into life sciences from 2007 through 2025. Pennsylvania plans on investing \$2 billion of the funds into life sciences. And Florida already has spent \$310 million of tobacco settlement money on plans to bring the East Coast branch of San Diego's Scripps Institute to a site in or near Palm Beach; it will then work on building a biotech cluster to support it.

Will all the planned state initiatives make each region a biotech powerhouse? Only time will tell, but common sense indicates more than money is needed to create viable bio clusters.

ON THE COASTS & ELSEWHERE

Where are successful U.S. biotechs found? Many are clustered in a small number of regions, where they expend their energies not only growing their own businesses but also building synergy with like-minded groups to create a viable local biotech industry. They're in places where you may expect them to be, on the East and West coasts, as well as in locales you'd never expect.

"America's Biotech and Life Science Clusters," a 2004 study produced by the Milken Institute (in cooperation with Deloitte & Touche) focused on 12 clusters identified by prior studies as being the most dynamic in the nation. Using 44 measurements, the study evaluated those dozen metros using five criteria: R&D inputs, risk capital, human capital, biotech work force, and current impact. The "innovation pipeline" of each area proved to be a key evaluation factor, according to the authors.

San Diego, the number-one biotech metro, received high marks for its "interlocked" and "multilayered cluster" offering a "uniquely entrepreneurial and creative dynamic." Translated into economic terms, the cluster is responsible for 55,600 jobs and \$5.8 billion in income. Next came Boston, followed by Raleigh-Durham-Chapel Hill; San Jose; Seattle-Bellevue-Everett; Washington, D.C.; Philadelphia; San Francisco; Oakland; Los Angeles-Long Beach; orange County, Calif; and Austin-San Marcos, Texas.

However, report authors noted that if life sciences (encompassing medical devices

and pharmaceuticals) were included in the measurements, the ranking would change slightly: Boston first, then San Diego; San Jose; Raleigh-Durham-Chapel Hill; Philadelphia; Seattle-Bellevue-Everett; San Francisco; Washington, D.C.; Oakland; Los Angeles; Orange County; and Austin-San Marcos.

SURPRISING EMERGING BIOTECH METROS

Increasingly biotech growth is becoming "very much region-driven" rather than state-driven, points out Dr. Plosila. That partly explains why some bioscience firms are thriving in places you'd expect as well as in places that make you wonder.

Everyone knows companies on the coasts seek to tap into the biotech mentality of innovation and the highly qualified talent pools found there. For example, Genentech, the world's second-largest biotech firm, is headquartered in the San Francisco Bay area. It's part of the larger northern California biotech community of over 500 bioscience firms, many of which access the area's four major research universities, 12 private research institutions, and four federal research labs.

On the East Coast, Boston (also known as "Genetown") nurtures almost 300 biotech/pharma companies. It, too, has long-standing relationships with renowned universities and biotech centers such as Harvard, Northeastern, and MIT (affiliated with The Whitehead Institute for Biomedical Research, the world's largest DNA-sequencing facility). Firms here include Pfizer, Millennium, Genzyme, BioGen, Novartis, and Merck.

What other American cities - and non-coastal locales - are doing biotech work without a media spotlight on them? Warsaw, Ind., is one of those "off the beaten path" places. For the past 25 years it's been home to Biomet, a global leader in the manufacturer of joint-replacement products. Another fairly unknown medical device cluster can be found in Memphis, Tenn.

Dr. Plosila adds that many people may be surprised to learn that both individual biotech firms and clusters are cropping up in "Rust Belt" communities such as Indianapolis, Peoria, Pittsburgh, and St. Louis. "St. Louis has embarked on a comprehensive biosciences strategy around its strengths in plant and life sciences," he explains. "Already it has raised nearly \$500 million in private dollars for venture capital; embarked on a medical district/park plan to offer shared facilities with its universities and industry; and created innovative mechanisms such as the St. Louis BioGenerator to commercialize research from both universities and industry." Other "surprise" regions, not in the Rust Belt, that are examples of places "seizing the initiative to build on their research niches" include Memphis, Oklahoma City, and

Springfield, Mass., according to Dr. Plosila.

In a related development, some of the traditionally manufacturing-focused regions are players in the new industrial revolution fueled by "industrial biotechnology," a term referring to biotech manufacturing processes using genetically enhanced microorganisms and enzymes to prevent or greatly lessen pollution. Besides "greening" the environment, these processes often help firms produce higher-quality goods and lower their energy costs, according to a 2004 BIO report.

A GLIMPSE AT CANADA/EUROPE

Canada ranks second after the United States for having the most biotech companies, and first for R&D expenditures per employee (source: InPharma, 2004). The Canadian government reports that the country's four biotech clusters of note are as follows:

1. Toronto, Ontario, is said to contain the single largest biomedical, biotechnology, and pharmaceutical cluster of any North American metro area. Its more than 100 biomedical firms represent about 40 percent of Canada's total number.
2. Montreal, Quebec, is headquarters for 200-plus health-related biotech firms, home to the National Research , Council's Biotechnology Research. Institute (world's largest specialized research center), and a hub for genomics. Quebec itself has the third-largest number of biotechs (150) of any North American state or province.
3. Vancouver, British Columbia, known for its major strengths in health and genomics, is recognized as one of the top 20 North American biotech regions.
4. Ottawa, Ontario, employs more than 11,000 people in its life sciences sector focused on biotechnology, medical technology, and health-related systems.

Europe's biotech industry posts almost \$23.2 billion in revenue, invests \$7.32 billion in R&D, and has 95,000 workers, according to an October 2005 European Commission report on 27 European industries ("European Industry: A Sectoral Overview"). As per the report, nations with the most biotech firms are the UK, Germany, France, the Netherlands, Sweden, and Denmark. Consolidation of firms is on the rise, resulting in a recent slight decrease in employment. About 60 percent of the biotechs employ fewer than 20 workers.

About a dozen European bioregions compete with clusters in North America and Japan. "Bio Valley" is the name for Europe's leading life-sciences cluster. Nearly 40 percent of the world's pharmaceutical industries have a presence there, and some

30,000 people are employed in life sciences work. BioValley operates as a tri-national network, encompassing the area found between Alsace in France, northwest Switzerland, and South-Baden in Germany. Here, active collaboration is encouraged between biotechs, research institutions, and other related groups to further science, business, and technology transfer.

Specifically, Europe's most renowned bio clusters are located in Basle, Berlin, Cambridge, HelsinkiTurku, Lyon-Grenoble, Munich, Oxford, Paris, Stockholm-Uppsala, and Zurich. (Both Barcelona and Madrid are poised to join the group soon.)

HOPE FOR THE FUTURE

Like a mythical, powerful genie, biotech is gaining strength, astounding all who look upon it - even making dreams come alive. The relatively young industry still has important issues to resolve in the world court of opinion (e.g., using human embryonic stem cells in research, human cloning, the perceived safety of genetically modified foods, etc.). Yet, biotechnology already has proven its enormous value and benefits by improving the health and lifestyles of millions of people. Millions more are counting upon the industry to quickly find effective solutions to bioterrorism attacks, the growing avian bird flu threat, and many other modern maladies challenging humanity. That's quite a tall order, but one perhaps that biotech is destined to fill.

[Sidebar]

Fierce Biotech has identified five geographic areas destined for major growth: California, Maryland and the 1-270 Tech Corridor, New Jersey, Wisconsin, and Singapore Biopolis.

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"Industrial biotechnology" refers to biotech manufacturing processes using genetically enhanced microorganisms and enzymes to prevent or lessen pollution.

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