



# NEW YORK MUST STEP UP ITS GAME

The Global Struggle for Biopharmaceutical Jobs

April 2011

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This report is produced by  
The Public Policy Institute of New York State, Inc.  
Acting-President: Heather Briccetti, Esq.  
Director of Research: Steven A. Taylor  
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## The International Biopharmaceutical Struggle Can New York Still Compete?

**T**he lack of incentives for private sector investments in New York's biopharmaceutical sector is the most significant threat to the employment prospects in the industry. If the state wants to increase jobs in the sector, then encouraging companies to invest capital in the Empire State is important.

To have an effective biopharmaceutical jobs program, the state's leaders need to put together a political constituency, including the business, labor and academic communities, behind constructing new plants and putting the most advanced research equipment into these new or improved facilities. Then, if New York has the best-trained workforce in the world, it will guarantee, as much as anything can, its employment future in this sector.

The "Great Recession" has made invoking of "crisis" a near universal descriptor in any economic development policy discussions, especially those dealing with emerging industries and the innovation economy. New York state undoubtedly is facing a biosphere level shift in its ability to attract and retain innovation economy employment -- arguably its best hope to provide meaningful and sustainable economic opportunity to its citizens.

However, the Empire State has been precariously slow to react to the

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seismic shifts that are affecting the world's most sought-after companies and jobs. So much so, that crisis does not adequately capture the threat to its future ability to provide a truly meaningful quality of life in the areas of personal growth, stable social systems, family nurturing and public health. The state is not just facing another crisis. A true catastrophe is looming on its event horizon.

The majority of the state's policy makers still have not awoken to the new reality that in areas like high-end life sciences research, pharmaceutical manufacturing, biotechnology, agro-pharmaceuticals, and enzymatic and other catalytic fuel productions, New York is no longer in a race with our peer states. It is incumbent upon our governmental leaders to fully grasp that they are in the midst of an ever-intensifying international competition with nations that in many ways are outperforming this state and country in every major category.

The biopharmaceutical industry still is New York's largest manufacturing and research and development sector. However, the state has over-mortgaged the future of its leading goods and ideas generator through neglecting the crucial role of investment. If it hopes to have a prosperous future, the state must create investment opportunities for its people and companies.\* New York needs to generate an exponential growth in the construction of new plants and equipment if it hopes to achieve a resurgent business environment.

We emphasize that we are urging the state to help create investments in the biopharmaceutical sector. We are pointedly not asking for the state to make additional investments.

The current fiscal situation severely limits the state's ability to make new public capital expenditures or spending programs. Furthermore, New York's history of trying to create jobs in the biopharmaceutical and other sectors has often resulted in merely localized success stories.

As Governor Andrew Cuomo cogently pointed out in his first state of the state message, "We spend about \$1.6 billion a year on economic development and are number fifty in terms of results."<sup>i</sup>

It is not a matter of finding the one new spending program or publicly financed building that will make a meaningful difference. New York needs to get its citizens to start empowering themselves, and have the private sector decide that New York is the place to make crucial investments in new plants and equipment.

It is only through a strategic investment policy that New York can hope to maintain its eligibility to run in this salient global race. This policy needs to start with the premise that jobs are ephemeral, but buildings and highly advanced technological equipment are not. No company will walk away from a billion dollar plant it has just constructed, and it will have to staff that building with the most productive workers it can find to maintain a competitive edge. If you want to create and keep great jobs in New York, get your private sector to build.

It is abundantly clear that New York ranks exceptionally high in research efforts and associated employees. Yet, it still is performing at substantially poorer levels in manufacturing, where the most dynamic employment and wage growth opportunities exist.<sup>ii</sup>

It is well past time for a serious discussion about the state's life-sciences ecosystem, and where New York should begin to move in policy measures designed to grow and strengthen the biopharmaceutical sector.

New York's cultural environment enveloping the emerging technology fields, especially the biopharmaceutical sector, is severely anemic in its care for its people, support for entrepreneurship, and economic development strategies.

Moreover, special attention must now be paid to the rapidly emerging sectors arising in countries like China, India and Brazil, and New York has as-of-yet no coherent plan of how to react to this development.<sup>iii</sup> The inescapable conclusion is that the biopharmaceutical ecosystem in New York is growing weaker, and Albany and major local governments must act before the equivalent of a climatic cataclysm strikes the state.

This report suggests a vision guided by the key dangers New York must face to move toward an ethos that will support the overall sector. However, nothing constructive will happen without leadership from our highest elected officials, academic administrators and corporate

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executives and labor leaders to translate any vision into a sustainable path for change.

Numbers need to back policy, but they do not by themselves point to what courses of action should be adopted. The goal can only come from a comprehensive strategic vision backed by dynamic and steadfast leadership.

A failure of leadership in the state to alter significantly the culture surrounding emerging industries, thereby strengthening the ecosystem the actors in these sectors swim in, will lead to grievous consequences. A letdown now will keep the innovation economy and its actors ensnared in what we call The Hamster Wheel of good intentions. Some of the state's most energetic and pioneering minds have tirelessly worked on how to jump-start New York's emerging industries. However, up until now, despite the best efforts of all swimming as fast as they can, all this exertion has barely kept New York's biopharmaceutical sector afloat.<sup>iv</sup>

Make no mistake. The wheel actually is real, it has actual costs and New York is, if anything, more trapped in its grips. Yet, the true tragedy about the wheel is that many think this self-reflecting helm is the best journey we can expect to take.

Task forces and working groups still form and disappear just as quickly.<sup>v</sup> There is the seemingly undying hope that if somehow we can come up with just one more spending program using sufficient public dollars, New York miraculously will jump to the forefront of the global competition. However, these efforts do not get to the noose strangling

the biopharmaceutical culture.

We are proposing to enter a stream that will allow the state to paddle beyond stagnation and failure. The key is a focus and sense of purpose that will nurture the miraculous potential the industry promises for personal opportunity and the public health.

New York needs to address the following elements before it can claim that it is prepared to meet these challenges. The state's leaders must realize that its highest trained human capital is its greatest asset, and seriously consider what it will take to maximize this asset. Next, they must make the hard choices as to where to direct and find the best use of limited resources so as to garner the greatest global recognition and attention. Then our overall business climate, including state economic development and tax policies, must be overhauled to meet these global challenges. Finally, we have to make our best guesses as to where the best opportunities lie in emerging bio-fields, and lay the groundwork for future growth in these areas while avoiding over-channeling the market.

Failure to act will mean this state will not just slip in comparison to its competing states, although that competition is fierce enough. What is now abundantly clear is that the true threats to the continual viability and growth in the sector are coming from overseas.

### A Current Snapshot

To start, let us first try to understand why this competition has become so ferocious. The answer is clear enough when one comprehends the tremendous and multiplying values that come from landing life scientists, research dollars and firms and especially biotech and pharmacological manufacturing firms.

The average pay for a biopharmaceutical employee in the United States for 2009 was \$102,341. Despite the widely held misconception that labor costs in New York are irredeemably uncompetitive, the corresponding average wage for the sector in New York was \$72,486, nearly 30 percent lower than the national mean. New Yorkers' training and work skills match well with nearly every other location. Why wages are so comparatively low is that we lack sufficient companies creating jobs. The flip side of lower pay is that in theory New York can be more than competitive in the contest for landing these positions.

This low base does not keep these jobs from being the most precious in the state based on the effects each of these jobs has on the rest of the state's economy. The truly striking figures come from when one sees how one of these positions is multiplied into additional jobs. For every life-science research position New York creates or retains in the sector, an estimated 3.458 jobs arise. This number by itself is double the effects produced by jobs on Wall Street.

The truly astounding numbers come from our shrinking manufacturing base. In New York, each position translates into 9.359 jobs. The highest cutting-edge biotechnology or new bio-similar production positions create nearly 16 positions additionally each.<sup>v</sup> Yes, this means that

*Financial Statistics for Pharmaceutical & Medicine Manufacturing in 2009 based on NAICS Codes*

|                 | Number of paid employees | Annual payroll (\$1,000) | Number of Production workers | Production workers wages (\$1,000) | Production workers hours (1,000) | Total cost materials (\$1,000) | Total value shipments (\$1,000) | Value added (\$1,000) | Total capital expenditures (\$1,000) |
|-----------------|--------------------------|--------------------------|------------------------------|------------------------------------|----------------------------------|--------------------------------|---------------------------------|-----------------------|--------------------------------------|
| United States   | 236,439                  | 18,161,776               | 116,135                      | 6,125,030                          | 223,508                          | 50,966,982                     | 191,409,938                     | 140,568,339           | 4,928,155                            |
| California      | 40,989                   | 3,390,312                | 20,385                       | 1,062,511                          | 36,501                           | 5,710,929                      | 30,840,359                      | 25,335,967            | 811,381                              |
| Massachusetts   | 8,642                    | 645,850                  | 4,846                        | 299,036                            | 9,454                            | 807,507                        | 5,640,855                       | 4,840,218             | 152,698                              |
| <b>New York</b> | <b>18,385</b>            | <b>1,111,836</b>         | <b>10,745</b>                | <b>420,198</b>                     | <b>21,446</b>                    | <b>5,294,495</b>               | <b>21,819,804</b>               | <b>16,520,037</b>     | <b>230,415</b>                       |
| Indiana         | 9,501                    | 705,871                  | 4,835                        | 313,731                            | 9,340                            | 2,216,714                      | 19,277,711                      | 16,069,187            | 190,104                              |
| New Jersey      | 23,374                   | 2,475,087                | 7,813                        | 395,204                            | 15,234                           | 3,043,649                      | 12,018,603                      | 8,854,377             | 249,757                              |
| Pennsylvania    | 14,803                   | 1,350,960                | 5,919                        | 384,707                            | 12,598                           | 4,388,776                      | 14,236,084                      | 10,169,469            | 428,571                              |
| North Carolina  | 23,374                   | 2,475,087                | 7,813                        | 395,204                            | 15,234                           | 3,043,649                      | 12,018,603                      | 8,854,377             | 249,757                              |
| Illinois        | 21,946                   | 2,243,193                | 6,057                        | 420,969                            | 12,302                           | 3,912,240                      | 11,790,884                      | 8,547,991             | 343,334                              |

sixteen other jobs are created when the state lands a new position in this field. Conversely, 16 people lose their livelihood when one of these positions disappears. This stratospheric benefit and devastating loss is the greatest multiplier effect by far for any sub-sector in the economy.

The full effect of the 3,000 biopharmaceutical manufacturing jobs, mostly upstate -- positions that disappeared from New York in 2010 or slated to be eliminated during 2011, is apparent. At least 30,000 other New Yorkers will find themselves downsized due to these sector cutbacks.

The manufacturing production pipeline explains why the sector generates so much value compared to professional services, (one-tenth as much) or retail trade (one-eighteenth).<sup>vii</sup> In order to manufacture a drug that has cost hundreds of millions of dollars just to prepare for production, new plants must be built or existing facilities radically upgraded with the most advanced technological equipment, then staffed with the most skilled workforce of any sector. Then base materials must be acquired and delivered.

Next, the new therapy needs to be produced under the strictest quality control standards. Global markets are then established and developed, and the final product must be transported and delivered to health care providers, pharmacies or direct to consumers.

Little wonder then why every nation that has sufficient strategic vision is placing no limits on what it will offer to attract, retain and grow biopharmaceutical firms, especially manufacturers. This shows more starkly than anything else why New York needs to fight for every one of these firms and jobs it can land. It also explains why the immediate future for the sector in New York looks so bleak if we cannot get to a shared strategic vision about what is at stake. The rest of the world is willing to risk its future for this sector, and it is winning.

The growth of the sector in New York between 2006 and 2009 has averaged 3.5 percent. The national average is less than 1 percent for this period mainly because states with large sectors such as California and Illinois were hit much worse by the recession, although these states averaged better than New York for the whole preceding decade.<sup>viii</sup>

Overseas, however, things are very different. Estimates for the rate of sector growth in Brazil in this period are at over 30 percent a year, 821 new facilities are currently under construction, and employment in the sector there now numbers over 100,000 workers.<sup>ix</sup> India has seen an annual expansion of 25 percent<sup>x</sup>, and China, whose sector is much bigger than these other rapidly growing BRIC's, shows an annual growth rate of 18.5 percent.<sup>xi</sup>

Growth rates are real but abstract. The global expansion in plant capacity is where New Yorkers should really take pause.

China is currently constructing an almost incomprehensible 40 million square feet of world-class biopharmaceutical space. One footprint outside of Shanghai alone is coming in at 2.5 million square feet, twice the size of the semi-conductor facility going up in Malta, New York, currently this nation's largest manufacturing project.<sup>xii</sup>

Do not let yourself be fooled that the Chinese can build so large because labor and construction costs there are so low. They are paying more for construction per square foot than a comparable, although much smaller facility in the United States, and the rent they are asking is \$85 dollars a square foot, higher than anywhere in this country. However, the international pharmaceutical industry is paying it.

This mega-sized facility is nearly fully pre-leased with manufacturers from all over the world, but especially from this country. This space will be bursting with fully trained synthetic chemists and others at the forefront of the health revolution hungry to find the next treatment that then will be distributed throughout the globe. In many ways, Shanghai has already replaced Boston and San Francisco as the most important biopharmaceutical cluster on the globe.<sup>xiii</sup>

You talk to developers there and they will tell you that the United States is done. In their opinion, this nation no longer has the infrastructure to compete, we refuse to empower our brightest people with implementing ideas, there are none willing to take substantial risks on anything, and no one here seems to have the inner vision to dream anymore.

However, they are very quick to say the problem is not with American scientists and workers, who they still believe are far and away the most productive in the world, nor their corporate executives, but rather with our government's lack of foresight.

The Empire State now finds itself in this greatly expanded and threatening ecosystem. It is this struggle that this state must gear itself up for if it is to not only thrive, but survive to any standard New Yorker's hope to hold up for their future prosperity.

How does New York stack up in the number of scientists at the forefront of looking for the next generation of products that will revolutionize our lives? The federal Bureau of Labor Standards classifies the top line scientists in the biopharmaceutical arena under eight job categories. New York state had 10,680 individuals working here. This compared with 41,200 in California, 15,500 in Massachusetts, 13,820 in Pennsylvania, 10,030 in New Jersey and 8,850 in North Carolina. Average wages for these cutting-edge dreamers in New York were lower than any of these competing states.

Where New York really is falling down is in the crucial area of new private sector capital investment. Although the total value of produced goods in the sector places us third in the nation behind California and Massachusetts, the value of capital investments in the sector in New York leaves us second from the bottom compared with all the other states with large biopharmaceutical footprints.

New York is just not seeing the commitments to new facilities and innovative tools it will need to remain near the forefront of the nation's and world's biopharmaceutical powerhouses. No stronger case can be made that this has been the effect of New York's addiction to high taxes, excessive regulations, and poor public investment choices.

In addition to striving to develop, attract and retain the finest life-science related workforce on the planet, reversing this investment decline needs to be the one goal that the Governor, state legislature, New York's representatives in Washington and local officials focus on.

This capital investment emergency must be met head on. Most of the recommendations in the following pages are designed to start the process to get the ideas coming from New York's nearly matchless research base into the resulting products that can be made in New York. The day is late, but it is not yet over. This report is one more small attempt to reignite the discussion, but this time, hopefully, from outside the wheel.

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## Summary of Recommendations

### Increasing Human Capital in the Sector

- Dedicated AAS or AS degree programs in biopharmaceutical manufacturing to provide trained personnel for our existing and future biopharmaceutical industrial base
- Enact a State Personal Income Tax credit for obtaining a bachelor's degree majoring in a Science, Engineering or Mathematics field from an accredited New York state college or university
- Establish collaborative research initiatives featuring fully integrated partnerships with significant academic research institutions and major private biopharmaceutical firms
- Remove statutory and traditional impediments to the creation of university technology parks and add capacity and strengthen for fully wet-lab equipped academic incubators with comprehensive bio safety level containment requirements
  - Permit public and private colleges and universities, and life science centered government entities to establish and grow full public / private research and commercialization partnerships including the allowance of long-term beneficial ownership leases to private developers and firms
  - Facilitate and coordinate universities' commercialization efforts with regional economic development councils, authorities and organizations

### Strengthen Regional Private Sector Clusters

- Utilize Empire State Development (ESD), New York State Foundation for Science, Technology and Innovation (NYSTAR), and the New York Academy of Science (NYAS) and the State Biotechnology Association (NYBA) for the creation of and access to an interactive catalogue of the state's existing and future researchers, entrepreneurs and life-science facilities
- Fully commit to the authorized Center of Excellence in Life-Sciences in New York City with a formal designation of participating institutions' responsibilities and contributions
- New York should initiate an international marketing strategy to promote globally recognized regional strengths such as in ophthalmic-pharmacology centered in the Rochester area
- ESD should also establish a continuously updated data center to benchmark New York state with other states and countries in the areas of taxes, regulations, commercialization of technology, economic development, and business marketing policies

## Improve New York State's Business Climate

- New York state and its municipalities must support a noninterventionist ambiance in New York to remove existing and reject new unnecessary or duplicative regulatory barriers on the inflow and outflow of capital, highly skilled employees, licensing, clinical research and trials, and marketing
- The state must devise a strategic plan to meet the unmet infrastructure needs necessary for the sector to successfully compete and grow
- The state should end its tradition of "cross-purposing" of its health and development policies regarding the sector
  - State health spending policies should not impede the ability to meet the costs and risks of research and development and contribute to optimal health outcomes, while aligning with the state's considerable efforts through ESD, NYSTAR, and tax policy to retain and grow the bio-science sectors in the state
- The state should encourage more liberal and broader tech transfer, intellectual property and licensing policies at our research colleges and universities
- The state should encourage firms to perform a greater number of clinical and other therapeutic trials in the state
- The state should be required to prepare estimates on any proposed regulations or bills on expected patient outcomes, overall health care spending, and the dynamic economic impacts of higher taxes, tax incentives, or capital outlays on the sector and the general state economy

## Enhance the State's Economic Development Policies

- The legislature should strengthen the existing Excelsior Program to encourage capital investments in the sector through as-of-right incentives
- The state needs to encourage firms in the sector to locate and maintain global company headquarters including the retention of long-standing tax preferences adopted to make New York the world's corporate capital
- The state should enact a new economic development energy program to reduce the overall cost of energy for manufacturers and major research firms
- The Governor and the Comptroller should lead and cooperate with local and regional economic development partners to increase the number of "face to face" interactions with venture and other capital firms with promising new companies in the sector
- ESD should strengthen efforts to market globally the state's leading universities as primary entrepreneurial resources

## A More Competitive Tax Structure

- The state and the sector must recognize that, given the current economic and budget crises, the use of refundable tax credits to support investments is the state's primary development tool
- However, the state must absolutely "keep its word" when companies make investments partly based on anticipated tax incentives
- Tax credits should target investments, and must be "as-of-right" and market driven
- The state must recognize how complex the global economy has become
  - The tax code cannot be simple or "neutral"
  - Tax preferences for investment are absolutely crucial for the state's future growth and well-being
- Property taxes are the largest assessment on the sector and need to be capped
- The legislature should double the value of Excelsior Credits for qualifying capital investments and adopt the Governor's proposed amendments to the program
- The state should extend and strengthen the existing and globally recognized Qualified Emerging Technology Credit for Facilities, Operations, and Training Credit
  - Above all, the state should eliminate the January 1, 2012 sunset
  - The size of qualifying firms and the per company cap should both be doubled
  - Credit levels should be increased by two-thirds
  - The training credit should be amended to make it more predictable and easier to utilize
- The state should enact an FDA Drug Discovery Fee Credit to aid firms willing to conduct research and produce new therapies in New York state with the stratospheric costs of bringing new drugs to market
- The state needs to adopt a twenty-five cent per gallon cellulosic production credit for firms that produce non-food source fuels
- New York should make its academic incubators "sales tax free"
- The legislature should urge New York's congressional delegation to advocate that the federal taxation on state and local capital grants and tax credits should be eliminated

## Expand and Invigorate New York's Agro-bio and Bio-energy Sectors

- New York state should compete more effectively in this multi-billion dollar field, utilizing Cornell University and other research institutions to tap into this over \$20 billion a year global market
- The state should also seek to create greater research and translational opportunities in the emerging use of bio-catalytic agents and other cutting-edge biotechnology techniques for the production of bio-fuels

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## Enhancing Biopharma's Human Capital

**T**he biopharmaceutical sector's greatest strength in the Empire State is its people. They are the frontline scientists, research and lab assistants, and manufacturing line workers that made the pharmaceutical and biotechnology industries New York's largest industrial and research sector.

However, for too long New York has taken this precious resource for granted. While the rest of the nation and our major international competitor countries have designed programs to target training to industry needs, dedicated themselves to producing graduates with bio-science degrees, fertilized collaboration between their major research institutions and major firms, and adopted the successful blueprint of creating and supporting university technology parks, until very recently, New York has rested on its existing laurels.

The consequence of this inaction has become all too clear. New York has the highest net migration of young educated workers in the country.<sup>xiv</sup> Specifically, the problem is not that there are higher percentages of highly trained employees moving out of the state compared with New York's peers. The problem is that we attract these workers at a pitiful rate. The reason is clear. This state just does not have enough companies providing well-remunerated jobs.

Many New York employers have complained that they do not have access in-state to the dedicated trained employees they need to grow. New York academic institutions have too often taken the attitude they need not be overly concerned with the specific needs of companies for advanced training and sector skills.

New York leads the nation in the granting of college degrees. However, it only ranks fifth in degrees awarded in the bio-sciences.<sup>xv</sup> We may complain about how many graduates leave New York within five years. However, the majority of those degree holders stay in the state where they went to college and university. Getting more majors in the Science, Technology, Engineering and Mathematics fields mean the state's employers will be able to pick from a larger and more qualified field.

This state traditionally has a very poor record when it comes to major academic research and major private firm collaborations on one end and creating cross-institutional research initiatives on the other. New York needs integrated joint ventures and other affiliation structures to maximize fully its world recognized assets and latent potentials.

One of the impediments facing our biopharmaceutical sector is the state's inability to see the potential growth and incredible employment opportunities provided by flourishing technology parks and fully wet-lab equipped academic incubators. No other model has shown the

**One of the impediments facing our biopharmaceutical sector is the state's inability to see the potential growth and incredible employment opportunities provided by flourishing technology parks.**

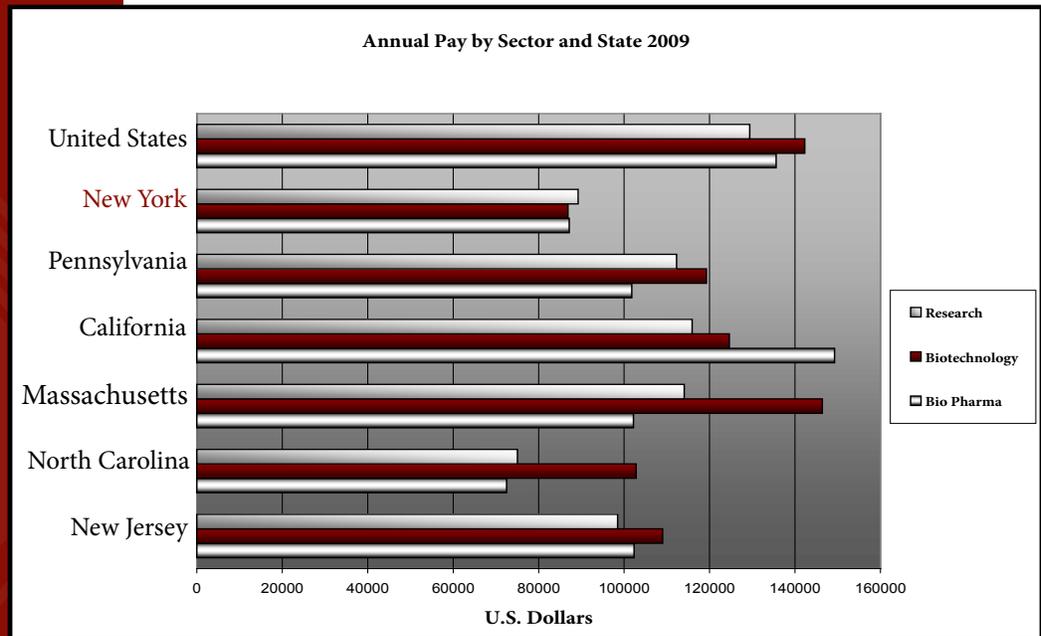
synergistic vigor in high-technology employment growth, new firm formation and retention, and capital investment expansion than university technology parks as highlighted by the success of North Carolina's research triangle.

Yet, New York is one of only two states that statutorily makes the establishment and flourishing of these parks nearly impossible for its public research universities. These institutions need the ability to offer long-term beneficial ownership positions to private sector tenants, along with the support services such parks so efficiently supply.

Over 300,000 cutting-edge employees in all emerging sectors work at university related technology parks in North America. Battelle estimates that another 450,000 lesser skilled employees work at the parks. These 750,000 employees support another 2.25 million workers.

*xvi*

Of the over 170 full-service university affiliated technology parks in the United States, there are only four fully established examples in New York. Ironically, the nation's oldest park is located in New York. The Rensselaer Technology Park, the state's first and largest, contains over 2,400 high-technology employees. Cornell's Business and Technology Park is home to 1,200 skilled workers. The Rochester Institute of Technology and Syracuse University also boast recently established parks that show great promise. New York needs to repeat these successes at its public universities as well.



Another area where New York has been falling short is in the establishment and support of globally recognized collaborative research institutions that fully integrate academic research with the research and commercialization resources of the private sector. Recently, a great step was taken in this direction by Pfizer's announcement of a new Center for Therapeutic Innovation at the Alexandria Center for Life Sciences that combines the wherewithal of the world's largest private research firm with seven of its great private universities.

The state needs to take another step forward and establish an institute

**The state needs to take another step forward and establish an institute for genomic and stem cell studies to be administered by the State University of New York.**

for genomic and stem cell studies to be administered by the State University of New York in collaboration with New York's other great life-science research universities and our most dynamic private companies.

New York has made great progress in other areas in the last couple of years. Kingsborough Community College, Hudson Valley Community College and Monroe Community College have recently instituted

dedicated biotechnology associate degrees so that the state's biopharmaceutical employers can be assured of access to some of the nation's best-trained front-line technicians and manufacturing specialists. The City and State Universities must provide sufficient resources and marketing support so that these crucial initiatives get every chance to succeed.

We are urging the adoption of a truly innovative incentive program to produce and retain more STEM graduates in New York. The state should adopt and offer a personal income tax credit to individuals that are granted a bachelor's degree in a science or engineering field from a New York accredited college or university. The credit should equal the value of state university tuition for up to four years the student attended, to be claimed over at least a four-year period.

This credit will serve at least two crucial purposes. First, it will provide a strong incentive for students to adopt STEM majors and complete their degrees. Second, it will also provide additional reasons for our graduates to stay in New York to work since the credit will only apply to wages earned in the state. The retention of these highly trained workers will more than pay the state back for the estimated \$20,000 per claimant the credit will reduce state revenues in the short run.

Finally, New York must remove its archaic impediments to the full leveraging of its state university assets. At a minimum, the state must eliminate its restrictions on the leasing and other uses of university property, including the granting of beneficial ownership positions to private developers and companies. In addition, the state must modify its debilitating procurement rules that hamstring our state universities' abilities to produce results from vanguard research that New York taxpayers have made hundreds of millions of dollars in investment in during the last 50 years.

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## Encouraging Regional Biopharmaceutical Clusters

**E**very biopharmaceutical resource in New York is precious, no matter its size or location. In many ways, the state is blessed with having sector assets in every part of its expanse.

Twenty years ago, there was every reason to hope that technological changes would mean that economic proximity was no longer necessary for supercharging productivity and employment growth, especially in cutting-edge areas like biotechnology.

However, the emergence of the interrelated world economy has demonstrated that, if anything, globally recognized definable and geographically compact industrial sectors have become more important than ever. In the emergence of the knowledge economy, regional innovation and industrial clusters have become the overriding predictor of dynamic firm formation and high-end value employment growth.<sup>xvii</sup>

Despite discussions about virtual clustering and horizontal integrations, the phenomenon that produces massive productivity gains, ability to attract entrepreneurs and larger investors in quantity, and the competitive drive to surpass global contenders, happens where distinct, and often competing, firms are interrelated by function, and are geographically concentrated. Only these types of recognized clusters have proved to be the true wealth and employment generators, primarily through the international export of goods and services.

The key concept that we need to comprehend is agglomeration.

When a region approaches a certain level of critical weight in the numbers of exceedingly skilled, intellectually and technology intensive areas, markedly rapid increases in productivity, capital and operational investments and spillover to vertically supporting activities occur. These focused increases mark a sector that has reached the "cluster effect" that is the hallmark of agglomeration.<sup>xviii</sup>

### Total Employment by Occupation SOC Code by State in 2009

| Occupation SOC code                               | United States | New York | California | Pennsylvania | Massachusetts | New Jersey | North Carolina |
|---|---------------|----------|------------|--------------|---------------|------------|----------------|
| Biomedical Engineers(172031)                      | 14760         | 400      | 2990       | 1040         | 1380          | 510        | 150            |
| Biochemists and Biophysicists(191021)             | 22860         | 1460     | 4610       | 2490         | 2490          | 2490       | 710            |
| Microbiologists(191022)                           | 16260         | 830      | 2600       | 2600         | 1280          | 900        | 760            |
| Biological Scientists All Other(191029)           | 29630         | 560      | 3580       | 380          | 1030          | 710        | 1090           |
| Epidemiologists(191041)                           | 4610          | 210      | 48         | 160          | 250           | 40         | 130            |
| Medical Scientists Except Epidemiologists(191042) | 101760        | 6440     | 24960      | 9130         | 8480          | 4530       | 5120           |
| Life Scientists All Other(191099)                 | 12320         | 420      | 1980       | 120          | 390           | 390        | 390            |
| Total   | 202200        | 10320    | 41200      | 15920        | 15300         | 9570       | 8350           |

Once this effect arises, one may confidently predict that there will be higher employment growth, higher wages, number of and growth of firms and marked increases in the expansion of intellectual capital such as patent awards compared to regions where the effect has not appeared.

The greatest predictor of when a true regional cluster arises is when the employment intensity of the relevant sector markedly surpasses the numbers attained by competing existing and potential national and international competitors. If this is the benchmark, unfortunately New York State does not have a single extant cluster in the biopharmaceutical arenas.<sup>xix</sup>

Perhaps the state can find its own path to rapid and sustainable strengthening of its biopharmaceutical base without demonstrating to the world that agglomeration has taken hold. Maybe New Yorkers can embrace dispersion and buck the empirical evidence that drives the rest of the world. Maybe, but New York needs to prove to the world that there is somewhere in this state where firms in San Francisco, Boston, London, Singapore, Mumbai and Shanghai have to be to grasp the future.

Fortunately, we have every reason to believe that with the right mixture of public leadership, policies can help us to reach thriving biopharmaceutical clusters in a couple of regions. Everyone must realize that this is not a zero-sum game. If the state can establish one or more powerhouse clusters, then every region's bio-related future employment growth will be immeasurably brighter.

The state has existing strengths and sufficient concentrations to give it at least a fighting chance of attaining agglomeration. The wider New York City area is approaching a critical employment density in traditional pharmaceutical-related areas. In addition, Rochester could further its unmatched potencies in ophthalmic-pharmacology.

However, New York is not sufficiently letting the world know of its strengths and its commitment to reach globally recognized cluster status. The state must catalogue its assets, utilize its existing Centers of Excellence and Centers of Technology infrastructure to approach desired densities, and create a system of definable metrics to let its leaders and practitioners ascertain where we are and where we need to go.

The state should start by having ESD, NYSTAR or its successor, NYAS, and other interested parties such as the Research Foundation of SUNY and NYBA cooperate in the creation of and provide access to a catalogue of the state's existing and future researchers, entrepreneurs, facilities and employees in the life sciences. Such a catalogue would go a long way in increasing the state's chances of organically growing to a sufficient level of agglomeration density.

The state has statutorily authorized a Center of Excellence (CoE) for New York City. It is time to move ahead with the formal designation of the participating institutions, and list respective responsibilities, contributions and future benefits. Serious consideration should be given to integrating the CoE with the nascent Center for Therapeutic Innovation.

New York has done a poor job of implementing an effective international marketing strategy to promote our current regional strengths. The overriding goal of these marketing efforts should be the attraction of

major new biopharmaceutical capital investments that would make the globe take notice, especially in manufacturing-related areas.

ESD should also generate a continuously updated data center to benchmark New York with other states and countries in areas that have shown to aid the development of regional clusters. It is only through knowing what other states and nations are doing in the areas of taxes, regulations, technology commercialization efforts, economic development programs and marketing to attract and retain biotechnology, pharmaceutical and other emerging sectors that New York can get a sense of where it is, and what needs to happen for it to

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leap forward in the global race.

With needed resources, the state could be doing much more in the efforts to reach agglomeration status, but it constantly must be cognizant of the distressed current budget constraints. Yet now is the time that longer range strategic planning needs to happen, and targeted public investment strategies identified.

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## Improving New York State's Business Climate

**I**t is universally recognized that the environment for New York's businesses to grow, or just retain, themselves in operation, is dismal.<sup>xx</sup> The state taxes too much, regulates too much, has fostered a generally risk averse atmosphere, denigrates its entrepreneurs and company heads, and for far too long, has not demonstrated proper concern for the fate and future profitability of its major employers.

New York has especially taken its biopharmaceutical sector for granted. For decades, there was little consequence for its doing so. It headquartered the world's largest drug firm, many other major firms had significant manufacturing and managerial operations in the state, and the Empire State provided the nation's, and one of the world's, largest markets.

Albany promulgates a culture that many investors find repellent. Its elected officials too often jump on those that have found commercial success for making insufficient contributions to the commonweal. Simultaneously, they avidly erect towering barriers to competition acting as virtual opposites to the structures dominating the skyline of its most renowned island. Myriad proposals from New York's legislators protect closed-door conduits for sheltered constituencies.

However, the globalization of the sector has drastically altered the landscape for biopharmaceuticals in New York. No longer can the negative aspects of its commercial culture be ignored. Economic obsolescence threatens the very heart of New York's biopharmaceutical sector. It is imperative that the state foster a regulatory environment that supports a strong biopharmaceutical sector.

High taxes and expansive regulations at both the state and local levels is the dominant message that New York transmits to the globe. The state needs to look honestly at how it is treating this essential sector if it hopes to jump to the forefront in the ranking of total investments and the high-income wage positions this type of investment promises.

Fortunately, although it is late in the race for global success, New York still contains the unique mix of dedicated and driven people and their supporting institutions that give hope to a new culture for the future.

**New York still contains the unique mix of dedicated and driven people and their supporting institutions that give hope to a new culture for the future.**

The state needs to listen to those voices that have laid out the paths for where the collective mind-set must turn for real change to occur.<sup>xxi</sup>

First, New York state and its municipalities must move to a non-interventionist standard where the public health is not threatened. Every existing and proposed regulatory barrier must be closely scrutinized to determine if such hurdles negatively impact capital formation, the creative efforts of highly skilled employees, licensing of new drug breakthroughs, the rapid move from discovery through trials and commercialization and marketing of new treatments hearkening medical miracles.<sup>xxii</sup>

The state also must come up with and implement a long-term strategy needed to overcome the unmet infrastructure needs of this and other

emerging and established industries. In addition to meeting the physical infrastructure needs crucial for international competition and sector growth, the state ought to grow broadband capacity at an exponential scale, and to provide affordable access to high-end computing and research technology to large and small firms and individuals alike.

New York also must minimize the “cross purposing” of its health and development policies. It is ultimately fruitless to have New York put such considerable efforts into ESD, NYSTAR and pro-business tax programs to grow the bio-science sector in the state while simultaneously erecting blockades to the creation and successful commercialization of research-intensive treatments through statutory marketing preferences and duplicative layers of public oversight, and an impossibly high overall tax burden.

New York should encourage its university heads to be true entrepreneurs in the development and implementation of tech transfer, intellectual property and licensing policies. Let these institutions serve as the laboratories of innovation in how to best commercialize the incredible fruits of research New York’s scientists and engineers are creating.

Every year about 6,000 new patents are awarded to New Yorkers. In this country only California and Texas can count more, and New York produces more patents than every other nation except for Japan, Germany, South Korea and Taiwan. New York needs to do more to turn these innovations into new firms and jobs.

New York hosted 3,267 clinical trials in 2010, second only to California. <sup>xxiv</sup> This tremendous resource for proving the value of its research products should be given every chance of growing in the future through a dedicated international marketing campaign to the major firms in the industry.

The final culture-shifting attempt New York immediately should adopt

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is to have the state prepare fiscal and employment impact estimates on any proposed regulation and bills coming from Albany or a local government. Anticipated effects on patient outcomes, overall health care spending and the dynamic economic impacts of higher taxes, tax incentives, or public capital outlays on the sector should be transparent to our policy makers and the public as a whole.

These impact reports need to focus not just on the general state economy, but should include a special emphasis on the effect on the overall vitality and global competitiveness of the biopharmaceutical sector. Let us at least get some reasonably reliable numbers to start a serious discussion of whether what we do as a collective whole serve to harm or enhance the industry.

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## Running As Fast As We Can Is Getting Us Nowhere Refocusing Economic Development Policy For the Twenty-first Century Economy

**F**or at least forty years, the state's policy makers, especially in Albany and Manhattan, have touted the use of public resources to aid the life sciences sector in New York. Myriad initiatives have been proposed, adopted and implemented to use public resources, primarily employing taxpayer backed capital to build research centered facilities and adopting tax credits directly tied to job creation or retention.

What has this history of these public labors taught us? Despite the undeniable merit and successes of many individual projects and statutory programs, the state's efforts "have often been too scattered, unspecific, platitude ridden, overly focused on primary research rather than commercialization, and do not get at the fundamental problems inhibiting the development of a successful innovation culture" for the biopharmaceutical sector.<sup>xxv</sup>

New York's economic development policies are not squarely facing up to the danger of a severe and perhaps irreversible decline in biopharmaceuticals' contributions to the state economy. The state suffers from antiquated private and public sector physical facilities, a lack of strategic vision and strong political leadership, and our intractable history of complacency and ideological blinders.

Our policy makers need to recognize the one metric where New York is most wanting compared with its American peers and global competitors. Given the size and import of the life-sciences on the state's economy, the Empire State is deficient in the levels of private capital investments occurring in our pharmaceutical and biotechnology sectors. New York has more employees than Massachusetts, New Jersey and Pennsylvania, but our levels of capital investments has lagged these three every year over the last decade. The future this portends is dull to say the least.

New York competes in every other commonly held measurement, such as total research dollars, innovation support programs and direct job creation programs, needed for a strong innovation economy.<sup>xxvi</sup> Where the state falls down is in the two, arguably most crucial areas of overall tax burdens and capital investment levels. Inevitably, if the plants and other buildings necessary to place and support these vital employees

close due to economic obsolescence with no replacements on the horizon, the jobs and research products will surely disappear with them.

The financial crisis has given us one more opportunity to find an economic development path that will aid the state in getting beyond the place where New York is the last location where private capital wishes to invest.

So if we have limited funds for direct public support, and credits tied to job creation tend to have a mixed success record, is there nothing the state can do to enhance the sector's economic development chances? It is not hopeless. There is one path available now to provide material support to our biopharmaceutical firms that will invigorate the sector

The state should be supporting capital investments in buildings and research equipment through the granting of market-driven, as-of-right tax credits.

and produce sustainable employment growth.

The state should support capital investments in buildings and research equipment through the granting of market-driven, as-of-right tax credits. These credits, when the state enacts them, produce more permanent employment, fewer taxpayer dollars per position, than to direct jobs creation credit programs as demonstrated by an analysis of the current state brownfield cleanup program.

It is easy to understand why this should be the case. Firms find it very difficult to walk away from investments of millions at a minimum, of their own, or their private investors' dollars, placed in plants and equipment that must be built and in service before the state provides any support at all. These buildings and research equipment must be staffed or the investment is totally wasted. The state finds that it indirectly is supporting job growth and retention without harmfully impacting market efficiencies.

It is time that a serious discussion begin with the state's partners in the labor community that the surest way to produce the best compensated and most-fulfilling jobs possible, is to get new plants, research facilities, and supporting facilities built in New York.

In addition, if the state adopts an enhanced investment and research facilities credit, the state is not obliged to provide support through tax expenditures until an investment is placed in service. There would be no fiscal impact to the state's taxpayers or the state budget for at least two years.

Meanwhile, under this approach, the state would recoup its future fiscal investments from the moment the first architect is hired and workers start construction. The state's support is not up-front, but is only delivered when the building is complete and equipment is up and running.

New York State has an unfortunate history of losing its most promising startup companies to other states as soon as they become economically viable. A major reason is the lack of state-of-the-art mezzanine level space in the state when these firms need to expand. Strong and consistent support for constructing this space through the tax code is the state's best hope for keeping these success stories in New York.

The state should begin by strengthening the Excelsior Program to encourage capital investments in the sector through enhanced as-of-right tax incentives.

In addition, there are other initiatives the state can implement to aid in fostering a productive ecosystem for biopharmaceutical innovation.

Empire State Development needs to start working on a dedicated strategy to encourage firms in the sector to relocate or maintain their global headquarters in the state. As part of this effort, the state should commit to maintaining long-standing and reintroducing tax preferences adopted to make New York the world's corporate capital. The largest of these is the exclusion of interest, dividends, and capital gains from subsidiary capital. In addition, the state should also consider loosening the requirements on combined reporting for loosely affiliated entities, and reintroduce preferences for foreign-based Real Estate Investments Trusts to put the state on a level field with its international competitors.

The state also needs to devise and adopt a rational long-term economic development power program. New York has some of the highest electricity costs in the country, and biopharmaceutical activities are incredibly energy intensive. The goal should be for stable and long-term discounted power for established firms committing to expand in New York, and, crucially, a method by which emerging companies can qualify for a program that will reduce power expenses.

The Governor and the Comptroller should lead and cooperate with local and regional economic development partners to increase the interactions between venture and other capital firms and promising start-ups and mezzanine firms in the sector. The Comptroller's in-state private equity program has \$446 million available for investment through credible venture firms in entrepreneurial companies established in New York. New York is also offering instate biotech firms over \$100 million in CAPCO venture funds. More efforts are needed to connect these companies with these fiscal resources, and cooperation between gubernatorial agencies and the equity program's managers should lead to a significant bridge in the infamous funding valley of death.

Last, ESD should develop a global promotion strategy to market around the world our leading universities' role as primary entrepreneurial generators and resources.

## Let New York Work Toward Having a Tax Structure That Is a Model for the World

New York state has the highest combined state and local tax burden in the country,<sup>xxvii</sup> and this burden falls hard on the biopharmaceutical sector. When you add together state level business and personal income taxes, sales taxes, taxes on energy and real estate transactions, health insurance and casualty line assessments, corporate operations taxes, and countless fees and assessments, the state level yoke is onerous enough.<sup>xxviii</sup> Add local taxes in all these areas and add a myriad collection of primarily regional area taxes such as the property tax, which is the largest non-federal imposition on businesses, unincorporated business taxes, commercial rent taxes and telecommunication assessments; it is a wonder that any business can make a go of it in New York.

If the biopharmaceutical sector in this state was not near the top of the most productive workers and operations in the world, no firm here could be profitable. Fortunately, the heritage of this being the Empire State still grants the sector these legacies of getting it done better and more economically than anyone else.

It would be ideal if New York could solve the problems posed by the state's existing tax structure by just simplifying tax codes, widening tax bases and lowering rates. However, the reality is unfortunately much more complex than such a rational model suggests. Yes, New York must reduce its overall tax burdens, but we must remember the tax code is the only element the state currently possesses to provide meaningful incentives to its private sector biopharmaceutical industry.

The state is also competing with at least 40 other states that offer dedicated tax incentives to its biopharmaceutical sector. Thirty-eight states currently subsidize R&D activities through their tax codes, 20 more offer tax credits to angel and venture investors, and 34 offer sales tax exemptions to R&D and manufacturing related purchases.<sup>xxix</sup> Wisconsin just enacted on January 1, 2011, a virtually complete state and local tax-free environment for its bio-science firms.

Again, we must not forget that we are not competing with our neighboring or other peer states; this is a global struggle in which New York is now more and more ferociously engaged. China not only offers its nascent firms three years in which they are not only completely tax free, but it also provides major offsets to tax liabilities imposed by the businesses' home country.

Great Britain, Israel and several provinces in Canada have adopted versions of New York's pioneering, Facilities, Operations and Training Credit, but they open the incentive to larger firms and simplify many aspects of qualifying for and claiming the credit. The economic development and tax community must realize that the state's personal and income tax codes can no longer even pretend to strive to be simple or "neutral".

Given the limitations posed by its structural financial deficits, the state's tax code represents its best opportunity to attract major and essential private capital investments from the sector in New York, without which the Empire State has no chance to grow its biopharmaceutical sector and attract major international actors. Market driven and "as-of-right" tax preferences targeted at investment is the best, and currently only, chance New York has to compete successfully in this global race.

Here are a series of actions the state should adopt as early as possible.

The property tax is the largest assessment on the sector. It is essential that the legislature adopt Governor Andrew Cuomo's proposal for a two percent cap on property tax growth for both residences and businesses.

Tax credits that target investments should be expanded, remembering that the primary objective for these incentives is to encourage additional private sector investments from capital markets. The ability to attract such private capital is the most reliable indicator available that the citizens of New York can expect a fair return, most markedly in terms of sustainable job creation, on their public investment.

The legislature should double the value of the Excelsior Credits for qualifying capital investment, an action that would have no impact for the next two fiscal years because the credit would not be claimed until the facilities are placed in service. The legislature should also adopt the Governor's other proposals to strengthen the program.

The chief success that New York has managed in the global struggle for private biotechnology firms in the last five years was its adoption of the Qualified Emerging Technology Credit (QETC) for Facilities, Operations, and Training Credit. As already noted, other countries have adopted the main outlines of the program, and now use it as their major attraction lure for new companies and investments. However, New York needs to adopt some measures to keep this program in its place as the cutting-edge program in the world.

Above all, the state has to eliminate the January 1, 2012 sunset on the QETC as soon as possible to give emerging firms the confidence that these incentives will be available as they plan potential investments, expanded activities and hiring skilled workers.

The limits placed on the size of firms eligible for the credit and the per company caps on the total size of the credits should both be doubled to give the state a better retention record for mezzanine level firms. In addition, the state should increase the various investment and activities credits by two-thirds and amend the training credit to make it more predictable and easier for eligible firms to utilize.

It takes an estimated \$1.3 billion to successfully bring a new drug therapy to market counting the cost of failed initiatives. Part of this incredible threshold is approximately \$10 million in fees imposed by the Federal Drug Administration (FDA). New York could take a bold step in trying to reinvigorate its shrinking biopharmaceutical manufacturing

sector by offering to repay these FDA mandated assessments to a firm that conducts the research and then manufactures the resulting remedy in this state. New York should adopt the proposed FDA Drug Discovery Fee Credit.

Innovators are making great strides in overcoming cost and technology barriers in the production of bio-fuels from non-food stocks. The forefront of these efforts are being carried by researchers utilizing drug similar to enzymatic agents to break down lignocellulosic cells so that the existing sugars can be fermented.

If this technology bears scalable results, New York state is perfectly situated to become the undisputed global leader in cellulosic bio-fuel production. No one can match the proximity to feedstock, to mass markets, and above all, abundant water, than upstate New York. The state should increase its existing bio-fuel production credit to twenty-five cents a gallon for firms that use bio-analytic catalysts to produce the non-food source fuels.

The state's academic incubators have an outstanding record of accomplishment in nurturing and retaining firms that start within their confines. However, it is essential that these nascent companies have access to cutting-edge equipment and resources. The state should finally adopt the proposal that has been put forward for years to make these incubators totally sales tax exempt.

It is counterproductive that state taxpayers offer incentives through grants and credits to developers, and then the federal government taxes the incentives as income. The state's congressional delegation should advocate for the elimination of federal income taxation of state and local capital grants and tax credits.

If New York were to adopt the bulk of these measures, its tax code

**The chief success that New York has managed in the global struggle for private biotechnology firms in the last five years was its adoption of the Qualified Emerging Technology Credit.**

would serve as a model for tax policy regarding our emerging and innovative technologies. However, none of this will matter much if investors and developers cannot count on New York to "keep its word" when companies and individuals make investments based on receiving the full value of pledged and anticipated tax incentives.

A tremendous pall was cast on the state's investment climate when the state began using credit deferrals, statutory 'look backs', and other means to break its bond and reduce the value of its commitments to the biopharmaceutical and other manufacturing or research intensive sectors. Over \$2 billion in earned and claimed credits have been put at risk by the state in the last two years. No one can be certain that when, or if, these now virtually "fake" credits will ever be paid or realized. No degree of world-leading tax policy can make up for the sense that New York cannot be trusted. The state should make one of its highest priorities the honoring of these commitments as soon as possible.

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## Stepping Up to the Plate in the World Veterinary Pharmaceutical and Agro-Bio Markets

**D**espite the state being blessed with one of the world's premier veterinary schools at Cornell University, combined with that institution's renowned agriculture school, New York barely registers a blip in the scale of its veterinary pharmaceutical and bio-energy sectors. There is great potential for rapid expansion of the state's presence in these two cutting-edge sectors.

The world's animal pharmaceutical industry is one of the world's fastest growing markets, and it is approaching \$40 billion a year. The state should aggressively seek to have its firms and research institutions compete to tap a greater share of these sales. The industry should be fully integrated into the state's current and future efforts in the other areas of the biopharmaceutical economy.

There is little doubt that agricultural biotechnology will continue to be one of the fastest growing segments of the innovation economy. Leveraging the right tax incentives, marketing efforts, and human capital training will put New York at the forefront of this growth.

The state should also seek greater research and translational opportunities in the emerging use of bio-catalytic agents and other cutting-edge biotechnology techniques for the production of non-food stock bio-fuels.<sup>xxx</sup> This industry is estimated to grow from virtually nothing to between 19.5 and 60 billion gallons a year by 2020. Thirty billion gallons is about 10 percent of the estimated size of the U.S. motor fuel market by then, so even if cellulosic fuels are primarily used as an oxygenation agent like corn ethanol is currently used, we are looking at an at least \$60 billion a year industry.<sup>xxxi</sup>

New York is perfectly situated in geography, natural resources and supporting academic research institutions to grab the largest share of this emerging production. The Adirondacks provide a nearly unlimited feed source for eligible cellulose material; the state is blessed with more than adequate supplies of fresh water, and institutions like the School of Environmental Science in Syracuse and Clarkson University can provide the human capital needed for this industry to explode in upstate New York.

The state needs to leverage all its existing strengths to increase research in these areas, and prepare the groundwork for massive capital outlays that will be needed to grab a significant portion of this alternative fuel market.

Finally, the state should stress plant biotechnology research agendas highlighting the existing programs at Cornell and SUNY Cobleskill. This is another huge global market that New York is barely scratching, and not for the lack of first-class scientists and engineers.

## End Notes

- i.* Andrew Coumo, 2011 State of the State Address.
- ii.* All data references not specifically given in the body or endnotes of the report are contained in the linked data files generated primarily from the Bureau of Labor Standards and Census Bureau files.
- iii.* New York is not alone, see Deloitte: Tough Medicine.
- iv.* Public Policy Institute: Transcending the Hamster Cage.
- v.* The latest two that showed real promise were the NY innovation task force and the New York Roundtable on Innovation.
- vi.* Sources: Milken Institute, PhRMA: Economic Multiplier Impacts of Biopharmaceutical Related Industries, BEA RIMS and PPI analysis.
- vii.* Cf. PricewaterhouseCoopers: California Biomedical Industry: 2011.
- viii.* Cf. Boston Consulting Group: Megatrends.
- ix.* Global Health Progress: Brazil's Biopharmaceutical Sector.
- x.* Ernst & Young: Beyond Borders.
- xi.* Business Market Reports: Global and China Biopharmaceutical Industry Report.
- xii.* The discussions that follow come from an interview arranged by an international engineering firm with Chinese developers and engineers who understandably remained anonymous.
- xiii.* On March 16th, 2011 Pfizer announced that it is moving its antibacterials research unit from Groton, CT to the Shanghai facility over the next two years. No longer is the U.S. losing its frontline manufacturing presence; the highest-end research divisions are now emigrating.
- xiv.* U.S. Census Population Estimates, Population Change 2008-2009.
- xv.* U.S. Department of Education, National Center for Education Statistics, 2007-08 Integrated Postsecondary Education Data System (IPEDS), Fall 2009.
- xvi.* Battelle: Characteristics and Trends in North American Research Parks.
- xvii.* Delgado, et. al: Clusters, Convergence and Economic Performance.
- xviii.* Porter: The Economic Performance of Regions.
- xix.* PricewaterhouseCoopers: See the Future: Top Industry Clusters in 2040.
- xx.* ALEC: Rich States, Poor States: 3rd Edition
- xxi.* See Media Planet: Biotechnology: Your Guide to the Bio-Tech Industry, for a condensed overview of how the industry functions.
- xxii.* Cf. PhRMA: Drug Discovery and Development: Understanding the R&D Process.
- xxiii.* United States Patent Office, and Inovia: U.S. 2011 Global Patents & IP Trend
- xxiv.* Cf. ClinicalTrials.gov.
- xxv.* Hamster Cage, p. Viii
- xxvi.* Cf. Archstone Consulting: The Biopharmaceutical Sector's Impact on the U.S. Economy: An Analysis at the National, State, and Local Levels, and, *ibid.*, Economic Impact of the Biopharmaceutical Sector on New York State, for a truly comprehensive survey of the existing data on employment and research impacts.
- xxvii.* Tax Foundation and PPI analysis.
- xxviii.* Fiscal Policy Institute: The State of Working New York 2007.
- xxix.* Battelle: State Bioscience Initiatives 2010.
- xxx.* National Academy of Sciences: Engineered *Saccharomyces cerevisiae*.
- xxxi.* U.S. Department of Commerce: Energy in 2020: Assessing the Effects of Commercialization of Cellulosic Ethanol.

## *Bibliography*

*American Legislative Exchange Council, 2010, Rich States, Poor States: 3rd Edition.*

*Archstone Consulting LLC, May, 2009, The Biopharmaceutical Sector's Impact on the U.S. Economy: Analysis at the National, State, And Local Levels.*

*February, 2009, Economic Impact of the Biopharmaceutical Sector on New York State.*

*Battelle, May, 2010, State Bioscience Initiatives 2010.*

*October, 2007, Characteristics and Trends in North American Research Parks: 21st Century Directions.*

*Boston Consulting Group, May, 2010, Megatrends: Tailwinds for Growth in a Low-Growth Environment.*

*Business Market Reports, February, 2011, Global and China Biopharmaceutical Industry Report, 2010.*

*Cuomo, Andrew, January 2011, New York at a Crossroads: A Transformational Plan for a New New York: State of the State Annual Message.*

*Delgado, Mercedes, Michael E. Porter, and Scott Stern, August, 2010, Clusters, Convergence, and Economic Performance.*

*Deloitte Consulting Group, June, 2009, Tough Medicine in Tough Times: New Jersey's Biopharmaceutical and Medical Technology Community.*

*Ernst and Young, 2010, Beyond Borders: Global Biotechnology Report: 2010.*

*Fiscal Policy Institute, September, 2007, The State of Working New York 2007: Encouraging Recent Gains but Troubling Long-Term Trends.*

*Global Health Progress, September, 2010, Brazil's Biopharmaceutical Sector Contributes to Economic Growth, Expands Access to Healthcare*

*Inovia, February, 2011, The U.S. 2011 Global Patents & IP Trend Indicator: An In-depth Look at the Foreign Filing Strategies of U.S. Patent Owners*

*MediaPlanet, June, 2009, Biotechnology: Your Guide to the Bio-tech Industry.*

*Pharmaceutical Research and Manufacturers of America, August, 2007, The Economic Multiplier Impacts of Biopharmaceutical Related Industries in Massachusetts on Outputs, Earnings, and Employment in the Overall State Economy.*

*February, 2007, Drug Discovery and Development: Understanding the R&D Process.*

*Porter, Michael E., April, 2003, The Economic Performance of Regions.*

*PricewaterhouseCoopers, 2011, California Biomedical Industry: 2011 Executive Summary. September, 2010, See the Future: Top Industry Clusters in 2040 Revealed.*

*September, 2010, See the Future: Top Industry Clusters in 2040 Revealed.*

*Proceedings of the National Academy of Sciences, December, 2010, Engineered *Saccharomyces cerevisiae* of simultaneous cellobiose and xylose fermentation.*

*The Public Policy Institute of New York State, January, 2010, Transcending the Hamster Cage: Unfettering New York's Static Innovation Economy*

*U.S. Department of Commerce: International Trade Commission, November, 2007, Energy in 2020: Assessing the Effects of Commercialization of Cellulosic Ethanol.*

Principal Author: Steven A. Taylor

Production Editor: Robert M. Lillpopp

Copy Editors: Anna M. DeLisle and Mark Amodeo

The Public Policy Institute of New York State, Inc.

Acting - president: Heather Briccetti

Director of Research: Steven A. Taylor

Founded in 1981, The Public Policy Institute is a research and educational organization whose purpose is to formulate and promote public policies that will restore New York's economic competitiveness. The Institute accomplishes this mission by conducting timely, in-depth research addressing key state policy issues.

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\*This report would not have been possible without the precedence of two empirical surveys that formed the bedrock from which we began. In February of 2009, Archstone Consulting (LLC) provided a comprehensive portrait of New York State's biopharmaceutical economic sectors. The report, "Economic Impact of the Biopharmaceutical Sector on New York State", clearly laid out the prime importance of the sector for the state and each of its major trade and industry regions.

The report was followed one month later by Archstone's national survey, "The Biopharmaceutical Sector's Impact on the U.S. Economy: Analysis at the National, State, and Local Levels", a state-of-the-art look at the macro metrics defining the sector in the United States. The perusal of the findings leaves no doubt of the sector's importance in nearly every state and for the nation as a whole. Both reports clearly show that New York has traditionally and still is one of the major global actors in the pharmaceutical global stream.

# NEW YORK MUST STEP UP ITS GAME

The Global Struggle for Biopharmaceutical Jobs

April 2011