Appendix A: State High-Tech Economic Development Incentive Programs

Pennsylvania Technology-Based Economic Development Subsidies

Pennsylvania has in recent years boosted its investments in early-stage companies, especially via Act 22, signed by Gov. Ed Rendell in 2004. It authorizes almost $2 billion in bonds and loan guarantees to leverage private investment in high-tech. The Act also includes business tax credits and vastly expands the state's research and development tax credit program. The resulting technology-based economic development programs employed by the state rely heavily on venture and seed capital financing both provided and insured by the state. They expand on the state's existing regional technology-based economic development capacities managed by the Ben Franklin Technology Development Authority. The state's generous biotechnology subsidies have bolstered organic growth in the industry and attracted firms from outside the state.

Pennsylvania conceptualizes its high-tech development efforts in terms of helping more companies move successfully through the first three stages of the "business life cycle"[1]:

- the concept stage, during which the idea for a product or service is hatched;
- the company formation stage, during which the company establishes itself, hiring employees and attracting its first customers; and
- the growth stage during which the company grows at an increasing pace.
- (The last two stages in this scheme are "maturity" and "reinvention.")

Particularly during the first two stages, which involve incubation of seed-stage technologies and early commercialization, the state has pursued linkages with universities and relied heavily on incubators. In the second stage and to help companies leverage private capital and succeed in the third stage, Pennsylvania concentrates heavily on providing seed and venture capital to tech companies. A $3 billion economic stimulus package passed by the state in 2004 (the above-cited Act 22) substantially increased venture capital provided by the state.

Major state entities supporting Pennsylvania's technology-based economic development are the Ben Franklin Technology Development Authority, the Pennsylvania Department of Community and Economic Development (DCED), and the Commonwealth Finance Authority (which has its own board but is staffed largely by DCED). Each entity manages a portfolio of programs.

High-Tech Industries Subsidy Programs

Ben Franklin Technology Development Authority (BFTDA)

Established in 1983, the BFTDA is DCED's technology-based economic development driver and one of the nation's earliest and best-regarded tech-development programs. The state's 2007–2008 budget appropriated $51.7 million in state and federal funds to the BFTDA.[2] During FY07-08 BFTDA invested $53.8 million through various programs.[3]

A quasi-independent development authority, the BFTDA administers a large body of funds and programs designed to foster partnerships between the business community and universities, assist in the commercialization of new technologies, and assist entrepreneurs and small businesses. Most programs managed by the BFTDA grant or insure venture capital investments to small Pennsylvania-based technology businesses. The BFTDA's statewide programs include:

- The **BFTDA Venture Investment Program** loans investment funds to seed or early stage technology related companies. These loans must be matched by at least three times as much private investment. This program is funded at roughly $2 million per year and has to date[4] made 21 investments totaling $23 million.[5]

- **University Research Grants** administered by the BFTDA are distributed to Pennsylvania colleges and universities for research and development and technology transfer/commercialization purposes. The grants are available in widely varying amounts. Total investments to date (according to the state's Investment Tracker) are valued at $90.1 million.[6]

The BFTDA also invests in technology companies through four regional offices in the state known as Ben Franklin Technology Partners (BFTPs). Each invests in technology start-ups in its own region. Since January 2000, the four BFTP locations have received a combined $161.5 million in funding from the state.[7]

- The **BTFP of Central and Northern Pennsylvania (BTFP/CNP)** invests in technologies through a phased, milestone-driven approach. Companies funded by BTFP/CNP receive financial assistance for up to three years and are eligible for up to $700,000 over that period.

- The **BTFP of Northeastern Pennsylvania (BTFP/NEP)** invests in both early-stage and established firms. Early stage firms are eligible for typical investments of up to $450,000 over a three-year period. There appears to be no cap on investments made in established firms located in or relocating to northeastern Pennsylvania; loans are at prime minus two percent.

- **BFTP of Southeastern Pennsylvania (BTFP/SEP)** uses three different investment programs to address each recipient's stage of technology development. The *Innovation Fund* loans up to $100,000 to very-early-stage companies for prototype refinement and early technology commercialization. The *Emerging Fund* makes available up to $750,000 in phased investments for process and product development. The *Technology Commercialization Fund* provides up to $350,000 to select university and research institution spin-off companies.

- **Innovation Works (IW), the BFTP of Southwestern Pennsylvania**, also invests in technology development through three different funds. The *University Innovation Grant* provides unspecified amounts of funding to universities from a $1 billion fund for technology validation, market research, prototype development and intellectual property evaluation. IW's *Innovation Investment Fund* is a milestone-based investment program that loans up to $250,000 to early-stage companies. The *Innovation Adoption Grant* is an award of $25,000 made to manufacturing companies to upgrade production processes or conduct research and development to modernize production methods.

Pennsylvania Life Sciences Greenhouse Initiative

DCED administers the **Pennsylvania Life Sciences Greenhouse Initiative**, a program enacted in 2001 with $100 million in Tobacco Settlement Funds that finances three regional life science "greenhouses" in the state. Funds were distributed to central Pennsylvania ($32.8 million), Philadelphia ($33.2 million), and Pittsburgh ($33 million).

- The **Life Sciences Greenhouse of Central Pennsylvania** (LSGPA) invests in biotech companies through gap funding, technology development funding, business opportunity validation grants, and, occasionally, relocation assistance. LSGPA also has an Incubator Development Fund. Investments made by LSGPA as of June 2008 totaled $17.4 million, $1.5 million of which was a relocation assistance grant provided to GlaxoSmithKline.[8]

- **BioAdvance, the Biotechnology Greenhouse of Southern Pennsylvania**, invests in biotech start-ups through a variety of programs. BioAdvance's investments totaled $13.9 million as of June 2008.[9]

- The **Life Sciences Greenhouse of Pittsburgh** (LSGP) invests in biotechnology firms and entrepreneurs through a few programs: Technology Development Fund, Collaborative Research Fund, Early Stage Fund, Seed Fund, and a regional incubator. LSGP also operates "relocation and support" functions. The organization's annual report boasts that "efforts to date have attracted a total of 10 life sciences companies to Pittsburgh.[10] Cumulative investments by LSGP total $11.3 million.[11]

A recently released performance audit of the Tobacco Settlement Investment Board (TSIB) criticized it for making little public information available and also for failing to disclose conflicts of interest.[12] The specific conflicts related to overlapping duties of DCED staff and TSIB members which jeopardize TSIB's appearance as an independent entity and thus its accountability.

DCED's **Keystone Innovation Zone (KIZ)** program was passed in 2004 as a part of Governor Rendell's economic stimulus package. It is intended to spur technology-oriented private investment in areas surrounding Pennsylvania universities with technological research capability. The goal of this program is to encourage collaboration between universities and the private sector in pursuit of regional development. Twenty-nine zones were established by July 2007 with the assistance of DCED grants of up to $275,000 per zone. The total cost of establishing these 29 zones was $11 million. The program combines a few financial incentives, the most important of which are:

- The **Keystone Innovation Grant**, a companion program to the Keystone Innovation Zone program, provides funding to encourage technology transfer and commercialization of intellectual property between universities and the private sector. The fund contains a total of $10 million, with $3.5 slated for grants to universities in 2008-2009.[13]

- The **Keystone Innovation Zone Tax Credit Program** provides tax credits of up to $100,000 annually to technology-oriented companies in operation for less than eight years. DCED began awarding credits during fiscal year 2006-07. A KIZ company may apply to DCED for a tax credit equal to 50 percent of the increase in its gross revenues from the previous year attributable to its activities in a zone. The total pool of tax credits has an annual value of $25 million, and they may be carried forward by recipient companies for up to 5 years or sold. Pennsylvania does not publicly track tax expenditures of this program, but as of December 2007, DCED had approved 101 of the 105 KIZ tax credit applications it received. The total value of these credits at that point was approximately $7.1 million.[14] The estimated cost of the program in tax expenditures is $25 million annually beginning in FY08-09.[15]

Commonwealth Finance Authority (CFA)

The Commonwealth Finance Authority was created in 2004 to develop principles and oversee management of money authorized by Governor Rendell's Economic Stimulus package. It primarily manages industrial development and related bonds, but is also responsible for the provision of some of the state's venture capital. The CFA lends to "Pennsylvania-related" companies—companies that are either already located or have expressed interest in relocating to the state.[16]

- The **New Pennsylvania Venture Guarantee** insures investments made by venture capital partnerships in early and expansion stage "Pennsylvania-related" companies. These guarantees cover up to 50 percent of the first loss of the aggregate amount of principal invested in Pennsylvania-related companies up to $37.5 million. As of July 2009 the CFA had extended eight loan guarantees to companies valued at $197.5 million.[17]

- The **New Pennsylvania Venture Capital Investment Program** is designed to increase available venture capital to technology-oriented businesses by loaning up to $60 million to venture capital partnerships. The ultimate beneficiaries of this financing must be "Pennsylvania-related" companies as defined by the CFA. The authority currently holds 20 investments totaling $56.7 million.[18]

The **Research and Development Tax Credit Assignment Program** has made available an increasingly large pool of tax credits to companies that conduct research and development activities and that are eligible for federal R&D tax credits. Eligible businesses can apply for a credit of up to ten percent of their increase in R&D expenditures from a base level. These credits may be carried forward for 15 years or sold. From 1997 to 2003, the Department of Revenue could not approve more than $15 million in total tax credits in any fiscal year, $3 million of which was set aside for small businesses. In 2004, the cap was doubled to $30 million ($6 million for small businesses). By 2006, the program cap had risen to $40 million ($8 million for small business). In 2008, businesses applied for over $94 million worth of R&D tax credits, $40 million of which were approved by the Department of Revenue.[19] A 2009 performance audit of the program conducted by the Legislative Budget and Finance Committee found that the Department of Revenue does little to verify that the R&D tax credits are only awarded to businesses with qualified R&D expenses. The report also found that it was difficult to verify that the applicable research expenses were even incurred in Pennsylvania.[20]

General Subsidy Programs

The **Guaranteed Free Training Program (GFT)** provides funding to manufacturing, "technology-based", and information technology businesses. The Workforce and Economic Development Network of Pennsylvania (WEDNetPA) funds basic skills training at $450 per worker and funds IT training at $700 per worker. In FY2007 – 2008, WEDNetPA spent $19.5 million training Pennsylvania workers through the GFT program, $4 million of which was devoted to "information technology" training.[21] While the state spent an equal amount of money—roughly $5 million—on training for employees of small businesses (defined as fewer than 100 employees) and "extra large" businesses (more than 500 employees), only 20,000 employees of small businesses were trained compared with 40,000 employees of "extra large" businesses.[22]

Distinct from Keystone Innovation Zones are **Keystone Opportunity Zones** (KOZs, essentially aggressive enterprise zones). This program was designed to stimulate growth through abatements and reductions of, exemptions from, and credits for a host of state and local taxes including corporate income and sales and use taxes.[23] A 2009 performance audit of the program by the state Legislative Budget and Finance Committee reached a number of damning conclusions about its administration and its effectiveness. The Committee found that the job creation and retention figures, as well as the capital investment figures attributed to the KOZ program to date are "not adequately documented and appear to be substantially overstated by DCED." The Committee further concluded that the total cost of the KOZ program is not known and that the program has not been monitored to determine when the clawback provisions of the KOZ act should be invoked.[24] A report on the effectiveness of KOZs in rural areas in Pennsylvania found that "a failure to abide by the legislative intent has resulted in inter-zone competition whereby greenfield properties compete with abandoned industrial sites for firm recruitment." The study further reported that "all things being equal, a firm will choose the tax-exempt open space over a brownfield site."[25] Pennsylvania estimates the cost of the program to be in the range of $35 million per year.[26]

Like many states, Pennsylvania also provides tax credits for job creation ($1,000/job through the Job Creation Tax Credit) and corporate losses (called the Corporate Net Operating Loss Carryforward). These credits will cost the state $22.5 million and $321.4 million in tax expenditures in 2008-2009, respectively.[27]

North Carolina Technology-Based Economic Development Subsidies

North Carolina has twice enacted costly low-tech subsidies for specific high-tech deals (see Dell and Google case studies) and it offers generous franchise and income tax credits for activities such as job creation and capital investment that benefit high-technology companies even though they are not specific to high-technology. The state's spending for these programs dwarfs the budgets of the state's numerous (but very small) programs targeted to high-tech start-ups and early stage companies.

North Carolina targets aerospace, biotechnology, pharmaceuticals and life sciences, information and communications technology, and chemicals and plastics as technology-based economic development priorities.

High-Tech Industries Subsidy Programs

The North Carolina Department of Commerce is the state's primary development agency, responsible for marketing, financing, and subsidy deals. The Department offers the following business incentive programs to generate technology-based economic development:

- **Research and Development Tax Credits** (Article 3F credits) are available at a rate of 1.25 – 3.25 percent to companies and universities engaging in R&D activities. In 2008, a total of $21.3 million was claimed.[28]
- **Sales and use tax exemptions** were enacted by the state legislature as a part of a controversial subsidy package for a Google server farm in Lenoir County. The legislation specifies that "sales of electricity and eligible business property to an internet service provider or web search portal business that invests at least $250 million in private funds are exempt from sales and use tax."[29] In the case of Google, the sales tax exemption on electricity alone over 30 years is estimated to be worth $89 million.[30]
- **Article 3G Tax Incentive** program, otherwise known as "Tax Incentives for Major Computer Manufacturing Facilities," is another law enacted for a specific high-tech deal.[31] Enacted in a one-day special session during which the identity of the prospective company was withheld by the Commerce Department, it gave Dell a credit worth up to 50 percent of its franchise and income tax liability. However, it is oddly structured: it is not tied to job creation or capital investment, but instead to the number of units produced (see accompanying case study).[32]

North Carolina Board of Science and Technology Programs

The North Carolina Board of Science and Technology, a state-authorized advisory board administered by the Department of Commerce, manages a portfolio of programs focused on advancing technology development. These programs primarily consist of nonfinancial incentives such as business assistance (strategic planning, support in securing financing from external sources, and small high-tech business incubators), as well as the North Carolina Green Business Fund and the One NC Small Business Program.

- **North Carolina Green Business Fund** provides grants of up to $100,000 for the development and commercialization of biofuels, green building, clean tech and renewable energy products industries. This fund expended $8.4 million in 2008.[33]

- **One NC Small Business Program** consists of two grants. The **Phase I Incentive Funds Program** reimburses qualified North Carolina businesses for half the costs up to $3,000 for preparing Phase I Proposals for Federal SBIR/STTR programs. The **Phase I Matching Funds Program** awards matching funds to North Carolina businesses that have been awarded an SBIR or STTR Phase I award, up to $75,000. In 2008, expenditures for these two grant programs totaled $1 million.[34]

The North Carolina Board of Science and Technology also manages the **North Carolina Biotechnology Center**, whose 2008 budget was $19.4 million. The Biotechnology Center administers the following grant programs:

- The **Centers of Innovation Grant** is a two-phase award to assist in biotechnology commercialization. Phase I is a $100,000 award, and Phase II is capped at $2.4 million. The Biotechnology Center issued four grants totaling $400,000 in 2007-2008.[35]

- **Collaborative Funding Grants** are available to university researchers paired with biotechnology companies to assist in biotechnology commercialization. These grants are worth up to $50,000 per year and must be jointly funded by the biotech company, the university, and the NC Biotechnology Center. In 2007-2008, the Biotechnology center issued grants totaling $495,000.[36]

- **Regional Development Grants** of up to $75,000 are designed to aid in the development of early-stage life science initiatives. Two of these grants, totaling $83,730 were issued in 2007-2008.[37]

- The **Biotechnology Research Grant** is a grant of up to $75,000 available to researchers at universities and nonprofits. The Biotechnology Center issued 11 grants totaling $772,596 in 2007-2008.[38]

The North Carolina Biotechnology Center also provides loans to small businesses:

- The **Company Inception Loan** supports business inception and related activities with a loan of up to $50,000.
- **SBIR Bridge Loans** up to $150,000 are available to SBIR/STTR Phase I grant recipients for research funding while the recipients await Phase II grants.
- Companies with "clear commercial potential" are eligible for **Small Business Research Loans** of up to $350,000.
- The **Strategic Growth Loan** matches Biotechnology Center loan support of up to $250,000 with venture capital investments to help biotechnology companies with established technical proof-of-concept.

General Subsidy Programs

The following incentives are available to many industries in North Carolina, including high-tech:

- **One North Carolina Fund** program (formerly the Governor's Industrial Recruitment Competitiveness Fund) spent $33.2 million on recruitment in 2008. A report provided to the North Carolina State Assembly on economic development expenditures the same year showed an increase in the number of One North Carolina Fund deals between 2002 and 2006, from 29 to 58[39]
- **North Carolina Job Development Investment Grants** are discretionary subsidies provided to businesses for job creation and retention. The state spent $14.25 million on JDIGs in 2008.[40]
- **Article 3J Tax Credits** (successor to the William S. Lee Tax Credits) provide credits to qualifying businesses for job creation, investment in business property and in some cases investment in real property. These credits may be used to offset up to 50 percent of a company's state income and/or franchise tax liability, and unused credits may be carried forward for up to five years:
    - The **Credit for Creating Jobs**, available to all industries except retail, is valued at $750 to $12,500 per job, depending on the location of the business by county (less prosperous county locations earn higher credits). In 2008, the total state cost of this credit was $16.6 million (for 3,448 jobs).[41]

- The **Credit for Investing in Business Property**, also available to every industry except retail, is worth between three and seven percent of the cost of capitalized property. A total of $32.7 million in such tax credits were claimed in 2008.[42]

- Companies that invest at least $10 million and create 200 jobs are eligible for the **Credit for Investment in Real Property**. The credit is worth 30 percent of the investment, and $1.3 million was claimed in 2008.[43]

A 2008 study by the Corporation for Enterprise Development found that Article 3J Tax Credits and grants through the One North Carolina Fund and the Job Development Investment Grant (JDIG) Program have "failed to effectively assist distressed areas and may even be widening the gap between the state's wealthiest and poorest counties."[44] The study found that the majority of deals, and therefore tax credits, have gone to the wealthiest counties in the state. Specifically, Tier 5 counties—the state's most affluent counties—received two-thirds of all JDIG program awards between 2003 and 2007.

Despite its long list of programs designed for small business development, North Carolina's funding for these programs is almost negligible compared with the state's spending on recruitment programs such as the One North Carolina Fund and its tax credit programs such as 3F and 3J. A staff agency report to the North Carolina General Assembly found that of all economic development spending in fiscal year 2006- 2007, 95 percent—or *$1.23 billion*—was spent on direct "incentives," that is, to specific companies. Only 5 percent of all economic development spending—or *$62 million*—took the form of support programs[45] such as technical assistance and transportation infrastructure development.[46]

New York Technology-Based Economic Development Subsidies

New York's technology-based economic development strategy relies heavily on tax credit programs intended to attract capital investment. The state also targets general economic development subsidies to high-tech companies by expanding the benefits of those programs for tech-specific industries and for research and development expenses. However, without state data on the use of these subsidies by high-tech businesses, or the share of total program expenditures to high-tech deals, it is difficult to gauge their relative popularity or success in nurturing technology-based economic development.

Like most states, New York offers a diverse range of subsidies to high-tech industries located in the state. These range from corporate tax credit programs to regional high-tech incubators. The state is actively targeting companies in information technology, microelectronics and nanotechnology, energy infrastructure, and life sciences and biotechnology.

High-Tech Industries Subsidy Programs

Empire State Development Corporation

The Empire State Development Corporation is New York State's lead economic development agency and business recruitment agency. ESD administers a number of programs. Those specific to high-tech industries and technology-based economic development include:

- **Investment Tax Credits/Employment Incentive Credits (ITC/EIC)** are available to manufacturers at a rate of five percent of the first $350 million of investment in new or expanded manufacturing production facilities and four percent of the amount over $350 million. The employment incentive credit is a two-year credit based on increases from base year employment and equals 1.5 percent, 2 percent, and 2.5 percent of the ITC amount if current year employment is 101 percent, 102 percent, or 103 percent of base year employment, respectively.

  For a research and development property, taxpayers may use the regular ITC rate plus applicable EIC or an optional 9 percent rate. Unused credits can be carried forward up to 15 years. A new business, defined generally by the state as one newly created in New York or relocated to New York, can receive a refund of unused ITC during its first five taxable years.

The latest edition of New York State's tax expenditure report estimates that the Investment Tax Credit and the Employment Incentive Credit will reduce businesses' tax liability by about $92 billion in 2009.[47]

Qualified Emerging Technology Companies Credits[48] are provided to qualified[49] emerging technology companies (QETC) that create new jobs or for corporate taxpayers that invest in emerging technology companies. The QETC tax credit program resulted in state tax expenditures of $11.4 million in 2008. The QETC credits are broken into three components:

- **Capital Tax Credits** – this credit is worth 10 percent of qualified investments in a QETC up to $150,000 in aggregate for four years or 20 percent of qualified investments held for 9 years up to $300,000. The credit may not exceed 50 percent of tax due and is not refundable but may be carried forward.
- **Employment Tax Credits** are available for three years and equal to $1,000 for each new employee hired over base year employment.
- To qualify for the **Facilities, Operations and Training Credit**, in addition to meeting the general QETC qualifications listed above, the company must have 100 or fewer full-time employees, 75 percent of whom are employed in New York, and total R&D expenditures of at least 6 percent of net sales (gross sales minus returns and allowances) during the tax year. The company must also have gross revenues not exceeding $20 million for the immediately preceding tax year. This credit may be taken for four consecutive years, is capped at $250,000 per year, and is fully refundable. It consists of three further components:
    - R&D Property Credit: 18 percent of research and development property and costs/fees incurred in connection with emerging technology activities.
    - Research Expenses Credit: 9 percent of qualified research expenses which are those associated with in-house research and processes.
    - High-Tech Training Credit: 100 percent of qualified high-tech training expenses, limited to $4,000 per employee per year.

General Sales Tax Exemptions from state and local taxes are available for property used in R&D: production machinery, equipment, parts, tools, supplies, and related services; fuel, gas, electric, refrigeration, and steam used in R&D or production; pollution control, prevention or abatement equipment; internet access service and computer hardware used in software development. Exemptions of R&D costs resulted in state tax expenditures of $312 million in 2008.[50]

The **Centers of Excellence Program** supports upgrades of research facilities and other high-technology and biotechnology capital projects. Current Centers of Excellence are regionally-based and specific to certain high-tech subsectors. They are:

- The *Center of Excellence in Bioinformatics & Life Sciences* (Buffalo) specializes in drug design research, computational and three-dimensional visualization, product commercialization and workforce training.
- The *Center of Excellence in Environmental and Energy Systems* (Syracuse) focuses research efforts on indoor environments in the areas of indoor air quality, comfort, lighting, acoustics and intelligent controls.
- The *Center of Excellence in Nanoelectronics* (Albany) will be the only university-based 300-millimeter computer wafer pilot prototyping facility in the world. It will provide critical laboratory and clean room space for research, build incubator space for high-tech company spin-offs, and create a workforce development program. The Center is also home to International SEMATECH North.
- The *Center of Excellence in Photonics and Microsystems* (Greater Rochester) is intended to create technology transfer and pilot fabrication facilities for high-resolution imaging and ultra-fast communications devices that can be shared by Center partners to accelerate product development.
- The *Center of Excellence in Small Scale Systems Integration and Packaging (S3IP)* (Binghamton) was created to advance microelectronics research and development, specifically addressing challenges in small-scale systems design, development, prototyping, process development and manufacturing for the microelectronics industry.
- The *Center of Excellence in Wireless & Information Technology* (Stony Brook) focuses on large scale computing and data mining critical to genomics and other data-intensive areas, Internet applications, wireless telecommunications, health care applications, and workforce development programs.

New York State Foundation for Science, Technology and Innovation (NYSTAR)

NYSTAR is the state public agency charged with support of technology development, innovation and commercialization leading to economic growth. NYSTAR was created as part of the Jobs 2000 Act (J2K), enacted in 1999. The agency's total 2009–2010 appropriation is $42 million.[51]

NYSTAR currently administers the following programs[52]:

- The **Centers for Advanced Technology (CAT) Program** was signed into law in 1982 to support university-industry collaborative research and technology transfer in commercial relevant technologies. 2008 expenditures: $23,242,696 (56 grants to 15 centers)

- The **CAT Development Program**, an extension of the CAT program, was designed to enhance and expand the capabilities of existing CATs that have achieved a record of success and demonstrate significant potential to increase the economic impact. 2008 expenditures: $6,678,448 (13 grants)

- The **College Applied Research and Technology (CART) Centers Program** was established in 2004 and designates two New York colleges as CARTs. The program is intended to generate economic impact in NYS through college-industry applied research collaboration and technology transfer. 2008 expenditures: $679,645 (3 grants)

- The **Regional Technology Development Centers (RTDC) Program** provides funds to support a statewide network of regional, non-profit organizations whose mission is to provide basic and specialty services to small- and medium-sized manufacturers, science and technology-based businesses, and start-ups in need of basic business advice and new technologies and methods to modernize their operations. The Program is an integrated service delivery initiative that draws on three related programs: the state Technology Development Organization (TDO) Program, the state Industrial Technology Extension Service (ITES) Program, and the Federal Manufacturing Extension Partnership (MEP) Program. 2008 expenditures: $5,419,671 (15 grants).

- The **Technology Transfer Incentive (TTIP) Program** provides grants to programs and individuals working at or in collaboration with state colleges and universities to accelerate the commercialization of developed or enhanced technology. 2008 expenditures: $1,206,650 (4 grants)

- The **Capital Facility Program** was established to assist New York State research universities in developing leading research facilities in the State. Funds from the Capital Facility Program have been used to build new research facilities and purchase equipment on campuses throughout New York. 2008 expenditures: $48,563,021 (77 grants)

- The **Faculty Development Program** established to assist New York State research universities to recruit and retain top research faculty members. 2008 expenditures: $27,406,659 (43 grants).

- The **James D. Watson Investigator Program** was established to provide financial support to early career researchers who are or have the potential to be leading researchers in their fields. $15,997,908 (29 grants)

- The **Matching Grants Leverage Program** leverages private sector investment in emerging technologies. To apply for a Matching Funds Grant, the applicant institution must meet a minimum 3:1 matching requirement of dollars coming to New York State (excluding institutional support). 2008 expenditures: $11,203,128 (28 grants)

NYSTAR also administers **Gen*NY*sis**, a life sciences research program being conducted at multiple New York state academic research institutions (public and private). Gen*NY*sis funds will leverage additional resources to support the construction of high-tech and biotech facilities in the state. This program was seeded with $250 million in 2003.

General Subsidy Programs

Overall since 2004, Empire Zone tax expenditures, debt service on economic development capital projects and spending on economic development grant programs have increased by nearly $340 million, an average annual increase of nearly 12 percent. In 2008-09, these expenditures totaled an estimated $950 million.[53]

The **Empire Zones Program** was originally enacted to stimulate growth in economically distressed communities and provides a bundle of tax incentives for businesses that invest or provide jobs in designated areas. Empire Zones are now classified as either: Investment Zones which encompass economically distressed areas, or county-based Development Zones. High-tech or biotech companies making a $10 million capital investment and creating 20 or more jobs can be located outside of the designated Investment or Development zones and still qualify.

In 2008, New York is estimated to have sacrificed an astounding $510.4 million in revenue as a result of its Empire Zones program.[54] That enormous tax expenditure makes Empire Zones the state's largest economic development expense. The program has been the subject of numerous critical performance audits, investigative journalism reports and non-profit studies.

Ohio Technology-Based Economic Development Subsidies

Ohio's Thomas Edison Program, founded in 1983, was among the first TBED programs implemented in the country. In 2002, the state enacted the Third Frontier Project, designed to assist technology companies throughout various stages of the product life cycle. Third Frontier is slated to expire in 2012 unless it is extended. It is credited with creating nearly 50,000 jobs since its inception.[55] Although it is not discussed here (see instead the chapter on representative-firm analysis) Ohio's tax landscape has changed substantially: The state has eliminated its corporate income tax and tangible personal property tax in favor of a gross receipts tax that substantially cuts overall business taxes.

High-Tech Industries Subsidy Programs

Ohio's statewide high-tech target industries include advanced energy and environmental technologies; aerospace and aviation; bioscience and bioproducts; instruments, controls, and electronics; and polymers and advanced materials.[56] However, Steve Kelley of the Ohio Department of Development's Office of Policy, Research and Strategic Planning once conceded that the state considers "anything that goes over 30 [miles per hour]" as high-tech.[57]

Ohio Department of Development

The Ohio Department of Development (ODOD) runs a large number of programs directed at incenting high-tech development in the state. A major umbrella program operated by ODOD is Ohio's Third Frontier Project, initiated in February 2002 to expand Ohio's high-tech research capabilities and promote company formation and job creation. The 10-year, $1.6 billion initiative is designed to build research capacity, support early-stage capital formation and product development, and finance advanced manufacturing processes. The Third Frontier Project is administered by the Third Frontier Commission, consisting of ODOD's director, the chancellor of the Ohio Board of Regents, the Governor's energy advisor, and six regional commissioners appointed by the Governor.[58] Programs in the Third Frontier Project include:

- The **Asset-Based Company Attraction Program** (ABCAP) has awarded a total of $3 million to two companies to develop and implement a sales strategy. ABCAP's targeted industry sectors are biosciences and advanced polymers.[59]
- The **Biomedical Research and Commercialization Program** (BRCP, formerly the Biomedical Research and Technology Transfer Partnership Award Program) has

awarded $128.4 million in 22 grants to collaborative projects by higher education institutions, non-profit research organizations, and Ohio companies in the areas of human genetics and genomics, structural biology, biomedical engineering, computational biology, plant biology and environmental biology.[60]

- The **Engineering and Physical Science Research Commercialization Program** (EPSRCP) provides grants to collaborative projects by companies, higher education institutions, and non-profit research organizations. Proposals must focus on technologies in the fields of advanced materials, power and propulsion, information technology, and instruments-controls-electronics. Through early 2009, thirteen organizations have been awarded a total of $80.7 million via 14 grants through this program.[61]

- The **Entrepreneurial Signature Program** (ESP) provides grants in six geographic regions to organizations that support entrepreneurship. The program has awarded $84.8 million through 2008.[62]

- The **Innovation Ohio Loan Fund** has committed $54 million over the life of the program through 2008.[63] The fund is intended to supply capital to Ohio enterprises having difficulty securing funds from conventional sources. The fund can finance up to 75 percent of a project's allowable costs to a maximum of $2 million.

- The **Ohio Research Commercialization Grant Program** (ORCGP) provides grants to improve the commercial viability of technologies developed through federal SBIR, STTR and Advanced Technology Program (ATP) research and development projects. Over $11 million has been awarded through this program.[64]

- The **Pre-Seed Fund Initiative** (PSFI, formerly Validation Fund & Seed Fund Initiative) provides grants to pre-seed funds to increase the availability of professionally managed capital and associated services to accelerate the growth of early stage Ohio technology companies. This program has awarded $34.8 million through 2008.[65]

- The **Research Commercialization Program** (RCP) provides grants to advance major research initiatives. Projects are to be collaborations among Ohio higher education institutions, non-profit research organizations, and Ohio companies in the biomedical, advanced/alternative energy, instruments-controls-electronics, advanced materials, and advanced propulsion industries. Between 2002 and 2008, the RCP has awarded $190.1 million.[66]

- The Third Frontier **Success and Pre-Seed Funding Initiative** (TFSPSFI) provides continuing support to those Pre-Seed Fund and related entrepreneurial support programs that have demonstrated success in using previously awarded grant funds.

- The **Ohio Research Scholars Program** (ORSP) emphasizes the recruitment of

researchers from outside Ohio. The ORSP will be accepting proposals in each of the state's five targeted research areas (advanced materials, biosciences, instruments-controls-electronics, information technology, power and propulsion) from Ohio's universities and colleges. Awards are made in the range from $2.5 million to $50 million, and have totaled $146.5 million between 2002 and 2008.[67]

- The **Third Frontier Advanced Energy Program** (TFAEP) provides grants to organizations seeking to commercialize new products, manufacturing processes or technologies, or to adapt or modify existing components or systems that can reduce the cost of advanced energy systems or address technical and commercialization barriers. Twenty-six companies and organizations have been awarded a total of $22.2 million by this program through the beginning of 2009.[68]

- The **Third Frontier Fuel Cell Program** (TFFCP) provides grants that support the growth of Ohio's fuel cell industry through collaborations that involve Ohio higher education institutions, non-profit research organizations, and Ohio companies. Thirty-two organizations have been awarded a total of $39.3 via 51 grants through this program.[69]

- **Wright Centers of Innovation in Biosciences** (WCIB) provide grants to support large-scale research and technology development platforms. Wright Centers are collaborations among Ohio higher education institutions, non-profit research organizations, and Ohio companies in the biosciences. Grants provided through 2008 to all Wright Centers of Innovation total $295 million.[70]

- **Wright Centers of Innovation in Engineering and Physical Sciences** (WCIEPS) are grants to support large-scale research and technology development platforms in the areas of advanced materials, power and propulsion, information technology and instruments, controls and electronics. Wright Centers are to be collaborations among higher education institutions, non-profit research organizations, and Ohio companies. Six organizations have been awarded a total of $147.7 million in 10 grants through this program.[71]

- **Wright Mega-Centers of Innovation** (WMCI) provide grants which establish research and development centers. The center must be a multi-organizational collaboration that could involve the state's universities, medical centers and other non-profit research organizations, and private sector businesses large and small in the areas of advanced materials, bioscience, power and propulsion, information technology and instruments, controls and electronics. The Cleveland Clinic has been awarded a total of $60 million through this program.[72]

- **Wright Projects** (WP) provide grants to support commercialization projects requiring major capital acquisitions and improvements at Ohio higher education institutions and non-profit research organizations. Projects must involve one or more Ohio companies and be in the areas of: advanced/alternative energy; advanced materials; advanced propulsion; biomedical; or instruments, controls and

electronics. Seventeen organizations have been awarded a total of $52.2 million in 30 grants from this program.[73]

There are a few programs not controlled under the Third Frontier Project. Tax credit programs administered by ODOD include:

- The **Research and Development Investment Tax Credit** is a commercial activity tax credit for all investment in qualified research expenses incurred in Ohio by eligible corporations. The amount of the credit is valued at seven percent of all qualified investment in a specific year and can be carried forward for up to seven years. The total value[74] of R&D Investment tax credits claimed was $5 million in 2008, projected to increase to $20.6 million in FY2009.[75]

- The **Technology Investment Tax Credit** (TITC) program offers credits to Ohio taxpayers who invest in small, research and development and technology-oriented firms. TITC allows Ohio investors to reduce their state taxes by up to 30 percent of the amount they invest in qualified Ohio technology companies. The TITC program was capped at $30 million but was recently increased to $45 million for FY2010. Over $28 million in TITC credits is currently allocated.[76]

Other programs specifically designed for technology-oriented companies include:

- The **Research & Development Investment Loan Fund** provides between $1 million and $25 million in loans for projects primarily engaging in research and development activity. Interest rates are fixed (currently at 3 percent). Companies receive a dollar-for-dollar, nonrefundable Ohio commercial activity tax credit for all principal and interest payments during the year. This credit was valued at $3 million for FY2008.[77]

- The **Research and Development Sales Tax Exemption** provides an exemption from the usual state and county sales tax for companies that purchase equipment for research and development activities. Tax expenditures resulting from R&D property exempted from sales and use taxes are estimated at $31.3 million for FY2008.[78]

- The **Ohio Venture Capital Authority** has invested $98.5 million as leveraged investments and into other venture capital funds from 2003 through 2008.[79] The biennial budget approved in July expands this program.

- Seven **Edison Technology Centers** located around the state provide a variety of product and process innovation and commercialization services to both established and early-stage technology-based businesses. In FY09, the Edison Technology Centers had an annual budget of $11 million.

Ohio approved its own stimulus program in 2008. Known as the **Job Stimulus Plan**, the program was intended to be funded with $150 million for advanced energy projects (primarily for clean coal), $100 million for biomedical industries, and $50 million for bioproducts industries. Funding for this program was significantly reduced as a result of the state's recent budget shortfall.

- The **Advanced Energy Stimulus Program** included $84 million for non-coal related technology projects and $66 million for clean coal projects.[80] In 2009, the state approved $40 million in loans for two companies.[81]
- The funding that the Ohio General Assembly appropriated for the **Biomedical Stimulus** and **Bioproducts Stimulus** is currently under consideration by a court as part of the legal review of the Tobacco Settlement litigation.[82]

Maryland Technology-Based Economic Development Subsidies

Maryland offers an abundance of small, minimally-funded technology-based economic development programs that provide few apparent connections to a coherent development strategy. Some have been designed to take advantage of or create linkages to federal research and development facilities and other laboratories in the state. (Maryland is home to many federal facilities, including the National Institutes of Health and the National Security Agency.) Unlike the other six states, Maryland does have programs that emphasize engaging minority groups in technology-based economic development efforts. However, these scattershot programs are minor when compared with the state's general bond-provision and tax credit programs.

Maryland's strategic targets include biotechnology and life sciences, information technologies, precision and small manufacturing, financial services, and telecommunications. The state measures its economic development successes locally, by quantifying employment generation and local capital expenditures. State expenditures for economic development are understood to generate capital expenditures on a local scale, thus driving economic development.

Primary state agencies are the Maryland Department of Business and Economic Development, the Maryland Technology Development Corporation, the Maryland Industrial Development Financing Authority, and the Maryland Economic Development Assistance Authority and Fund. Each entity manages a portfolio of programs.

High-Tech Industries Subsidy Programs

Maryland Department of Business and Economic Development (DBED)

DBED administers the **Maryland Venture Fund**. The fund utilizes five investment vehicles:

- The **Challenge Investment Program** is a seed fund that matches private sector investments up to $150,000 for smaller high-tech firms. During FY08, this program lent $1.5 million to Maryland businesses.[83]
- The **Enterprise Investment Fund** matches private sector investments of up to $500,000 for the commercialization of new technologies. This fund invested close to $3.1 million in FY08.[84]

- The **Maryland/Israel Development Fund**, a fund shared by the Israeli government and Maryland that provides up to $300,000 in matched investments for high-tech firms. One company received an investment of $200,000 through this fund in FY08.[85]

- The **FIPS Certification Grant Program**, which provides small grants (up to $50,000) to technology companies needing proper security certification to do business with the federal government. Only one grant has been issued through this program since 2006.[86]

- The **Enterprise VCLP Fund** invests in Venture Capital Limited Partnerships ($11.5 million total since 1994) but has made no investments since FY03.

Some of DBED's other programs are:

- The **Maryland Industrial Partnerships** program (MIPS) jointly funds collaborative research and development projects between companies and University System of Maryland faculty. MIPS has awarded grants to more than 800 projects since 1987, cumulatively worth over $140 million.[87] In 2008, the program spent $2 million on partnerships.[88]

- The **BRAC Revitalization and Incentive Zone Program** provides jurisdictions undergoing military base expansions with grants of up to $5 million to promote high-tech economic development. Five such zones had been approved under the enabling legislation as of December 2008[89], but funding provision thus far is unclear.[90]

Two tax credit programs specifically target technology companies:

- The **Research and Development Tax Credit** program includes two separate, but related, tax credits. One credit is calculated on a business's average level of research; the other credit is calculated on its increase in R&D expenditures over previous years. Unused credits can be transferred to either program to reach each program's cap. If a business receives more R&D credits than it paid in taxes for 2007, the unused portion of the credit may be carried forward for up to seven years. At the nominal statutory rates for both credits, applicants would have received $24.1 million in basic research credits and $46.4 million in growth credits, but the program has capped tax credits at $6 million annually.[91]

    - The **Basic R&D Tax Credit** is provided at 3 percent of eligible R&D expenses that do not exceed the business's average R&D expenses over the last four years.

- The **Growth R&D Tax Credit** is worth 10 percent of eligible R&D expenses that exceed the businesses average R&D expenses over the last four years.

- The **Biotechnology Investment Incentive Tax Credit** provides companies that invest in biotech firms up to 50 percent of their investment value in tax credits that can be taken against corporate or personal income tax. The maximum amount of the credit cannot exceed $250,000 for qualified investors. The program was approved as of July 1, 2006 for $6 million annually. The amount of tax credits awarded in calendar year 2008 was $6.3 million.[92]

Maryland Technology Development Corporation (TEDCO)

Maryland's DBED works closely with the state's Technology Development Corporation, or TEDCO. Created by the state in 1998, TEDCO is "constituted as a public instrumentality of the State."[93] The organization's goal is to facilitate business creation through the commercialization of technology. TEDCO acts as Maryland's leading source of funding for seed capital and entrepreneurial business assistance for the development, transfer and commercialization of technology.

Funds managed by TEDCO run a number of programs, including multiple technology transfer programs, business incubators, various incentive programs aimed at companies that partner with federal laboratories in Maryland and university-based technology development programs. TEDCO provides direct grants, investment-matched grants and subsidized loans to early stage technology firms and researchers at universities and federal labs.

Technology Transfer Programs

- The **Fort Detrick Technology Transfer Initiative** (FDTTI) provides up to $50,000 in grants for technology commercialization to small high-tech companies. Eleven projects were awarded in FY2006 from an initial $799,697 Congressional appropriation. A second round of FDTTI funding in the amount of $1,051,812 was received in June of 2007. This Congressional appropriation provided funds for 15 more awards. By the end of June 2008, five FDTTI awards were approved and ten more proposals were under consideration.[94]

- The **Applied Research Development Project** (ADRP) was established in 2007 with $936,000 to increase institutional research capacity by meeting the biotechnological needs of the U.S. Army while providing opportunities for collaboration with Maryland minority-owned businesses. An estimated seven to ten science and technology projects at the MRASC Institutions will be funded by the new program.[95]

- The **Maryland Technology Transfer Fund** (MTTF) provides loans of up to $75,000 to companies partnered with university- or federal lab-based research teams for the development of early stage technologies. In FY08 the program approved grants worth $1.6 million for 22 projects.[96]
    - The *Johnson & Johnson Joint Investment Program*, a subprogram of the MTTF, places some of these companies on a track to receive an additional $75,000 in matched investments.
    - An additional subprogram of the MTTF is TEDCO's *BRAC Technology Transfer Initiative (BTTI);* it will provide funding for five collaborative projects, up to $75,000 each, and will be awarded to companies involved in technologies related to BRAC.
- The **TechStart Program** grants university- or federal lab-based teams working on technology commercialization with funds of up to $15,000 per technology to encourage company spin-offs from universities. In FY08 the program funded six proposals for a total of $90,000.[97]

Small Business Incubation

- The **Incubator Development Fund** provides matched funding of up to $1 million to organizations that set up high-tech business incubators for capital development. To date, appropriations to the fund total $9.3 million.[98]
- Two **Incubator Feasibility Studies** were funded by the state with grants totaling $55,000 in FY2008.[99]
- The **Working Capital Loan Fund** makes available to high-tech companies loans in the amount of $50,000 for working capital. As of FY07, the revolving fund contained $1 million.[100]
- The **Business Assistance Fund** provided $287,500 to 12 incubator programs (16 distinct physical facilities) to provide directed and targeted business assistance to their tenant and affiliate companies in FY2008.

Rural and Minority Business Programs

- The **Maryland Minority Research and Development Initiative** provides phased funding up to a total of $850,000 to technology-oriented companies with fewer than 500 employees owned by women or minorities. To date, the program has reviewed proposals from 15 companies but TEDCO annual reports show no financing activities in this program.[101]
- The **Rural Business Initiative** provided non-financial assistance to early state technology companies in southern Maryland and on the state's Eastern Shore.

This program was funded with $495,000 and ended in 2007.

- **ACTiVATE Program: Achieving the Commercialization of Technology in Ventures through Applied Training for Entrepreneurs**, funded primarily through federal grants, is designed to train women entrepreneurs to create successful technology-based startup companies. Over four years the program has spent a total of $710,000.[102]

Maryland Stem Cell Research Fund (MSCRF) is also operated by TEDCO; it includes a variety of grant programs for human stem cell research. Maryland-based organizations of all types are eligible for the grants: public and private, for-profit and non-profit, universities, colleges, research institutes, companies, medical centers and others. The MSCRF awarded 58 grants worth a total of $22.5 million in FY08.[103]

- **Investigator-Initiated Grants** provide up to $500,000 yearly for up to three years to researchers.
- **Exploratory Research Grant** applicants can receive up to $100,000 a year for two years.
- **Post-Doctoral Fellowship Grants** provide up to $55,000 a year for two years.

Maryland Industrial Development Financing Authority (MIDFA)

Although many types of businesses qualify for MIDFA credit insurance, the program has specifically targeted biotech-based economic development to address fixed-asset financing gaps according to one development official.[104] MIDFA's primary programs used to target biotechnology are:

- **Credit Insurance** provided by the state insures up to 80 percent of transactions made by a financial institution, not to exceed $2.5 million. MIDFA backed $18.7[105] million in loans through FY07-08.
- **Taxable and Tax-Exempt Bonds** are insured up to 100 percent, not to exceed $7.5 million.
- Taxable and nontaxable **Private Activity Revenue Bonds are** used for fixed asset financing.

General Subsidy Programs

Maryland administers a number of economic development funds not specific to high-tech but for which technology companies are also eligible.

The **Maryland Economic Development Assistance Authority and Fund** (MEDAAF) manages six programs that provide funding to companies and local jurisdictions for job creation and retention. All sectors except for service and retail establishments are eligible for MEDAAF programs.[106] In 2008, MEDAAF provided close to $5 million for "strategic"[107] economic development opportunities.[108]

The financial bulk of Maryland's economic development programs, however, is found in the state's surfeit of tax credit programs,[109] many of which are managed by DBED. Many of the tax credits are not targeted for high-technology but are structured so that some high-tech firms may qualify for them.

Under the **One Maryland Tax Credit** program businesses can qualify for up to $5.5 million in income tax credits. Businesses that invest in an economic development project in a "qualified distressed county" may qualify for project tax credits of up to $5 million and start-up tax credits of up to $500,000. DBED certified 10 applicants that claimed to have created approximately 630 jobs for the One Maryland tax credit in 2008, but it does not report tax expenditures through this program.[110] A audit of DBED's performance that year found that the department "did not always obtain adequate documentation to verify initial and continued eligibility for income tax credits approved and, in one case, approved an ineligible $50,000 credit."[111]

The **Job Creation Tax Credit** is worth 2.5 percent of annual wages for all newly created, full-time jobs, subject to a limit of $1,000 per new job. In certain designated zones (such as Enterprise Zones), the credit is increased to five percent of annual wages for all newly created full-time jobs, subject to a limit of $1,500 per new job. DBED approved credits for 1,016 jobs in 2008 but again fails to report the actual dollar value of credits.[112]

Maryland's **Enterprise Zone** program includes 28 zones in 14 jurisdictions. The primary benefits to businesses that are located within a enterprise zone are eligibility for local property tax credits and state income tax credits. In 2001, the program provided property tax credits to 352 businesses. By 2009, 793 businesses had their property taxes abated through credits. According to a DBED annual report on the program, from FY 2001 to FY 2010, the annual amount of property tax credits granted was anticipated to increase from $4.8 million to $26.3 million.[113]

New Jersey Technology-Based Economic Development Subsidies

New Jersey substantially subsidizes both technology-based and non-technology industries through the state's Economic Development Authority. The state's primary vehicle for technology-based economic development is the Edison Innovation Fund, launched under Gov. Jon Corzine in 2006. Technology businesses are also subsidized by a number of tax credit programs. However, New Jersey's failure to report tax expenditures—a significant and unusual budgeting flaw for a major industrial state—makes these programs' use and therefore their effectiveness or cost impossible to gauge. However, it is evident that spending directed to technology-based economic development programs in New Jersey is substantial compared with other states in this study, and greater accountability should be a priority.

High-Tech Industries Subsidy Programs

New Jersey's strategic industry targets include stem cell research, nanotechnology, renewable energy and clean energy technologies, advanced imaging technology, genomics, and research and development for homeland security and national defense.[114]

Economic Development Authority

In 2006, state agencies engaged in economic development activities were consolidated under the authority of the New Jersey Office of Economic Growth in then-Gov. Corzine's office. New Jersey's primary state level development agency is the Economic Development Authority (EDA). The EDA recently inherited most of the programs of the now-defunct New Jersey Commerce Commission, which for years helped businesses navigate state regulations and administered a number of state incentive programs.[115]

The **Edison Innovation Fund**, launched under Gov. Corzine in 2006 and administered by the EDA, manages a number of programs intended to assist early stage and established technology and life science companies. Corzine first recommended the fund as part of his campaign plan for the economy when he ran for Governor in 2005. It was supported by several high-tech in-state industry groups and intended to coordinate and amplify the state's efforts for high-tech companies. Since the fund's inception, nearly $340 million in financing has been provided to the private sector towards job creation and business development within technology and life science businesses.[116] Total expenditures made through the Edison Innovation Fund in 2008 were valued at $84.6 million.[117] Programs managed by the fund include:

- The **Edison Innovation Research and Development Fund** gives grants to life science and technology companies of up to $500,000. The grant is intended to be used for research and development activities. Twenty percent of the granted amount may be used as equity financing for operational expenses. In 2007-2008 the Commission on Science and Technology awarded $3.4 million to eight companies.[118]

- Companies already approved for an Edison Innovation R&D Fund grant are also eligible for the **R&D Wraparound Fund**, a loan of up to $100,000 to support non-R&D activities. The EDA awarded $200,000 through this fund in 2008.[119]

- The **Edison Innovation Commercialization Fund** provides up to $200,000 for commercialization of products with yet-to-be-established markets to technology and life science companies.

- The **Edison Innovation Growth Fund** is a loan made available at a one-to-one match ratio of public investment to private investment for products with an established proof of concept. The loan ranges from $200,000 to $1 million.

- The **Edison Innovation Technology Fellowship Fund** provides grants at a minimum of $65,000 in salary expenses to New Jersey life science and technology companies that hire recent doctoral graduates of New Jersey universities.

Aside from the Edison Innovation Fund, two industry-specific programs for high-technology businesses in New Jersey include:

The **New Jersey Stem Cell Research Grant** is available to both businesses and facilities in the amounts of up to $300,000 (individuals) and $1 million (facilities). In 2007, the Commission on Science and Technology approved $10.3 million in Stem Cell Research Grants.[120]

Companies that produce renewable energy or energy efficiency systems, products or technologies are eligible for grants and interest-free loans of up to $3.3 million through the **Edison Innovation Clean Energy Manufacturing Fund**.

The **Research and Development Tax Credit Program** allows a credit for increased research activities based on qualified expenditures. It provides a credit of 10 percent of the excess qualified research expenses over a base amount plus 10 percent of basic research payments. Unfortunately, New Jersey does not disclose state tax expenditures (neither the total cost, nor the identity or even the number of claimants), making cost evaluations and accountability analyses of its tax credit programs impossible.[121]

Businesses with fewer than 225 employees are also eligible for the **Small NJ-Based High-Technology Business Investment Tax Credit**. This credit is valued at 10 percent of the

total investment in a small New Jersey-based business, and is capped at $500,000 per investment.

The **Technology Business Tax Certificate Transfer Program**[122] allows unprofitable technology and biotechnology companies to raise capital by selling New Jersey Net Operating Losses and Research and Development tax credits to other unaffiliated New Jersey businesses for at least 75 percent of their value. The total available funding in this pool is $60 million annually.[123] In 2008, 80 technology and biotechnology businesses were approved to share the $60 million available through the program.[124] Since 1999, this program has subsidized over 300 technology and biotechnology companies with over $505 million.[125]

Like many states, New Jersey administers geographically designated zones focused on high-technologies developed in universities. Three **Edison Innovation Zones** are located near New Jersey's flagship public university campuses. High-tech companies locating in these zones are entitled to an enhancement of the Technology Tax Certificate Transfer Program, extra points on the Business Employment Incentive Program scoring formula, reduced interest rates and matching funding for the Edison Innovation Commercialization Fund, and the Edison Innovation Growth Fund as well as continued access to all other initiatives. Of the 80 companies in the Technology Business Tax Certificate Transfer Program, 12 took advantage of the $10 million set-aside for companies located in the state's three Edison Innovation Zones.[126]

Programs targeted toward small high-tech businesses in New Jersey include:

- The **New Jersey Business Innovation Research Bridge Grant** is available to companies falling between stage one and stage two of SBIR STTR awards. The grant provides up to $50,000 for multiple types of expenses. In 2007 the Commission on Science and Technology awarded funding totaling $550,000.[127]

- Another small business grant is provided to companies in the New Jersey small business incubator network. The **New Jersey Incubator Seed Fund** makes available $20,000 to $50,000 to companies participating in any of the state's 12 incubators. In 2007, the state spent $530,000 through this fund.[128]

General Subsidy Programs

The New Jersey EDA also administers the **Business Employment Incentive Program (BEIP)**. This program is not specifically directed at high-tech companies, but it makes program qualification easier for these industries. BEIP grants last up to 10 years; they are worth up to 80 percent of the total amount of state personal income taxes withheld by the company from the paychecks of employees who are new to New Jersey (even if they were simply transferred from another state).

To qualify, emerging technology and biotech companies' must create at least 10 jobs new to New Jersey in a two-year period. Between October 2006 and December 2008, the EDA approved 39 BEIP grants worth $73 million for life sciences and technology companies.[129] In FY08 alone, the EDA executed 46 BEIP agreements (for both tech and non-tech companies) worth an estimated $133 million over the term of the grant.[130]

The BEIP program has been a source of recurring controversy, both because of its high cost and because of its structure. Critics have alleged that it often pays for zero-sum job shuffling (e.g., when it pays New York City-based firms to relocate jobs to New Jersey that would have come anyway, such as back-office operations fleeing high rents in Manhattan).

BEIP also has an odd structural flaw due to New Jersey officials' desire to lure Pennsylvania-based companies employing Pennsylvania residents across the border as well as differing reciprocal tax agreements between New Jersey and its neighbors. The agreement between New York and New Jersey is that workers pay taxes where they work; the agreement between Pennsylvania and New Jersey is that people pay taxes where they live. Therefore, New Jersey gives income tax rebates under BEIP to some companies for Pennsylvania residents who never pay into the New Jersey Treasury. In other words, via BEIP grants based on phantom income taxes, New Jersey is subsidizing jobs "created" for Pennsylvanian taxpayers. New Jersey does not report or estimate how much this structural flaw costs.

West Virginia Technology-Based Economic Development Subsidies

West Virginia's relative lack of private investment, high-tech industry infrastructure, or strong technology programs in institutes of higher education have left the state with relatively few venues through which to pursue technology-based economic development. The state's strategy is somewhat scattershot, consisting primarily of smaller tax credit programs. While many states focus technology-based economic development efforts on technology transfer and small business incubation, West Virginia is first seeking to attract elite faculty members to its universities with added state funding. While the state has enacted some high-tech industry investment tax credits, some are effectively dormant and it appears that the West Virginia legislature has not approved any new credits for the last two years.

Relative to other states examined in this study, West Virginia lags in most forms of economic development subsidies. High-tech industries are no exception. The modest goals outlined by the state in Vision 2015, the state's science and technology strategic plan, reflect the state's level of advancement in science- and technology-based industries. These goals focus primarily on increasing university research capacity in science, technology, engineering, and math. Specific economic development goals include the creation of a Technology-Based Economic Development (TBED) office within the State Department of Commerce, the creation of an early stage technology commercialization fund, and a general objective to increase by 10 percent the number of science, technology, engineering and math jobs in the state.[131]

A Battelle Institute study commissioned by the state in 2007 describes potential areas for growth in technology-related industries in West Virginia; known as technology "platforms," they are advanced energy and energy-related technology; advanced materials and chemicals; identification, security, and sensing technology; molecular diagnostics, therapeutics, and targeted delivery systems.[132]

The state's strategic development initiative, West Virginia: A Vision Shared!, calls for emphasis on emerging and technology-based economic development strategies, but it is not specific.[133] The state does not have a comprehensive TBED strategy such as Ohio's Third Frontier program, relying so far on a more piecemeal approach. West Virginia depends primarily on bonds and tax credits as economic development tools, but their use tends not to be defined by industry. Compared to other states examined in this study, West Virginia devotes few resources to the promotion of entrepreneurship, technology commercialization or venture capital support.

Most of the state's economic development programs are administered by the West Virginia Economic Development Authority (WVEDA). The state's other major development office is the West Virginia Development Office (WVDO), an agency under the state Department of Commerce. The WVDO acts as the marketing arm of the state.

High-Tech Industries Subsidy Programs

Technology-specific programs utilized by the state include:

- The WVEDA provides a loan insurance program that guarantees up to $500,000 of bank-provided loans to firms at coverage of up to 80 percent. The **Leveraged Technology Loan Insurance Program** (LTIP) expands loan insurance coverage to 90 percent for businesses involved in the development, commercialization or use of technology-based products and processes. LTIP is not referenced in recent annual reports issued by the WVEDA. According to the West Virginia Center on Budget and Policy, no LTIP insurance has been issued since FY2006.[134]

- The **West Virginia Enterprise Capital Fund** entitles investors to a state tax credit of up to 50 percent of their venture capital investment. The credits may be claimed against personal and corporate net income taxes, business franchise tax, business and occupation tax, carrier income tax, telecommunications and severance tax. Credits may be carried forward fifteen years by the investor. No tax credits were made available by the West Virginia Legislature during FY 2008.[135] To date, there has been one $25 million allocation in the 2002-2003 fiscal year.[136] This is a replacement for the Capital Company Act.

- The state's **Centers for Economic Development and Technology Advancement** program was designed to enhance technology transfer efforts between universities and the private sector. WVEDA administers tax credits allowed for investments in qualified economic development and technology advancement centers. In 2004 the state provided $1 million in tax credits (to two companies) for the 2004-2005 fiscal year. Tax credits are then allocated among the investors in the respective research and development companies.[137] No credits have been allocated since 2005 – 2006.[138]

- The **High-Growth Business Investment Tax Credits** are available to investors of qualified research and development companies. The tax credit may equal up to 50 percent of the total value of the qualified capital investment, up to $50,000 per taxpayer. The credits may be claimed against personal, corporate net income, or business franchise taxes. WVEDA approved $167,500 in such credits for 15 investors in FY 2007 and $510,800 in FY 2008.[139] As of June 30, 2008, the program has been eliminated.[140]

- The state's **High-Tech Manufacturing Tax Credit** allows businesses making computer and peripheral equipment, electronic components or semiconductors to receive a tax credit to offset 100 percent of the Business Franchise Tax and 100 percent of the Corporate Net Income tax for up to 20 consecutive years. Applicants for this tax credit must create at least twenty new jobs with a median compensation of $45,000 per year. No High-tech Manufacturing Tax Credits were utilized in FY 2008.[141]

- The **Strategic R&D Tax Credit** allows for up to 100 percent sales tax offset for purchases of property and services used in research and development. These purchases are exempt from West Virginia's consumer sales and service tax and use tax. The value of each credit is up to $50,000 per recipient above actual tax liability.[142] As reported by the state's tax expenditure study, the value of this credit in FY2008 was less than $200,000.[143,144] However, a study of four tax credit programs conducted by the state tax commissioner released a month later reported that the credit's value in 2006 was $1.67 million.[145]

  This tax credit is essentially a replacement for the **Research and Development Projects Credit**, which was terminated in 2002. Businesses that qualified for this credit prior to the program's termination may still collect the credit if they are within the 10-year window of tax credit viability. West Virginia's 2009 tax expenditure report fails to disclose the value of this tax credit, citing taxpayer confidentiality (suggesting it has only one or two users).[146] The aforementioned tax credit study estimates that annual expenditures for a mature Strategic Research and Development Tax Credit will likely exceed the $3 million level of the old Research and Development Tax Credit Program.[147]

TBED strategies intended to connect research performed at institutions of higher education with the private sector are administered by the Division of Science and Research of the West Virginia Higher Education Policy Commission.

- State lottery proceeds fund the **Research Challenge Fund**, a competitive grant program founded in 2004. Grant recipients are affiliated with West Virginia colleges and universities through academic research centers paired with industry partners. As of mid-2008, the state had disbursed $8.4 million through the fund.

- The $50 million **West Virginia Research Trust Fund**, also known as "Bucks for Brains," is a program designed to attract faculty who will conduct scientific research on behalf of the state. West Virginia University and Marshall University will use money raised through their development offices to match money from the trust fund, which was established in spring of 2008. So far only about $3 million has been expended through this program.[148]

Notes (Appendix A)

[1] Pennsylvania Department of Community and Economic Development, Pennsylvania Tech-Formation 2005: A Status Report and Growth Strategies for Technology-Based Economic Development. http://www.21fund.org/uploads/PennTechFormationReport.pdf

[2] 2007-08 Budget Line Item Appropriations. http://www.portal.state.pa.us/portal/server.pt?open=512&objID=4571&&mode=2#2007-08

[3] Commonwealth of Pennsylvania. Comprehensive Annual Financial Report For the Fiscal Year Ended June 30, 2008. http://www.portal.state.pa.us/portal/server.pt/gateway/PTARGS_0_113914_346576_0_0_18/cafr-6-30-08internet.pdf

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