ACCELERATING INCLUSIVE GROWTH IN THE PIONEER VALLEY:

A Prospectus for Transformative Economic Investment

WesternMass ECONOMIC DEVELOPMENT COUNCIL

MACP MASSACHUSETTS COMPETITIVE PARTNERSHIP

COMMUNITY FOUNDATION OF WESTERN MASSACHUSETTS

The Irene E. & George A. Davis Foundation

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Dear Friends:

The Pioneer Valley has much to be proud of and even more to offer the future, but our communities, industries, and workforce need access to significant growth capital to contribute at their full potential. For far too long, both public and private resources have flooded into a few select places in the US. This geographically unbalanced growth pattern has bread inequality, which only grows wider with our increasing tendency to overlook promising opportunities in regions like the Pioneer Valley.

To help correct this myopathy, researchers at the Brookings Institution developed a regional business planning framework that exposes latent opportunities in slower growth metropolitan economies throughout the US. Drawing on their model, this report is organized as an economic development investment prospectus. Our goal is to identify tangible economic investments that Massachusetts can make up and down the Pioneer Valley, leveraging federal funds from the CHIPS and Inflation Reduction acts.

With assistance from researchers at MassINC and Cambridge Econometrics, and a host of regional leaders, we have made great strides surfacing ventures that could give our region competitive advantage in clusters positioned for rapid growth, as the global economy moves toward a sustainable and low-carbon future.

We are grateful for the time and effort that these leaders contributed to the project. We also owe a debt of gratitude to Jay Ash and the Massachusetts Competitive Partnership, Paul Belsito and the Davis Foundation, and Megan Burke and the Community Foundation of Western Massachusetts. These committed partners provided resources that made this work possible and strategic guidance to make it stronger.

In developing this prospectus, we have taken a first step toward creating alignment among residents and local leaders on the most promising investment opportunities in our region. However, this is only the beginning of a longer, more in-depth conversation. To succeed, we must work together to unpack these concepts and coalesce behind specific strategic economic development investments that will fuel equitable growth and innovation in the Pioneer Valley.

In this spirit, we encourage you to join with us in both dialogue and collaborative effort.

Sincerely,

Rick Sullivan
President & CEO
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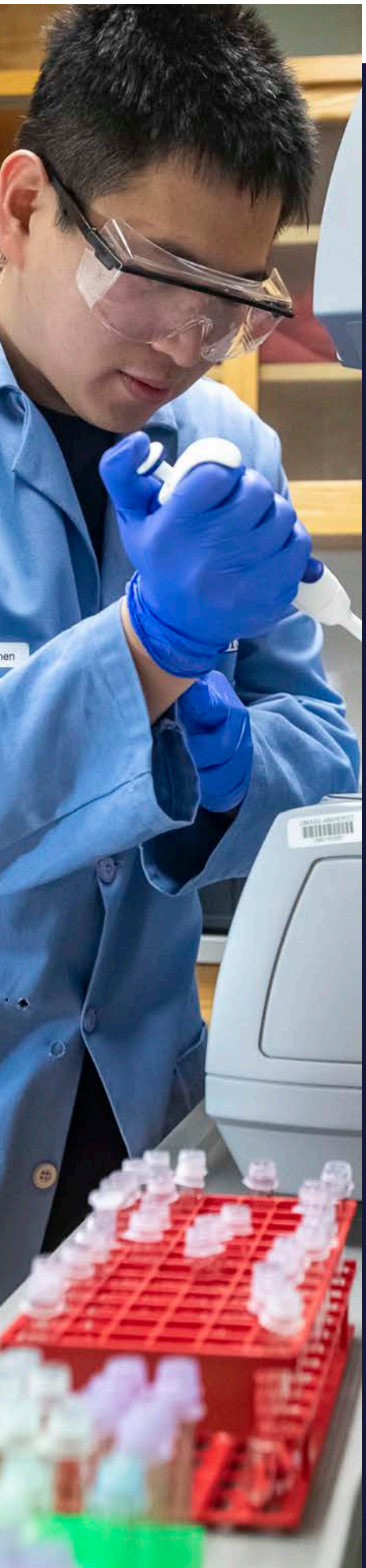


TABLE OF CONTENTS

INTRODUCTION

The Pioneer Valley of Western Massachusetts is blessed with an exceptionally high quality-of-life, world-class academic institutions, a rich concentration of precision-manufacturers, bucolic New England towns, and historic urban centers. Despite these formidable strengths, its economic base has been contracting for decades. This is largely attributable to heavily unbalanced economic growth patterns.

For far too long, Massachusetts has relied on the strong performance of Greater Boston's world-class innovation industries to drive economic expansion. Rather than investing in the unique strengths of each region of the state alongside this impressive growth, we have largely focused on continuing to build the Boston economy with state and federal resources.

Underinvesting in the assets of the Pioneer Valley has led to low regional productivity, which in turn means stagnant population and income growth. To be sure, the Pioneer Valley still contributes meaningfully to the Commonwealth's economic dynamism, but it is not producing anywhere near its full potential. And there can be no doubt that following the current course will lead to serious challenges with significant long-term costs for the state.

A far better future is within our grasp. Massachusetts has the wherewithal to make transformative investments in the Pioneer Valley, giving the state a second powerful economic engine. True to Governor Healey's vision for a clean energy corridor running the full length of I-90, the Pioneer Valley is especially well-positioned to develop niche strengths in sustainable development technologies. With unprecedented federal funding drawing enormous private investment to these sectors, now is the time for the state to make a strategic play in the Pioneer Valley.

With limited revenue growth and many worthy causes competing for state resources, it is critical that leaders on Beacon Hill see the compelling business case for investment in the region. This document offers a prospectus of sorts, quantifying the acute need for targeted attention to the Pioneer Valley and demonstrating that there are at least three innovative sectors where the Pioneer Valley is well-positioned to compete: food science, advanced materials, and clean energy.

A NOTE ON FOUNDATIONAL ECONOMIC INVESTMENTS AND REGIONAL CONNECTIONS

As readers contemplate the strategies and investments outlined in this prospectus, it is important that they keep two important caveats in mind:

First, this document focuses exclusively on opportunities to make transformative investments in high-growth industries. Without question, foundational investments in core areas, including education, housing, public safety, and transportation are also critical to the economic vitality of the region. A sound strategy to increase spending on foundational investments must prioritize bringing additional dollars to the regional economy by establishing new competitive niches in industries that export goods and services.

Second, the analysis focuses on the three-county Pioneer Valley region (Hampden, Hampshire, and Franklin counties in Massachusetts). This area is consistent with the geography covered by the Western Mass Economic Development Council. That said, it is important to recognize opportunities for regional connections and collaboration, such as:

- The Knowledge Corridor region, which includes the bi-state area of Greater Hartford. Led by the Knowledge Corridor Partnership, there are numerous examples of bi-state regional collaboration in areas such as transportation (especially passenger rail and Bradley Airport), workforce training and community college partnerships, regional marketing, and shared expertise in precision manufacturing, defense, and aerospace.

- The Berkshires and Albany are important partners to the west, including the vast cultural and outdoor recreation opportunities in the Berkshires, shared manufacturing strengths, and the growing nanotech industry cluster in Greater Albany.

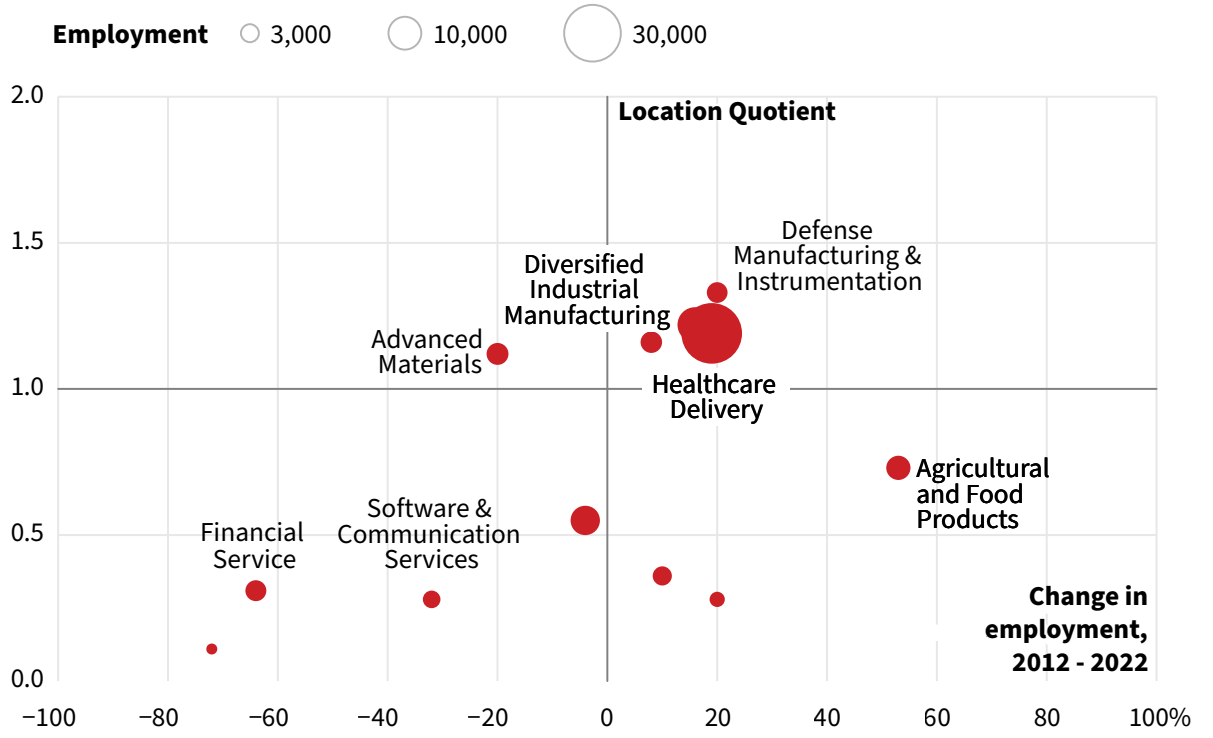
- Worcester and Central Mass are within an hour to the east, with Worcester holding the title of second largest city in New England, with strong economic momentum led by a resurgent residential growth and downtown revitalization, biomanufacturing and health care, higher education, and strong passenger and freight transportation connections.

THE ECONOMIC IMPERATIVE

Key economic performance measures underscore the urgent need for transformative investments in the Pioneer Valley. Leaders in the region and beyond must acknowledge these five high-level trends as they formulate growth strategies for the future:

1. The Pioneer Valley retains important manufacturing strength, but it lacks growing industry clusters. The clearest way to see the manufacturing prowess that the region retains is by comparing a subsector's share of total employment in the region to its share of total employment in the US economy. The Pioneer Valley has competitive advantage when this ratio, or Location Quotient in the parlance of economic development professionals, is significantly greater than one. Location quotients in the Pioneer Valley are high for defense manufacturing and instrumentation, diversified industrial manufacturing, and advanced material manufacturing **(Figure 1**).

Figure 1: Employment in Pioneer Valley Industry Clusters



Source: US Bureau of Labor Statistics

This tells us that the region has talent and know-how, but these traded clusters are relatively small, accounting for less than 4 percent of employment combined. And while defense manufacturing and diversified industrial manufacturing added jobs over the past 10 years, these gains were more than offset by losses in the advanced materials cluster, which shed nearly 1,000 positions. Even more concerning, the data do not reveal any new clusters forming in industries that will bring money into the regional economy by exporting goods and services, with one notable exception: employment in the agricultural and food products cluster grew by over 50 percent between 2012 and 2022, adding 1,600 jobs. Employment in the sector remains below the national average, but is strong relative to other areas in New England, and sustained growth at this rate will give the region a competitive toehold by the end of the decade.

2. The Pioneer Valley is underperforming relative to its potential to conduct research and development and commercialize new technology. In our global economy, growth and competitiveness hinge on the ability to produce new services and products. This is especially true for locations where land, labor, and other basic inputs are relatively expensive. For innovation to occur, regions need research and development activity, as well as firms with the ability to commercialize new discoveries. With a host of universities and manufacturers with advanced capabilities, we would expect to see the Pioneer Valley compare favorably to others in the US on measures of R&D and product development. Regrettably, this is not the case (**Figure 2**).

Other midsize regions, including Ann Arbor, Michigan; Charlottesville, Virginia; and Madison, Wisconsin, produce three times more university-led R&D on a per capita basis. These locales are also dramatically more likely to have private businesses engaged in advanced research, as measured by funding received through the federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.

Limited research activity means firms in the area are generating a lower volume of new products and services, as evidenced by low levels of patenting on a per capita basis. This could be at least partially attributable to a lack of major employers in advanced industries. To be sure, having many smaller firms promotes innovation and provides stability. But large firms can play an important role in the entrepreneurial ecosystem, nurturing supply chain, investing in R&D, and training workers. After waves of industry consolidation in recent years, large firms headquartered in a region can also provide stability. Of the top 15 largest employers in the Pioneer Valley, Smith and Wesson was the only manufacturer. The company recently departed for Maryville, Tennessee, after more than 100 years of continuous operation in the region.

Figure 2: Regional Innovation Metrics

Metro Area	Higher Education R&D	SBIR/SSTR Awards	Patents
Ann Arbor, MI	4,147	98	2
Champaign-Urbana, IL	2,755	75	727
Charlottesville, VA	1,811	81	501
Hartford, CT	221	8	762
Madison, WI	1,627	28	2
Rochester, NY	386	12	283
Springfield, MA	299	5	624
State College, PA	5,207	79	1
Syracuse, NY	239	1	419
Worcester, MA	5,061	18	741
Average	**2,175**	**41**	**960**

Source: SSTI and US Patent and Trademark Office

Note: Higher Education R&D on a per capita basis for the years 2009-2018 combined. SSBI/SSTR Awards on a per 100,000 residents basis for the years 2013-2017 combined. Patents on a per 100,000 residents basis for the years 2000-2015 combined.

3. GDP per capita in the Pioneer Valley is half that of Greater Boston, and below the metro area average for the US. Without new discoveries leading to new high-growth clusters to refresh the region's economic base, productivity growth has slowed such that per capita GDP is below average. GDP per capita for metro Springfield is $53,000 compared to $108,000 for metro Boston. But even more notable is the region's lagging position relative to other midsize regions throughout the country. GDP per capita in metro Springfield is 25 percent below Syracuse and 35 percent below Madison, Wisconsin (**Figure 3**).

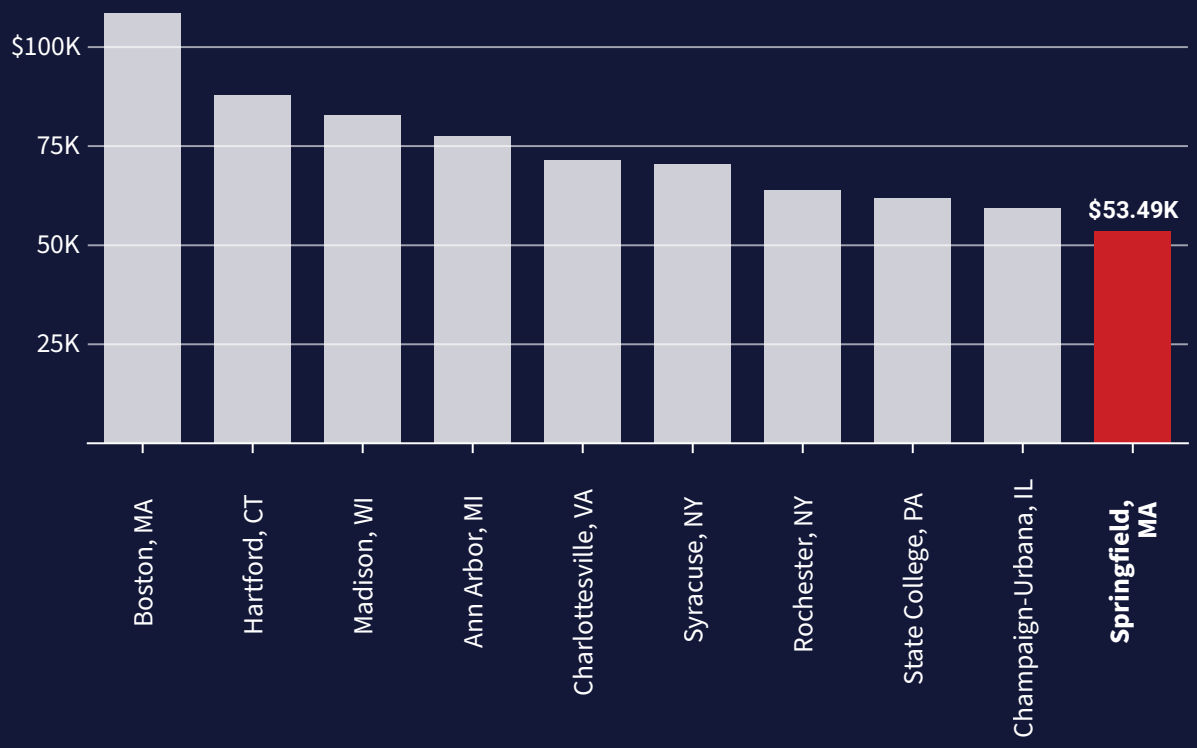
This datapoint is particularly concerning because Massachusetts is a high-cost state, even in regions like the Pioneer Valley, which many perceive as relatively low-cost. From energy and health expenses to housing and taxes, expenses that result from a combination of our location and policy environment make it difficult for industries to compete, unless they are providing high value-added products and services.

4. The gap between median household income in the Pioneer Valley, Massachusetts, and the US is growing. The lack of fresh activity to boost productivity and replenish the economic base is adversely impacting the region's residents. Over the past decade, inflation-adjusted median household income in the Pioneer Valley grew by less than 5 percent (**Figure 4**). This compares to nearly 9 percent nationally and 12 percent for Massachusetts statewide. The median household in metro Springfield now earns $65,000 annually, about 5 percent less than the national figure ($69,000), and over 25 percent less than the median household in Massachusetts statewide ($89,000).

Just as the state's high costs impose more drag on less-productive regional economies, they place more strain on households in the Pioneer Valley with less income. This leads to greater financial insecurity. The resulting financial stress has implications for worker productivity. It also makes it more difficult for households to save for a downpayment on a home or a business venture. And with fewer dollars for discretionary spending, there is less money left to circulate through the local economy. [1]

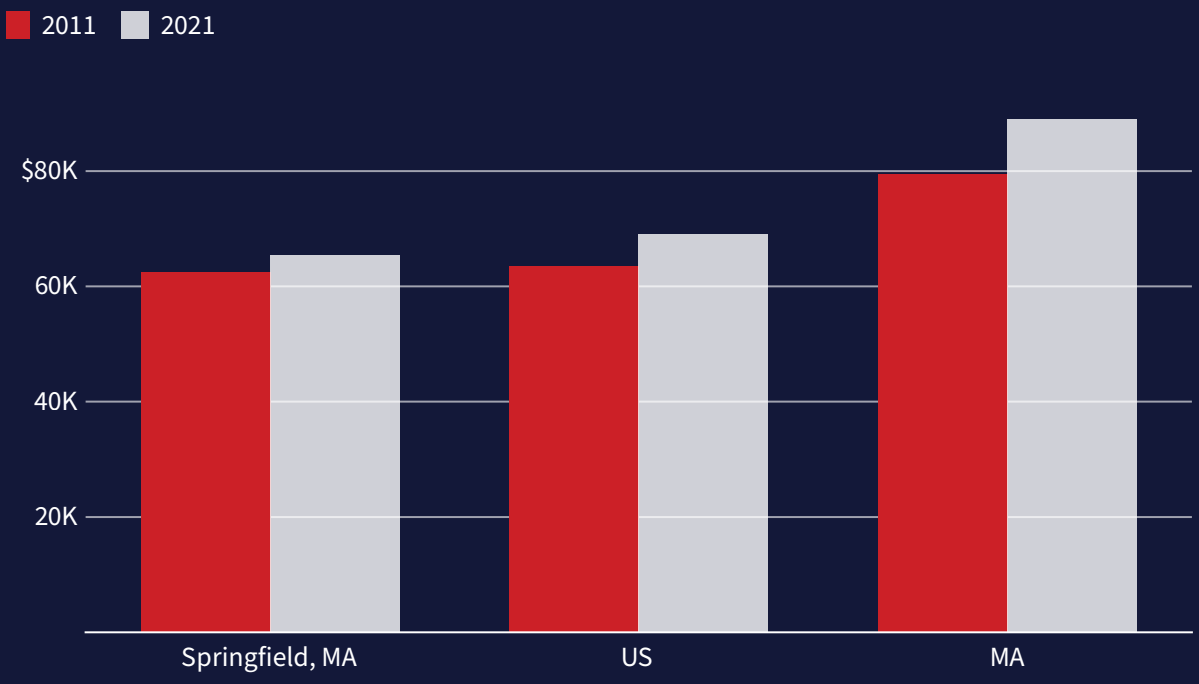
5. High concentrations of poverty undermine the potential of the region's future workforce. Like most areas of Massachusetts, the region's cities are home to a large share of its youth. Decades of deindustrialization and disinvestment has left these communities with extremely high poverty rates. In Holyoke and Springfield, more than one in four residents live on income below the federal poverty threshold. Low-income children who are born and raised in high poverty environments are significantly less likely to reach their full potential and move up the economic ladder. This has significant adverse long-term consequences for the regional economy.

Figure 3: Regional Gross Domestic Product Per Capita, 2021



Source: US Bureau of Economic Analysis

Figure 4: Real Median Household Income, 2011 and 2021



Source: American Community Survey

Note: Due to changes in the metro area definition, 2021 is the most recent data available for comparison. All estimates provided in 2021 dollars.

> *While these endeavors carry risk, there is an emerging consensus that states can generate return on public investment when they structure their sectoral investments wisely.*

THE CASE FOR TRANSFORMATIVE INVESTMENT IN HIGH-GROWTH INDUSTRIES

The challenges the Pioneer Valley faces in 2024 are not news, and they are by no means unique to the region. The landmark 2007 study, *Reconnecting Massachusetts Gateway Cities*, established the various ways in which the success of innovation economies, like Boston, created "agglomeration shadows" for regional economies left behind in the transition to knowledge industries. The report called for renewed and sustained focus on economic development in Gateway Cities, with the belief that this would drive regional economic growth beyond the I-495 corridor.[2]

Over the past 15 years, the legislature and state economic development leaders responded to this call to action by prioritizing public infrastructure investment in Gateway Cities through the MassWorks program. With leadership from MassDevelopment, they also developed the Transformative Development Initiative (TDI) and other creative place-based economic development approaches.

These efforts face two fundamental challenges to broader impact: First, as has been documented, the total public investment they have provided to each Gateway City has been modest.[3] Second, there has been very little complementary effort to seed growth in innovation industries. Without this investment, other parts of the state can't gain toeholds in high-growth clusters.

There are three tangible reasons why the moment has come for transformative investment in industries where the Pioneer Valley has legitimate strength:

First, there is growing recognition and compelling evidence that strong industrial policy has a role to play in regional economic development. Economic policymakers have wavered over whether the public sector, particularly at the state level, can cost-effectively influence the growth of an industry cluster. While these endeavors carry risk, there is an emerging consensus that states can generate return on public investment when they structure their sectoral investments wisely.[4]

Through its involvement in the life sciences cluster, Massachusetts has demonstrated that public investment can help secure a region's competitive position in an emerging industry. The federal government is increasingly turning to industrial policy to develop regional economies. High profile federal efforts include the Regional Challenge / Build Back Better and Regional Tech Hub grants, which provide substantial funds to help regional partnerships grow world-class industry clusters in key innovation industries.

With Albany's nanotech cluster to the west and Worcester's biotechnology cluster to the east, the Pioneer Valley is poignantly sandwiched between two regions that demonstrate how transformative state investment can lead to the development of a competitive niche in growing innovation industries in midsize metros with modest knowledge economy assets (**see box p. 14**).

Second, regional leaders are coalescing around a vision for transformative economic investment. The size and diversity of the Pioneer Valley make it especially difficult to develop a cohesive strategy that meets the needs and opportunities of many. This has long been a barrier to elevating and advocating for prime economic development opportunities in the region. The genesis of this document evidences the commitment of regional leaders to work collaboratively across geographic, industrial, and institutional boundaries to draw transformative investments with the potential to generate new wealth and prosperity up and down the valley.

Third, the Pioneer Valley has legitimate opportunities to gain competitive advantage in high growth industries. The Pioneer Valley certainly has the preconditions to compete globally in knowledge industries—it is home to the University of Massachusetts flagship campus at Amherst, along with 10 four-year colleges and three community colleges. Together, these institutions develop an enormous amount of talent, as well as a significant volume of basic and applied research.

Moreover, the area is highly regarded for abundant outdoor recreation opportunities, strong health care and hospital systems, an excellent international airport, advanced manufacturers, and a rich food eco-system, from farmers and specialty food producers to larger-scale food manufacturing.

With these indisputable economic assets, it is striking how little proactive economic development investment the region has seen in the past several decades. Blinded by Boston's enormous output, it is difficult for many to appreciate the true potential of the Pioneer Valley, but as we shall see in the following section, there are numerous investable opportunities for the state to pursue in sectors well positioned for growth.

SUCCESS STORIES TO THE EAST AND WEST

Albany Nanotech Cluster

Just on the other side of the Berkshires lies a prime example of how state investment can catalyze the growth of a world-class tech cluster. In the span of a decade, a basement physics lab at SUNY Albany grew from employing just 72 workers to over 2,600 scientists, researchers, engineers, and technicians.[5]

Beginning in 1997, the state of New York invested heavily in the SUNY Albany's College of Nanoscale Science and Engineering campus. Construction of 1.6 million square feet of research and development space across six buildings has drawn $1.2 billion into the regional economy. But this was just a means to an end. The goal was to create a world-class center for nanotechnology research that would lead to commercialization and manufacturing in the region. More than one-third of faculty recruited to the growing campus came with industry experience, compared to less than 15 percent in traditional physical sciences departments.[6]

To ensure that this research capacity led to local production, the state offered large tax incentives to manufacturers. In 2002, it provided $100 million to draw Tokyo Electron Ltd.'s $300M research and development center. This was followed by over $200 million in incentives to bring in SEMATECH, a consortium of the world's largest computer chip makers. Then in 2008, the state provided another $1.2 billion to help GlobalFoundries build a $4.2 billion semiconductor plant.[7]

In 2008, Albany had no competitive advantage in semiconductor manufacturing. By 2011, regional employment in the sector exceeded the national average by a factor of five. And the region continues to build its competitive position. Late last year, the state announced plans to provide another $1 billion to leverage federal funding from the CHIPS Act to develop a $10 billion public-private semiconductor research facility on the campus.[8]

Worcester Health Research and Biomanufacturing Cluster

The growth of biomanufacturing in Springfield's backyard is similar to the Albany model, though over a much longer time period and with more modest state investment. The legislature created a medical school in Worcester in 1962, and a decade later provided a $370 million appropriation for a teaching hospital on the campus. By the 1980s, efforts were underway to help translate medical research into commercial products. In 1985, Governor Dukakis designated Worcester a "Center of Excellence in Biotechnology" (one of four technology-based centers established to integrate state universities into regional economies). Two years later, the Massachusetts Biotechnology Park opened. Developed as part of the "Targets of Opportunity Initiative" to concentrate growth in urban centers, the state transferred land belonging to Worcester State Hospital to create the park and issued bonds to finance construction of its first two buildings. (UMass later acquired and rebranded the site as UMass Medicine Science Park.)

In 1989, BASF built a $101 million facility employing more than 350 people. The company changed ownership to Abbie Vie, which grew its presence to more than 1,200 workers. [9]

Massachusetts also sought to incubate new businesses in the cluster, earmarking $3 million for the establishment of the Massachusetts Biotechnology Research Institute—now Massachusetts Biomedical Initiatives (MBI). Initially, the organization served as a tech transfer office for several colleges and helped with licensing deals for alumna. It also raised over $74 million to make equity investments through a nonprofit venture capital arm. Since 2000, MBI has assisted over 175 companies that have created over 1,025 jobs with over $1 billion in economic impact.

MBI has been especially active in recent years. In 2020, the institute opened a startup center at 17 Briden Street. Located next to Worcester Polytechnic Institute's Life Science Bioengineering Center, the facility achieved full occupancy in just 10 months. In 2022, MBI expanded 17 Brinden Street to add a pilot Biomanufacturing Center. The expansion includes 10 new biomanufacturing labs to support startup companies in process development. [10]

At the same time, the state has sought to provide additional industrial space for biomanufacturing facilities. In 2017, the state transferred another 46 acres of surplus land and provided $15 million for the demolition of the Worcester State hospital building for a master planned campus. Led by the Worcester Business Development Corporation, redevelopment of the property included eight pad-ready sites dedicated to biomanufacturing. WuXi Biologics is constructing a $60 million manufacturing facility with $1 million in state incentives on one parcel. Galaxy Life Sciences has purchased the remaining parcels, and recently announced plans to build a $150 million facility for an unnamed client.[11]

THE POTENTIAL VENTURES

The transition to a low carbon future will lead to significant disruptions of mature industries and massive growth in demand for new products. With the state supporting as a patient investor, the Pioneer Valley is well positioned to excel in this new era of economic restructuring, leveraging its significant assets in three sectors: food science, advanced materials, and water technology.

A NOTE ON THE RESEARCH PROCESS

To identify potential economic investment ventures for the Pioneer Valley, the MassINC/Cambridge Econometrics research team applied a mixed-methods approach that involved:

- Quantitative analysis of sectoral trends, including employment concentrations, R&D funding, and patenting activity.
- Qualitative interviews with numerous leaders in economic development, higher education, workforce, private industry, and public utilities, with particular focus on sectors the data identified as high growth.
- Application of evaluation criteria to screen potential economic investment ventures, including regional economic impact, alignment with regional assets, inclusive and equitable growth opportunities, and opportunities to build momentum with early and successive wins.

This method is not intended to produce an exhaustive list of investment opportunities, nor is it meant to serve as the basis for prioritizing among them. The objective here is solely to demonstrate that the region has significant overlooked economic potential. Regional leaders and their partners will need to work together to conduct due diligence and further develop these concepts into actionable investments and initiatives.

FOOD SCIENCE, NON-PHARMACEUTICAL BIOMANUFACTURING, AND THE FOOD ECOSYSTEM

With the Connecticut River running north-south throughout the Pioneer Valley, the region has long been known for its agricultural lands, small to mid-size farms, and food product manufacturing. The region is also the headquarters for the Big Y grocery store chain, as well as food manufacturers such as Hood and Agri-Mark. More recently, the region has experienced measurable growth in entrepreneurial food products, supported by the Western Mass Food Processing Center in Greenfield (among other resources), as well as abundant craft breweries and farm-to-table restaurants.

Less well known, the Pioneer Valley also boasts world-class food-related research capabilities and an emerging food-tech cluster with companies such as Clean Crop Technologies in Holyoke and Florrent in Deerfield. In fact, the food science department at the University of Massachusetts Amherst is the number one ranked research department in the entire US and number three globally (only trailing two universities in China).

Advances in food production are critical to addressing climate change and sustainability. Innovation in the sector includes:

- Developing alternative plant-based proteins or proteins cultured from cells to help offset the more carbon-intensive traditional meat production industry.
- Improving food product safety, limiting waste, and adopting more energy-efficient food product packaging.
- Supplying more agricultural food products locally to reduce the transportation and refrigeration resources needed to transport food across the US (and globally).

For these reasons and more, the $183 billion food technology industry is expected to increase substantially in the coming years, with CAGR rates projected to be roughly 8 percent over the next 10 years.[13]

Developing the food science cluster in the Pioneer Valley would have strong synergies with other state economic development priorities, most notably the growth of pharmaceutical biomanufacturing in Central Massachusetts. While the firms are distinct, there is overlap in the supply chain and workforce for companies engaged in non-pharmaceutical biomanufacturing processes to culture proteins from cells and to create biofuels from plants.

Finally, growing the region's food eco-system will further the development of a more inclusive economy through equitable entrepreneurship initiatives and workforce training. For example, the WMEDC is already leading the Anchor Collaborative, which works closely with major employers (UMass, Big Y, BayState, etc.) to increase the share of procurement spending retained in the region, with a focus on building the capacity of small, minority-owned businesses to supply these large organizations. An obvious area for increased local supplier activity is related to food and catering needs.

From both a cultural and a marketing perspective, the Pioneer Valley is well-positioned to be seen as a center of excellence for sustainable food. UMass Amherst has long been celebrated for its excellent food, Springfield Public Schools has set a new standard for providing students with fresh and healthy meals, and farm-to-table ecotourism is growing throughout the valley.

While there are likely numerous opportunities to build the food eco-system, two specific investments stand out:

Pioneer Valley Food Innovation Hub —$75 to $125 million

The UMass food science department has outlined an expansive and ambitious vision for a food innovation hub. There are multiple precedents for a food innovation hub, including the Cornell Food Venture Center and the University of Nebraska Food Innovation Center.[14] The UMass food science department has already developed preliminary plans to expand their on-campus facilities and is working with the university and other partners to try to advance the project, which includes modern research and testing facilities, a sensory lab, a clinic for human testing of food innovation products, and other innovation center functions. This expansion is estimated to cost approximately $30-40 million.

With an additional $45-75 million, the department could also guide the development and operation of a secondary off-campus hub that offers:

- Shared kitchen space
- Good Manufacturing Practices (GMP) pilot space
- Food analysis and safety evaluation hubs
- Start-up incubators
- Operations with full-time staff (director, community/industry outreach, technicians, plant manager)

Such a facility would support local food businesses and entrepreneurs, providing a platform for industry outreach and partnership. It could also offer space to engage related industries (e.g., water, polymers, renewable energy, animal science, etc.) in the development of the broader food cluster.

Food Product, Storage, Distribution Facility — $20 to $40 million

Discussions with local food eco-system leaders, including the Franklin County Community Development Corporation, revealed a need to develop a larger-scale food product, storage, and distribution facility. A natural extension of the Western Mass Food Processing Center in Greenfield, this facility would address current capacity constraints and provide larger-scale equipment to help growing small businesses expand their operations. Ideally, this new facility will be located near I-91 and other transportation assets with proximity to agricultural lands. Industry leaders believe such a facility would require between $20 and $40 million to make the construction and initial operation financially feasible.

ADVANCED MATERIALS — R&D AND MANUFACTURING

As noted previously, the Pioneer Valley is home to an advanced materials cluster. There are a number of companies in the sector scattered throughout the region, including Adhesive Application in Easthampton, Eastman Chemical/ Solutia in Springfield, Plastipak in East Longmeadow, and Myrias Optics in Sunderland (a UMass spin-out). These cutting-edge firms develop and produce polymers, optics, gels, and composites with exceptional strength and conducting qualities. These products are used in a range of industries, including aviation, automotive, instrumentation, and health care. Globally, the market is projected to grow by 6 percent CAGR over the next five years, as these products will play an increasingly essential role in the transition to clean energy technologies.[15]

UMass Amherst boasts one of the nation's top ranked departments for polymers and has leading-edge optics and manufacturing development facilities. The university has partnered with industry and helped give life to innovative startups, such as Felsuma. Supporting these industry partnerships is the Center for UMass Industry Research on Polymers (CUMIRP) and the UMass Center for Hierarchical Manufacturing (CHM), which provide advanced equipment for industry testing and demonstration.

With a series of targeted investments, the Pioneer Valley can build upon its strengths in advanced manufacturing. The opportunities include:

Manufacturing Accelerator — $50 to $75 million
While the concept requires feasibility and site analysis, there is a recognized need for an off-campus manufacturing accelerator that could provide lower-cost space for advanced material startups looking to expand to five or more employees. CUMIRP and CHM lack the space to support these growing companies. Rough estimates based on similar buildings suggest an investment of $50 to $75 million would be sufficient to support the construction and initial operation of this facility. Potential locations that have been discussed include land and buildings in the North Amherst and Hadley areas, as well as industrial and R&D spaces available in places such as the STCC Technology Park in Springfield and the Northampton industrial park.

Strategic Faculty and Post-Doc Hires — $10 to $15 million
The Pioneer Valley can further solidify its leadership in the field by helping CUMIRP and CHM hire more leading experts and developing more innovators of the future. Following the Georgia Research Alliance model (**see box p. 22**), modest investments to attract senior academic researchers with strong relationships to industry can provide major leverage to strengthen the cluster. Similarly, research centers can generate large returns by providing more opportunities for relatively inexpensive post-docs to develop new technologies together with faculty and industry partners.

Small-Scale Industry-University Grants — $1 to $5 million

While there are some examples of regional industry partnerships with higher education researchers in the Pioneer Valley, small-scale grants could help generate many more, leading to innovative new products and processes. Grants could start at $10,000 with larger amounts contingent on local employee counts. The grants would provide financial support for more higher education faculty and researchers to engage with local businesses on R&D and new product ventures. Related, the State Voucher Program funded by the Massachusetts legislature gives small and medium-sized businesses (with less than 50 employees) access to the leading-edge UMass research facilities at reduced rates. More than 90 core facilities, from 3D printing to x-ray scattering, are available for use with the voucher program across the UMass campuses. UMass researchers suggest administrative modifications to the state voucher program to ease and increase the industry's use of specialized equipment and instruments on UMass campuses (which would help businesses and potentially lead to more partnerships).

Specialized Workforce Training for Advanced Materials — $5 to $10 million

The Pioneer Valley and its community colleges and vocational schools have a strong track record of providing manufacturing workforce training. For example, STCC offers a wide variety of advanced manufacturing training opportunities and Greenfield Community College has a Pathways to Advanced Manufacturing training program with numerous private industry partners. However, available funding is often too small or too short-term (two- to three-year grants) to have larger and more sustained impact. Further, much of the training to date has been focused on precision machining. There are opportunities to provide similarly specialized training in partnerships with producers of advanced materials. Such an approach will help ensure that R&D activity leads to local manufacturing and broadly shared impact across the region.

CLEAN ENERGY TRANSITION

The Pioneer Valley has been a regional leader in clean energy with ISO New England headquartered in Holyoke, extensive hydroelectric power (Holyoke Gas and Electric, FirstLight), early adoption of solar generation (conversion of the Mt. Tom coal-fired power plant), and a prominent effort to promote equitable business ownership and workforce development training in the sector in partnership with the Emerald Cities Collaborative. Despite these advances, the region has struggled to define its economic role in the clean energy transition.

A robust strategy is critical because the clean energy transition is the largest market opportunity by several orders of magnitude. Efforts to decarbonize the economy are drawing $2.8 trillion in investment globally each year and estimates suggest spending must increase to $4.5 trillion annually to reach net zero by 2050. The Healey-Driscoll state economic development plan seeks to position the entire commonwealth to complete for this investment.
Now is the time to carve out the areas where the Pioneer Valley can both: a) increase the region's research and development and manufacturing contributions toward addressing climate change globally; and b) increase the business and employment opportunities for residents to maximize the regional economic benefits of local expenditure on decarbonization.

Given the size of this opportunity and the complexity of the undertaking, developing a strategy will require considerable analysis and regional discussion. However, an initial scan reveals two high-potential opportunities:

Water Treatment Technologies — $25 to $30 million
Finding cost effective ways to produce drinking water more efficiently while also removing microscopic pollutants and ensuring a safe supply with more extreme weather events will require municipal utilities to adopt new approaches to water treatment. The Pioneer Valley is leading this transformation with advanced research and testing at UMass Amherst's Water and Energy Technology (WET) Center. The facility hosts researchers and private companies developing a range of water technologies. Demand for the space exceeds current capacity. The center has proposed a $6 million expansion. This is one of the most tangible near-term economic development opportunities in the region. Another $20 million would position the WET Center to fund the development and initial operation of an off-campus incubator and accelerator. This facility would provide space, equipment, technical assistance, and mentoring and networking opportunities to help commercialize new discoveries coming out of UMass.

Leveraging Clean Energy Investment for Equitable Development — $20 to 25 million
The transition to clean energy technologies has the potential to stimulate economic development if the investment circulates through the regional economy and builds generational wealth. Realizing these benefits to the maximum degree feasible will require the full-participation of lower-income communities and residents. While this will mean engaging these populations in the development of the strategy, there are two promising areas where this work is already well underway and primed for additional state investment.

The first is community solar. To find pathways for achieving equitable economic impact from solar in rural and urban communities, several partners have come together, including the UMass Clean Energy Extension, WMEDC, the UMass Donahue Institute, the Franklin County Community Development Corporation, municipal officials, community-based organizations, and mission-based solar lenders. The collective goal is to pilot local ownership business models for seven to 10 community solar projects that provide business opportunities, wealth retention, and ratepayer savings to low-income households.

This investment concept builds on the anticipated $250 million Solar for All funding that Massachusetts is anticipating from the US Environment Protection Agency (EPA). Athol, Shelburne, and Ware are committed to town-

driven solar and business development projects and will develop local ownership business plans that direct lifetime economic net benefits to rural towns and low-income residents who spend a disproportionally high share of their income on energy. In addition, Amherst is working with local African Heritage communities to help fulfill the town's commitment to bring reparations to its Black constituents. Holyoke and Springfield are establishing pilot community solar projects in coordination with Holyoke Gas and Electric and community organizations.

Equitable entrepreneurship and workforce development is the second area where the region has already undertaken considerable leg work. WMEDC, the Pioneer Valley Planning Council, and the Massachusetts Clean Energy Center have joined forces with the Emerald Cities Collaborative—a national nonprofit working to advance a sustainable environment and inclusive economies. Together, these organizations are providing clean energy workforce training and small business support to help entrepreneurs of color ramp up their capacity to participate in the growing market for energy efficiency and renewable energy projects. This effort is supported by a one-time grant from the Massachusetts Clean Energy Center. Additional state investment could extend and sustain this work and increase the number of residents and small businesses served. With adequate resources, these efforts could blossom into a substantial clean energy small business and workforce training hub with dedicated facilities located in one of the region's Gateway Cities.

THE GEORGIA RESEARCH ALLIANCE

Established in 1990, the Georgia Research Alliance (GRA) is a nonprofit, public-private partnership to help industry, research universities and state government agencies collaborate to build a technology-driven economy fueled by advanced research. The State of Georgia provides GRA with approximately $23 million annually to support its operations.

A key activity is recruiting star research talent to Georgia's universities and providing generous grants to help these researchers build state-of-the-art labs. GRA also provides seed funding, legal assistance, and other services to support the researchers as they work to move their discoveries to the marketplace.

In 2022, GRA researchers drew $900 million in R&D funding and employed nearly 2,000 researchers. Since its founding, GRA estimates that is has produced a return on investment approaching $12 billion.[16]

THE ASK: $500 MILLION FOR TRANSFORMATIVE INVESTMENTS IN THE PIONEER VALLEY

The preceding sections provide a strong basis for establishing a "Fund for the Pioneer Valley"—a dedicated pool of resources for transformative investment in advanced industries that positions the region for strong and equitable growth while supporting the state's overall economic development strategy as it relates to the clean energy transition.

This fund must contain sufficient resources to generate results. Based on a scan of similar efforts, such as the New York Upstate Initiative (**see box p. 25**), this means committing at least $50 million per year in state resources to economic investments in the Pioneer Valley over a 10-year period. While this is an order of magnitude above typical economic development expenditures, the figure is modest from a state capital investment standpoint. The Commonwealth regularly devotes this level of investment to singular investments in infrastructure and public facilities. A series of targeted investments in high-growth sectors in the Pioneer Valley will have far broader economic impact and much larger returns for taxpayers in the long run.

This fund should provide support for three basic activities in roughly the following proportions:

- $400 million for a strategic portfolio of innovation investments
- $90 million for site development
- $10 million for economic development implementation capacity

To help ensure that the fund makes worthy investments and that it fully leverages the state's capital, each allocation should leverage additional federal and private investment at a ratio of at least one-to-one. This would result in at least $1 billion in total investment in the Pioneer Valley economy over the next 10 years.

Strategic Portfolio of Innovation Investments — $400 million

As noted previously, the potential ventures outlined in this prospectus are not exhaustive—rather they represent a starting point for cataloging investable regional economic opportunities and prioritizing among them. Accordingly, and recognizing that effective regional economic strategies are sustained (rather than one-time investments), the Pioneer Valley requires access to an unrestricted pool of state capital.

These funds will be strategically deployed by the region through a representative committee or task force assigned to lead this work, and its state partners, including the Massachusetts Technology Collaborative, the Massachusetts Clean Energy Center, and the Massachusetts Life Sciences Center.

While limited to priority clusters, the funds could support a range of activities, including capital to construct centers of excellence, R&D facilities, accelerators, incubators, and operating resources to staff these facilities while they develop reliable revenue streams. These resources could also support a range of workforce initiatives, from the recruitment and retention of world-class talent to local job training.

Pioneer Valley Site Development Fund — $90 million

To support economic development growth opportunities in the Pioneer Valley, it is also essential to create a portfolio of land and buildings that can accommodate businesses of all sizes, as well as the R&D facilities, incubators, and accelerator spaces vital to a strong cluster. While the region is not as densely developed as Boston, significant limitations to physical growth include:

- Existing industrial and flex space buildings have very low vacancy.
- Older mill buildings occupy existing areas zoned for industrial use, but they struggle with long-term vacancy and underutilization because they require costly upgrades to meet today's stringent building codes.
- Limited land is available for large-scale industrial, commercial, and R&D uses (beyond an industrial parcel in Westfield and space at Ludlow Mills coming soon, there are virtually no market-ready sites to accommodate new development).

The state's Site Readiness and more recent Underutilized Properties programs (administered by MassDevelopment) have been a positive step in the right direction to help advance site development. However, the funding has been insufficient to meet the needs of the entire state and move the needle on development in the Pioneer Valley.

Consequently, it will be critical to have an unrestricted pool of capital at the ready for commercial and industrial land acquisition, site preparation, building rehab, demolition (when appropriate), and gap financing for new construction. This funding will support efforts to grow, retain, and attract businesses in the targeted sectors.

These funds will be strategically deployed by the region with consultation from MassDevelopment, and local development leaders are confident that they can be leveraged for a strong ROI to accelerate private investment.

Economic Development Implementation Capacity — $10 million

Skillfully launching a series of targeted ventures and structuring the related investments will require significant capacity. While the region possesses multiple entities that could lead and/or support the effort (e.g., WMEDC, PVPC, FRCOG, regional workforce boards), staff at these organizations already have major responsibilities and do not currently have the resources to implement this work. Evaluating and scoping these projects will also require studies and technical expertise.

Relatively modest state funding to support implementation in the range of $10 million, or $1 million per year, will go a long way toward ensuring that the region can build a team of skilled professionals to lead these efforts.

Key areas to build implementation capacity include:

- Increased economic development staffing for overall project management (including a senior-level position) to coordinate across the investment portfolio, multiple levels of government (local, regional, state, federal), and engage with regional stakeholders and champions.

- Funding to conduct feasibility, site location, and design studies of proposed facilities (e.g., food innovation hub, manufacturing accelerator).

- Acceleration of the Western Mass EDC's Anchor Collaborative, which is building capacity, especially to engage businesses owned by people of color, but needs more resources to realize the benefits of this promising initiative.

- Dedicated state funding targeted at expanding the UMass Amherst role in regional economic development and increasing the UMass presence and contribution to the overall economy. Many state universities across the country have a team that plays this economic development role. And Chancellor Reyes has already signaled support for expanding the outward impact of the state's flagship university in the Pioneer Valley.

THE UPSTATE NEW YORK INITIATIVE

New York State began its concerted effort to generate more geographically balanced growth in 2011 with the establishment of 10 regional economic development councils (REDC). These public-private partnerships were tasked with formulating long-term strategic plans and funding priorities. The process was notable for the community-based, bottom-up approach taken to identify areas of strength.

To act on the significant opportunities identified in these plans, the state launched the Upstate Revitalization Initiative in 2015. Competitive funding was made available to the REDCs. Three awards of $500 million each were made to Central New York (Syracuse area), the Finger Lakes (Rochester area) and the Southern Tier (Binghamton). The REDCs received the funding in $100 million increments over five years. The state continues to invest significantly in REDCs throughout the state as part of New York's statewide economic development strategy.

> *With carefully structured spending in the Pioneer Valley, the Commonwealth has another opportunity to demonstrate the role that the public sector can play creating competitive advantage for regional economies in high-growth sectors.*

THE RETURN

Ultimately, Massachusetts will measure the Fund for the Pioneer Valley's performance by job and wealth creation in the region. The state must seek this return as a patient investor, allowing considerable time to elapse between seeding innovation, commercializing new discoveries, and generating jobs and significant revenue from these products and services.

However, the state may still expect to quickly recoup a significant portion of the outlay that it makes each year. This is because state funds will leverage federal and private investment that would not otherwise occur. The combined spending will allow the region to attract and retain researchers, immediately producing new income and payroll taxes. The investment will also stimulate private construction, generating property taxes and sales taxes on the materials and equipment, in addition to additional income and payroll taxes for workers involved in designing and building these facilities.

To maximize the long-term return, the region and its state agency partners will have to weigh numerous factors when selecting among the various investment opportunities, and more importantly, which sector, or sectors, they will target with resources from the fund. The decision matrix should include:

- Alignment with regional strengths. What is the likelihood that the Pioneer Valley will prevail in developing a strong cluster, considering the positioning of competitors in both the US and abroad?

- Potential regional economic impact. Can the region develop and demonstrate new products in the cluster? Will it be able to fabricate some of these goods locally? What will be the local job impact?

- Potential for equitable development. How high are barriers to entry and are there opportunities for entrepreneurs to enter the market without large equity investors? Does the industry offer career ladders and jobs with family-sustaining pay at all levels? Are there opportunities to center growth in the region's Gateway Cities?

- Potential for early wins. Are there strong projects that the region can execute quickly to build momentum, leveraging the full marketing value that the new fund will provide for the region?

Like the ventures described previously, this criterion is not intended to be exhaustive. Regional leaders and state partners must work together to establish transparent processes, shared goals, and metrics to hold one another accountable for results.

This is vital because voters are skeptical when it comes to public investment in risky private markets, especially in advanced industries that are not well-understood. As a result, government at all levels has been overly cautious when it comes to making economic development investments necessary to help regions adjust to industrial change. Massachusetts has provided a national model with its successful investments in the life sciences. With carefully structured spending in the Pioneer Valley, the Commonwealth has another opportunity to demonstrate the role that the public sector can play creating competitive advantage for regional economies in high-growth sectors.

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About MassINC

MassINC's mission is to make Massachusetts a place of civic vitality and inclusive economic opportunity by providing residents with the nonpartisan research, reporting, analysis, and civic engagement necessary to understand policy choices, inform decision-making, and hold the government accountable.

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Cambridge Econometrics is an economic consultancy with offices in Northampton, MA, and globally in Cambridge (UK), Brussels (BE), and Budapest (HU). Our work is organized around investments, impacts, policies, and strategic planning for the economy, society, and environment.

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