

Pioneer Valley Planning Commission

Pioneer Valley Economic Recovery Scenario Planning and Strategic Roadmap



Final Report

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Executive Summary

Background and Purpose

As part of the Pioneer Valley Planning Commission's economic recovery planning project, funded by the US EDA CARES Act, Cambridge Econometrics (CE) have been responsible for the development and execution of a regional economic scenario planning exercise focused on helping to identify strategic initiatives for the region's economy. A critical under-pinning to this effort was the realization that economic inequities in the Pioneer Valley that pre-dated the Covid-19 pandemic, were further exacerbated with the region's black, indigenous and people of color (BIPOC) communities.

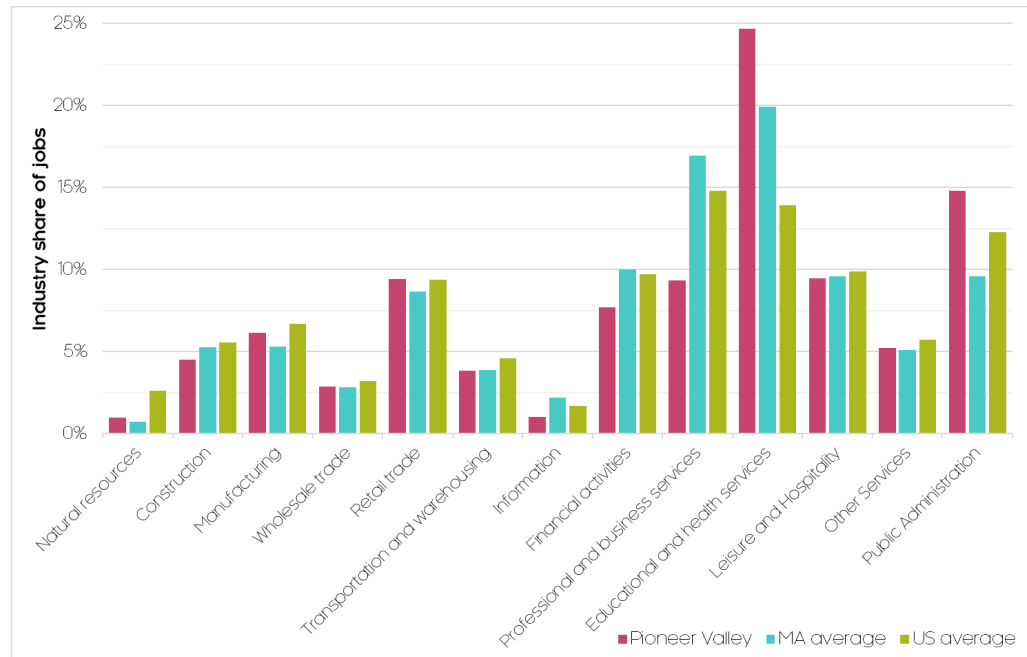
With widening gaps in terms of unemployment and poverty rates, homeownership, income levels and other critical metrics, the overarching focus of this project from the start has been to work towards creating a more equitable and inclusive economy.

The objectives of the scenario planning exercise have been to: a) help anticipate potential future trends and opportunities in the region; b) examine what 'economic success' looks like for the Pioneer Valley; and c) test and better understand how various strategic initiatives (policies, investments, programs) can help contribute towards economic success for the Pioneer Valley via: 1) a more equitable and inclusive economy; and 2) a more resilient and diversified economy.

Background Profile of the Pioneer Valley Economy

Pre-pandemic (2019), the Pioneer Valley region had a resident population of 627,300, generated \$32.1 billion of Gross Domestic Product (GDP), and accounted for an estimated 372,000 jobs and 23,600 employer establishments. The economic performance of the Pioneer Valley region (defined as Hampden and Hampshire counties) in the years preceding the Covid-19 pandemic had generally been slower than its historical performance, and trailed behind benchmarks such as the Massachusetts (MA) average, and the nationwide (US) average.

A useful way of assessing the Pioneer Valley's industry mix is to compare its industry share (in terms of jobs) to the MA and US averages. Educational and health services jobs share is remarkably large, almost double the US average (14%) and above the MA average (20%, although it is also the largest industry statewide). This reflects the region's long-standing economic foundations of hospitals and health care along with numerous higher education colleges and universities. Other industry strengths in the Pioneer Valley (where there is a relatively high share of total jobs) include retail trade and manufacturing.

Figure ES-1: Industry share of total jobs relative to benchmarks (2019)

Source: GDP and Personal Income, BEA

Economic inequities in the Pioneer Valley are stubbornly persistent. BIPOC residents in the Pioneer Valley, despite accounting for only 26% of the population in the region, represented more than half (53%) of all continued unemployment insurance (UI) claims at the start of 2020. Likewise, only 1 in 21 BIPOC residents are business owners, in contrast to 1 in 10 White residents. An additional obstacle to income and wealth generation in BIPOC communities are the lower relative rates of home ownership; in 2017, only 31% of BIPOC households were homeowners, in contrast to 71% of White households, and 47% of BIPOC households across the US.

The Covid-19 pandemic caused a significant shock to the Pioneer Valley economy throughout 2020 and into 2021 and 2022. During the first few months of the pandemic, local employers shed some 46,500 jobs, more than four times that incurred at the height of the Great Recession. Equating to a reduction of -17%, this was larger than the US average (-13%), but in line with the MA average. After this sharp contraction and the early uncertainties of the pandemic, the labor market recovered strongly, and by the end of 2021 job totals had all but returned to pre-pandemic levels, with the Pioneer Valley recovering in line with the MA average.

The impact of the Covid-19 pandemic on industries in the Pioneer Valley has been highly uneven. Initial job losses were concentrated in those most vulnerable to 'stay-at-home' and social distancing restrictions including:

- Leisure and hospitality, which experienced the sharpest reduction in jobs (-58%) with an initial 14,600 job losses, although by the end of 2021 the industry had returned to pre-pandemic levels of employment.
- The education and health services industry, the largest employer in the Pioneer Valley, experienced 10,200 initial job losses (-13%).

Regional Economic Scenario Analysis

Supported by extensive data research and stakeholder input, led by the Pioneer Valley Economic Recovery Task Force, the economic impact scenario analysis focused on six strategic initiatives aimed at creating a more equitable and resilient Pioneer Valley economy:

1. Improving Workforce Participation and Sustainable Employment Opportunities;
2. Supporting BIPOC Business Ownership and Expansion Opportunities;
3. Expand Regional Housing Options and Increase BIPOC Homeownership Rates;
4. Reversing Stagnant Population Trends;
5. Expanding the Clean Energy Industry Cluster; and
6. Leveraging New Opportunities in Cybersecurity and Related Tech Sectors

Two example analyses are included here with full details in the main report:

Increasing the number and growth of BIPOC-owned businesses is a central goal to build a more equitable and inclusive Pioneer Valley economy. Based on the most current data, minority-owned businesses (14%) lag far behind their share of the population (26%). Nationally, this relationship is much closer with about 34% of the population in minority population categories and just 30% of businesses.

To analysis the economic potential of this strategic initiative, we examined:

- An *aspirational scenario* where the BIPOC business ownership share halves the gap relative to the BIPOC population share. This would result in 2,200 additional BIPOC business owners by 2040 (a 28% increase on baseline)
- A *transformational scenario* where the BIPOC business ownership share equals the BIPOC population share. This would result in 4,900 additional BIPOC business owners by 2040 (a 70% increase)

Table ES-1: BIPOC business ownership scenario results

Economic impact scenario results relative to baseline					
		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: ownership share halves the gap relative to BIPOC population share	Jobs	1,000	2,500	4,300	6,000
	Output (\$m)	\$140	\$370	\$700	\$1,080
	Household income (\$m)	\$80	\$210	\$390	\$610
Transformational scenario: ownership share equals BIPOC population share	Jobs	2,300	5,800	9,600	13,500
	Output (\$m)	\$330	\$850	\$1,540	\$2,400
	Household income (\$m)	\$190	\$480	\$870	\$1,350

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *transformational scenario* could support:

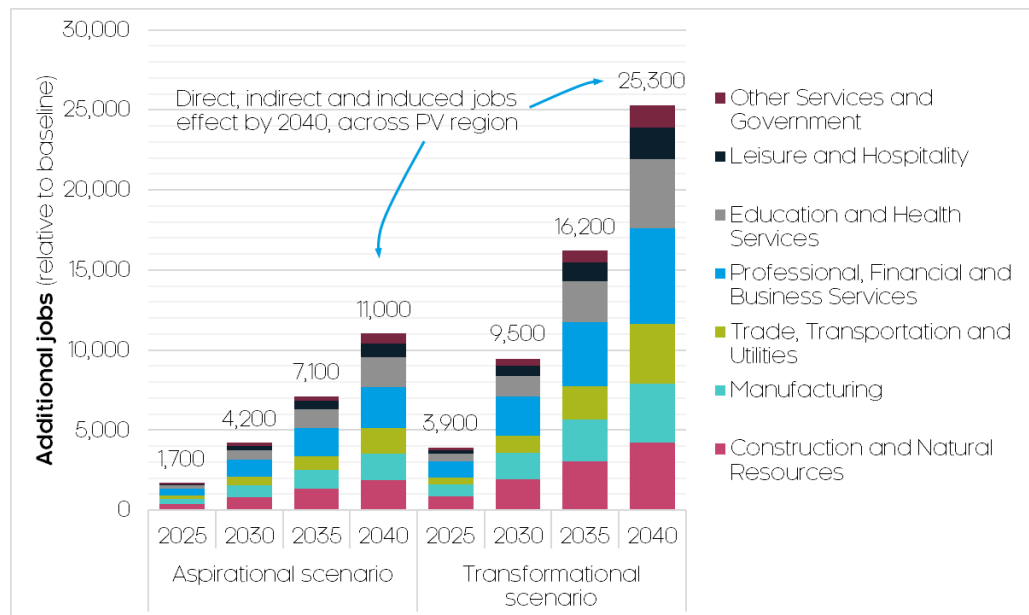
- The creation of an additional 13,500 direct, indirect, and induced jobs, 3% above the baseline; \$2.4 billion of additional output for regional firms; and a \$1.4 billion boost to household incomes

The Pioneer Valley was an early leader in developing its **clean energy economy**. While the clean energy sector has grown more rapidly in recent years in other parts of the Commonwealth, the Pioneer Valley’s share of clean energy jobs remains well above the state-wide average, and opportunities continue to exist for the cluster to drive regional economic growth as state and federal policy accelerate the clean energy transition.

We assessed two ambitious clean energy sector growth scenarios relative to the baseline expectation of 14,000 total clean energy jobs by 2040:

- An *aspirational scenario* where the clean energy sector in the region grows at a faster rate than recent performance. This would result in 5,000 additional clean energy jobs by 2040 (a 4% increase).
- A *transformational scenario* where the clean energy sector in the region grows at a similar rate to the recent 10-year MA average. This would result in 11,500 additional clean energy jobs by 2040.

Figure ES-2: Clean energy scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *transformational scenario* could support:

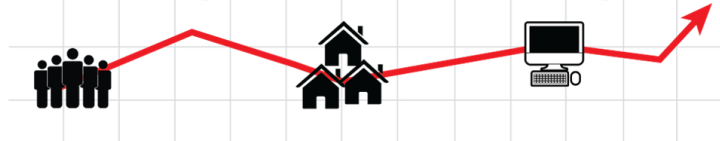
- The creation of an additional 25,300 direct, indirect, and induced jobs, 6% above the baseline; \$5.8 billion of additional output for regional firms; and a \$3.3 billion boost to household incomes

Strategic Regional Economic Recovery Initiatives and Next Steps

Building from the results of the economic scenario analysis, the strategic priorities are organized around: 1) creating a more equitable and inclusive economy; and 2) supporting a more resilient and diversified economy. These six strategic areas were explored in significant detail with stakeholders and the

task force to develop the ideas on actions, next steps, and resources needed for implementation.

Pioneer Valley Economic Recovery Strategy



Actively Create a More Equitable and Inclusive Economy	Support a More Resilient and Diversified Economy
Improve workforce participation and remove obstacles to sustainable employment	Reverse stagnant population trends with regional housing, east-west rail, and vibrant downtowns and town centers
Expand regional housing options and BIPOC homeownership rates	Cybersecurity and other tech/big data industry opportunities
Grow the number of BIPOC-owned businesses and support their growth	Expand the region's clean energy industry
Address the 'digital divide' and expand affordable broadband access	Understand Covid-19 impacts on hybrid work and transition real estate for new uses
Implement the Anchor Institution Initiative to expand BIPOC and local hiring and supplier opportunities	Support other key industry sectors – manufacturing, health care, education, farms and food, outdoor recreation

In the immediate future, PVPC plans to continue the Pioneer Valley Economic Recovery Task Force to support collaboration, implementation, and monitoring of progress towards the stated economic priorities. There are a number of federal and state funding resources currently available, many of which were amplified by the American Rescue Plan Act (ARPA) of 2021 or the 2022 Bipartisan Infrastructure Law (BIL). In short, it means that there are more funding opportunities than typically available across areas like housing, workforce, and small business support.

The Pioneer Valley region is an economic area with strong anchor institutions and higher education, a high-quality workforce, enviable outdoor recreation assets, innovative and competitive business sectors, and a diverse mix of urban, downtown, rural and town center areas. But it also faces challenges regarding economic segregation, pockets of poverty and disconnected workers. Focusing on specific mechanisms to improve economic equity, while also positioning the region for broader economic success and attracting workers and residents, should lead to a more prosperous, equitable and inclusive Pioneer Valley economy.

1 Introduction

1.1 Background and Purpose

As part of the Pioneer Valley Planning Commission's economic recovery planning project, funded by the US EDA CARES Act, Cambridge Econometrics (CE) have been responsible for the development and execution of a regional economic scenario planning exercise focused on helping to identify strategic initiatives for the region's economy. A critical under-pinning to this effort was the realization that economic inequities in the Pioneer Valley that pre-dated the Covid-19 pandemic, were further exacerbated with the region's black, indigenous and people of color (BIPOC) communities.

With widening gaps in terms of unemployment and poverty rates, homeownership, income levels and other critical metrics, the overarching focus of this project from the start has been to work towards creating a more equitable and inclusive economy. And the scenarios and strategic initiatives detailed here are largely geared towards that aim – what specific areas of work can boost sustainable job and small business opportunities, increase homeownership rates and build wealth for the region's BIPOC and long-underserved populations?

Supporting PVPC's economic recovery planning, the objectives of the scenario planning exercise have been to: a) help anticipate potential future trends and opportunities in the region; b) examine what 'economic success' looks like for the Pioneer Valley; and c) test and better understand how various strategic initiatives (policies, investments, programs) can help the region achieve 'success.' The ultimate purpose of this work has been to identify and articulate strategic initiatives for the Pioneer Valley to create: 1) a more equitable and inclusive economy; and 2) a more resilient and diversified economy.

It is worth noting that this economic recovery planning project was one part of PVPC's broader CARES Act grant-funded work, which also included:

- Economic data performance dashboards and tracking which helped illuminate the economic costs and implications of the Covid-19 pandemic, with emphasis on how it has worsened the region's pre-existing equity concerns.
- A new and substantive outreach effort to BIPOC communities, leaders, and 'connectors' to help better understand the issues and opportunities from groups that are often not as well-represented in economic planning initiatives. The work of that team, including the Healing Racism Institute of the Pioneer Valley, directly influenced the strategic priorities and recommended actions in this report.
- A separate but related rural economic development study focused on better understanding the issues and opportunities in the region's many rural communities, which are often over-looked at the regional level.

Together, PVPC is compiling a comprehensive economic recovery planning roadmap summary report which consolidates the findings of these efforts and helps to articulate pathways forward with its many partners.

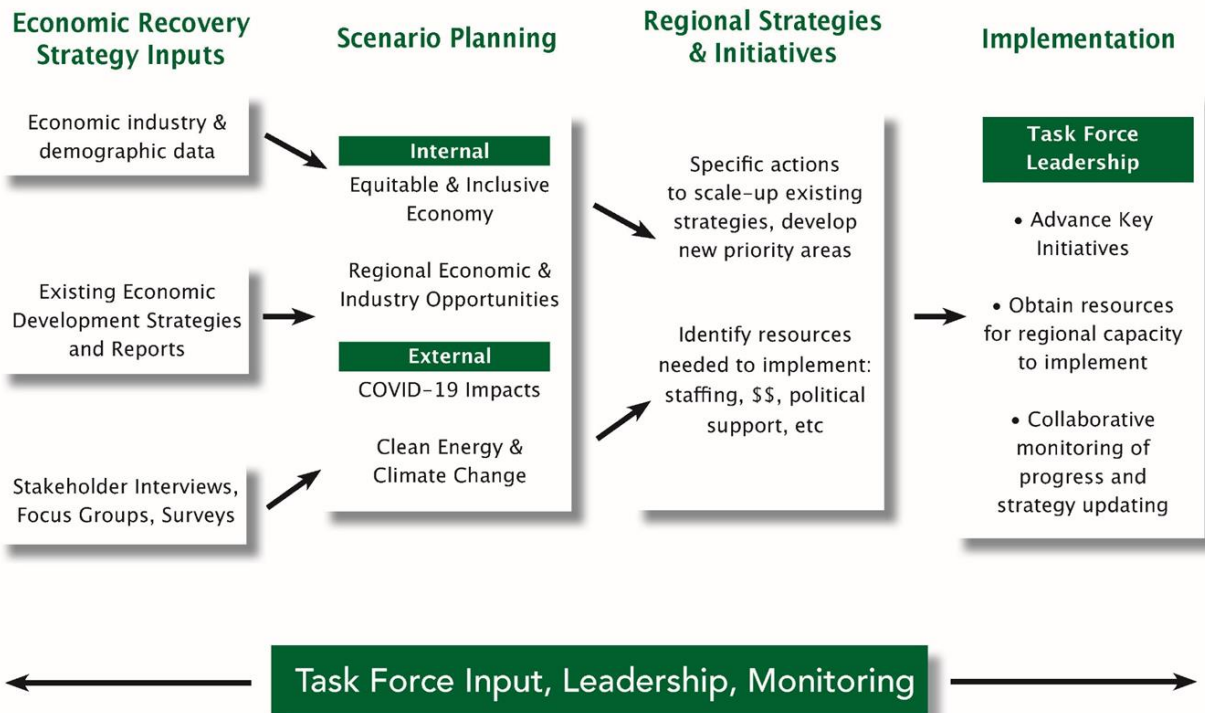
1.2 Overview of Approach

Based on extensive research and discussions with local experts in regional economic planning, we developed an overall framework for the scenario analysis and strategic recovery planning. There are multiple options for approaching economic scenario planning, from more qualitative and descriptive approaches all the way to highly sophisticated integrated regional modeling of land use, transportation, housing and the economy.

Reflecting an extensive stakeholder feedback process and guidance from PVPC, our approach sought to focus on applying a regional economic forecasting and simulation model customized to the region to evaluate various future scenarios on the Pioneer Valley economy of Hampden and Hampshire counties in Massachusetts. This broadly took place in four categories (or steps), as summarized in the graphic below:

- 1. Economic Recovery Strategy Inputs:** a critical step to this project was the wide-range of inputs collected and reviewed, from past/recent economic development-related strategies and plans to key economic and industry data along with input provided by a large number of stakeholders across economic development, workforce, small business support, universities and community colleges, etc.
- 2. Scenario Planning:** the scenario planning was originally envisioned as encompassing both internal and external (to the region) perspectives to reflect both regional strengths and opportunities, while being attuned to broader trends related climate change, Covid-19, and other factors. The final set of scenarios identified for detailed analysis reflect both of these perspectives but were grouped into regional priorities organized by the dual goals of a more equitable/inclusive economy and a more resilient and diversified economy.
- 3. Regional Strategies and Initiatives:** based on the identification of scenarios of significance for the region's economy, a broad set of stakeholders participated in task force meetings and strategy workshops to develop actions, policies, investments and resources to move from hypothetical scenarios to tangible strategies the region can work towards.
- 4. Implementation:** this part of the process was focused on helping the region build support around identifying a select number of strategic initiatives, with a clearer understanding of their potential to create positive change, leading the way to further discussion of implementation and the resources/capacity needed to sustain each strategy. Next steps will include continuation of the Pioneer Valley Economic Recovery Task Force, facilitated by PVPC.

Pioneer Valley Economic Recovery Strategy



Funded by an EDA CARES Grant

Moving forward, it is intended that the results and priorities identified through this economic scenario planning will help to set the foundations for:

- More detailed strategic planning initiatives and action steps;
- Identification of possible obstacles or challenges for implementation; and
- Honest assessment of the resources, organizational capacity and funding needed to start and sustain new or enhanced regional strategies.

1.3 This Report

The remainder of this report is organized around our approach to the regional economic scenario planning:

1. We start by providing an [overview of our approach to the economic scenario planning](#), including:
 - a background [assessment of the Pioneer Valley economy](#)
 - a scoping of the [scenario modeling options](#)
 - outlining our final approach to [defining and modeling the scenarios](#)
2. This is followed by [presentation and analysis of the economic scenario modeling](#), including modeling definitions, assumptions, and results

3. We then [propose and consider the regional economic strategic initiatives](#) required to implement some of the ambitions outlined in the scenarios
4. Before reflecting on the [transition to implementation](#), and the funding and resources required for the capacity to implement

2 Economic Scenario Planning: Background, Methodology and Approach

2.1 Introduction

This section of the report provides the core analytical foundation of this project with details on the Pioneer Valley economy (recent trends and existing conditions) that inform the scenario analysis, along with the chosen approach and economic models applied to identified scenarios and strategic priorities for the regional economy. Scenario planning can mean different things to different people and here, we attempt to articulate some of the approaches considered and why PVPC and the broader team chose the regional economy approach to evaluate future scenarios and understand the scale of economic opportunity if success is realized in strategic areas.

2.2 Background Profile of the Pioneer Valley Economy

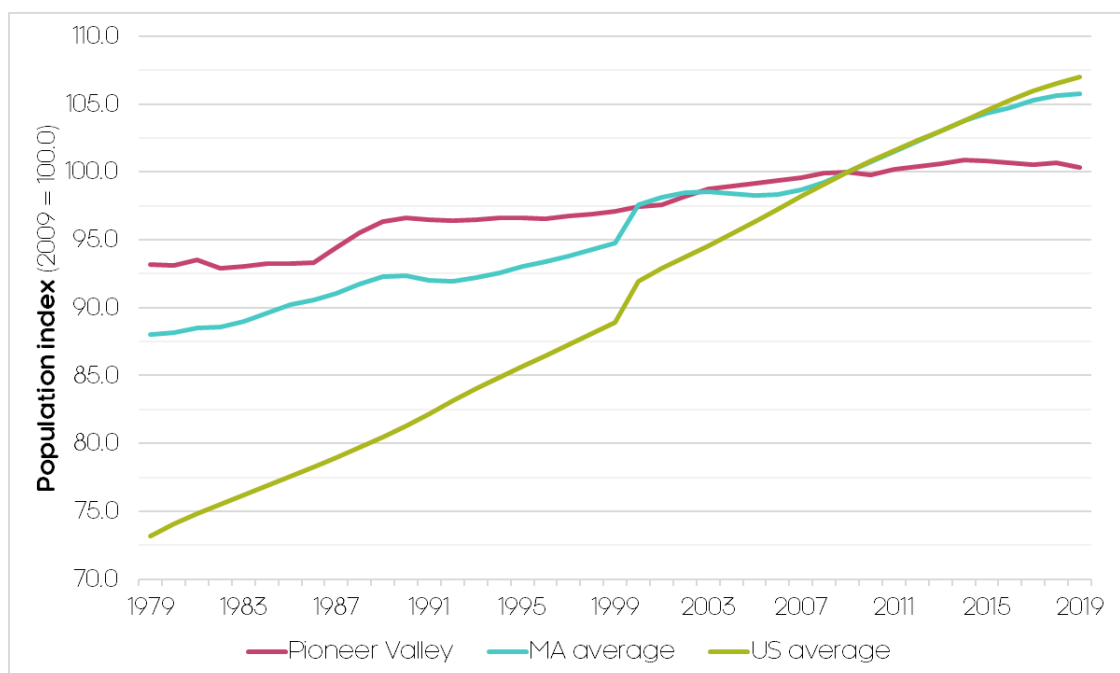
Pre-pandemic trends and performance

Pre-pandemic (2019), the Pioneer Valley region had a resident population of 627,300, generated \$32.1 billion of Gross Domestic Product (GDP), and accounted for an estimated 372,000 jobs and 23,600 employer establishments.

The economic performance of the Pioneer Valley region (defined as Hampden and Hampshire counties) in the years preceding the Covid-19 pandemic had generally been slower than its historical performance, and trailed behind benchmarks such as the Massachusetts (MA) average, and the nationwide (US) average.

As Figure 2-1 shows, in the decade leading up to the pandemic the Pioneer Valley’s resident population had grown by only 0.4%, lagging benchmarks (MA

Figure 2-1: Population index (all ages) relative to benchmarks, 1979-2019 (2009 = 100.0)



Source: Population Estimates Program, USCB

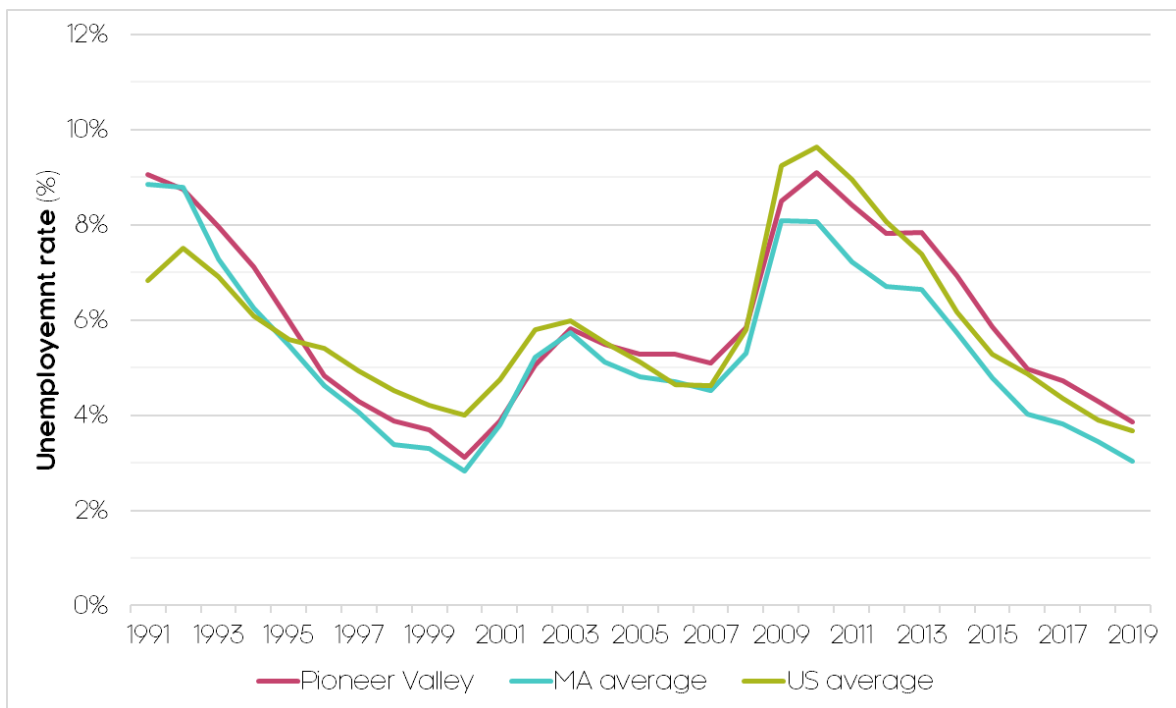
average 5.8%, US average 7.0%) and longer-term trends (the preceding 30-year average was 0.4% per year).

Accompanying this slower growth has been the aging profile of the Pioneer Valley population; the number of residents of retirement age (65+) increased by 25.6% over the decade, and accounted for almost one fifth (18%) of the population in 2019.

Against this backdrop, the Pioneer Valley labor market has still performed relatively strongly; some 44,900 additional jobs were created between 2009 and 2019. This saw the region recover the job losses from the Great Recession one year earlier than the US average, with job creation averaging 1.1% per year (the preceding 20-year average was 0.4% per year).

This stronger rate of job creation helped reduce unemployment and increase economic participation. As Figure 2-2 shows, after peaking in 2010, unemployment in the region more than halved, reaching its lowest rate (3.8%) in almost 20 years by 2019. Labor force participation also increased, and in 2019 there were 19,100 more residents in employment than in 2009.

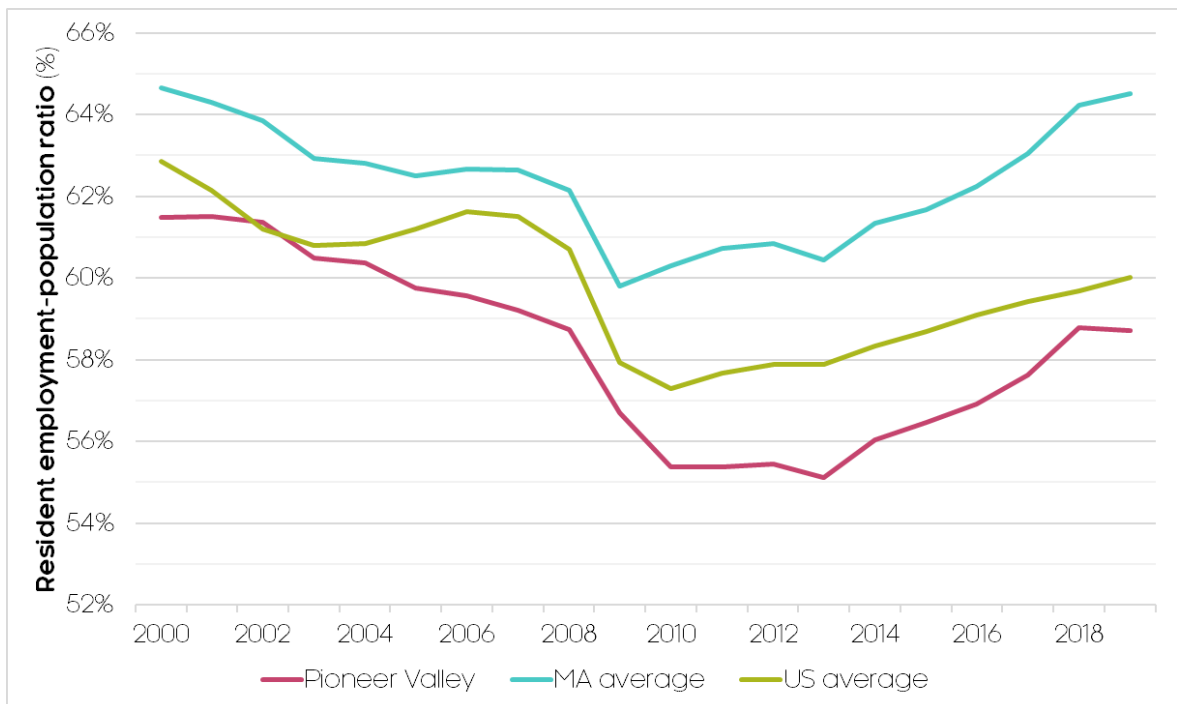
Figure 2-2: Unemployment rate relative to benchmarks (1991-2019)



Source: Current Population Survey, BLS

As Figure 2-3 shows, this almost saw the region close the longstanding gap in its resident employment-population ratio relative to the US average; in 2018, with 59% of Pioneer Valley adults in employment, the gap was at its smallest since 2004 (though still well below the MA average over 64%).

Generally though, across key labor market indicators, the Pioneer Valley underperforms relative to benchmarks. And these aggregate measures disguise labor market inequalities and gaps, especially for different socio-economic groups (which we explore further below).

Figure 2-3: Resident employment-population ratio relative to benchmarks (2000-2019)

Source: Current Population Survey, BLS

Despite improvements to the labor market, the growth of the Pioneer Valley economy has been subdued; in real terms (adjusted for inflation), GDP growth averaged 1.2% per year over 2009-2019, well behind relative benchmarks (MA average 2.4% per year, US average 2.2%).

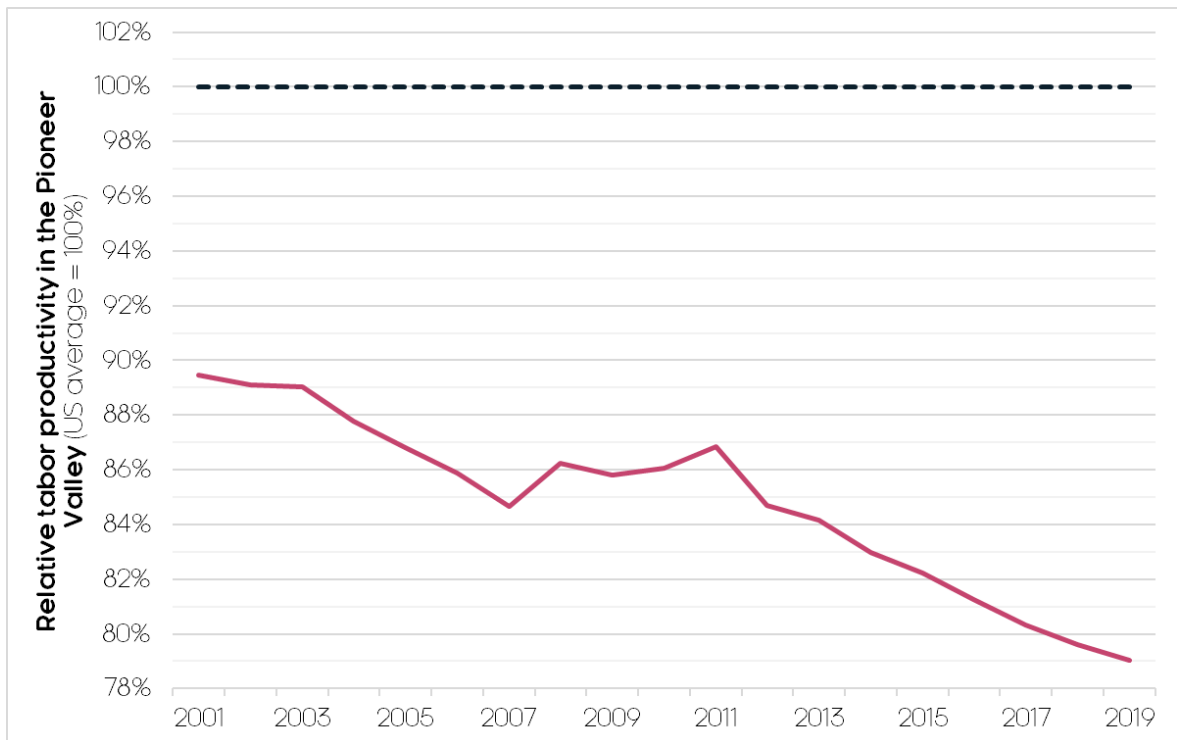
This slowdown is largely attributable to subdued labor productivity improvements in the Pioneer Valley region; between 2009-2019, labor productivity growth averaged -0.1%, lagging benchmarks (MA and US both 0.7%) and its historic trend (0.8% per year).

This has exacerbated a longstanding shortfall in the Pioneer Valley, as Figure 2-4 shows, with labor productivity 21% below the US average in the region, double the 10% shortfall in 2001, which is severely harming the competitiveness and growth potential of the region's economy.

Some of this shortfall could be attributable to shifting industry mix (i.e., towards lower productivity, service-based industries), as the Pioneer Valley has not experienced growth in high-tech/high-wage sectors like the rest of the state (e.g., bio-tech, software, professional/technical services).

However, it is likely that much of this trend is attributable to local economic factors (e.g., investment intensity, skill levels, infrastructure coverage, business attitudes etc.)

Figure 2-4: Labor productivity in the Pioneer Valley relative to the US average (US average = 100%, 2001-2019)



Source: GDP and Personal Income, US BEA

This trend has contributed to lower and slower growing wages in the region; in 2019, the average annual wage paid by employers was \$50,600, some \$11,700 (17%) below the US average and \$31,800 (37%) below the MA average. When adjusted for the cost of living, employer wages in the Pioneer Valley have seen no significant increase since 2009.

Industry trends and specialisms

Figure 2-5 provides a high-level overview of the Pioneer Valley's pre-Covid industrial structure, showing how the \$32.1 billion of GDP and 372,000 jobs in the region were allocated across key industries.

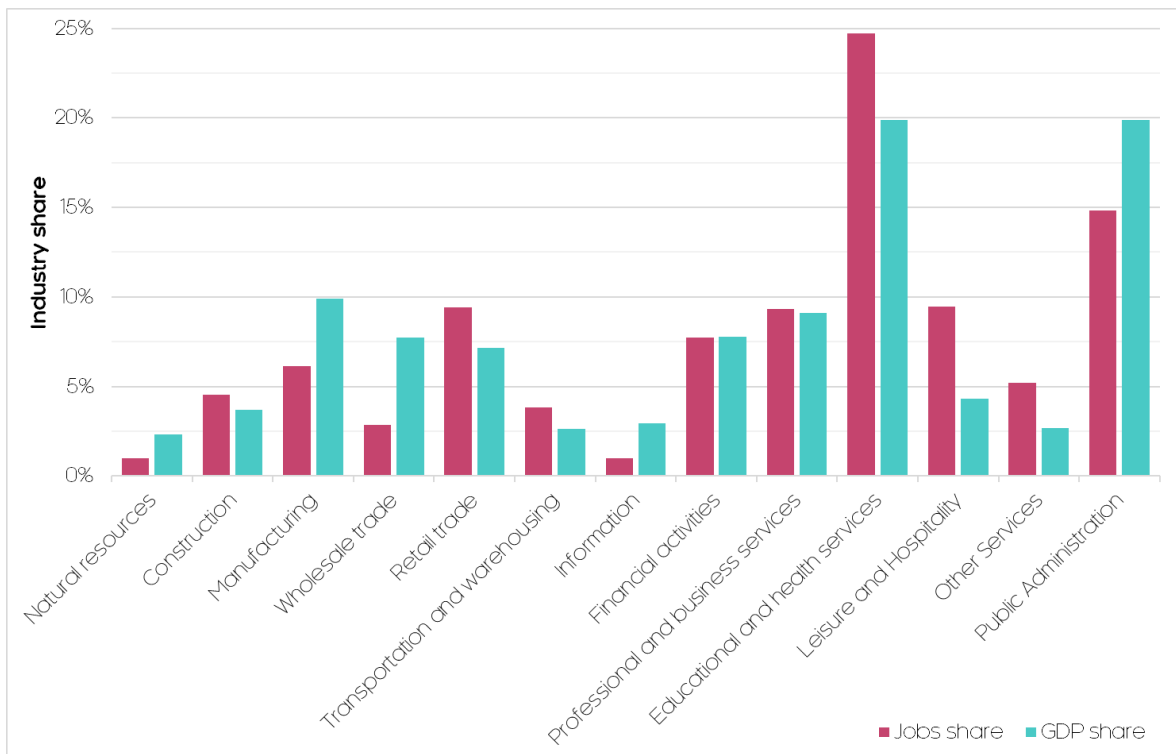
Educational and health services is clearly the largest industry sector for the Pioneer Valley in terms of jobs, providing one fourth (25%) of all jobs in the region, including part-time and temporary positions.

This is followed by public administration (including federal, state and local government), which accounts for 15% of all jobs. Retail trade, professional and business services, and leisure and hospitality are the next largest, all accounting for approximately 1 in 10 jobs.

In terms of GDP, the industry mix is more evenly distributed. Educational and health services and public administration each generate one fifth of GDP in the Pioneer Valley region. Manufacturing is the third largest industry in terms of GDP, with a 10% share, almost double its 6% jobs share.

This discrepancy (compared to jobs) is indicative of the relatively higher GDP generated per worker (labor productivity) in manufacturing, as average GDP per worker is \$105,300 for manufacturing compared to \$74,600 across all industries.

Figure 2-5: Industry share of total jobs and GDP in the Pioneer Valley (2019)



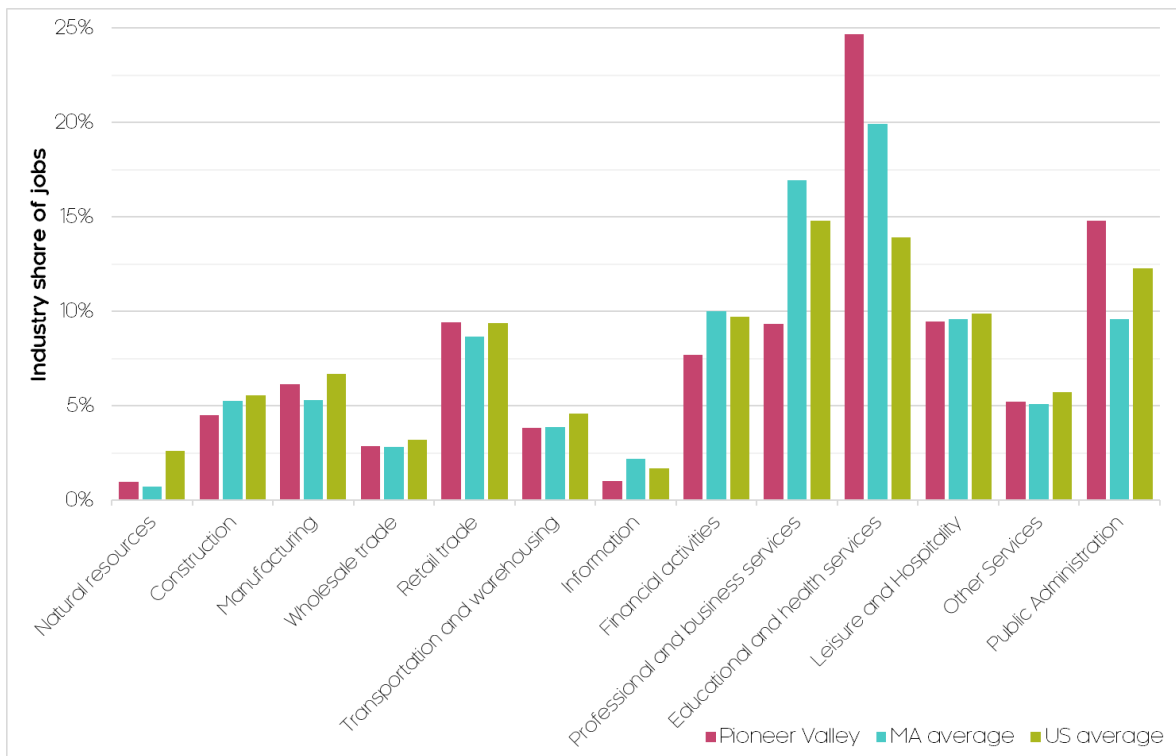
Source: GDP and Personal Income, US BEA

Therefore, higher labor productivity industries such as manufacturing, wholesale trade, and information display a higher GDP share than job share, whilst the opposite is true for lower labor productivity industries, such as retail trade, transportation and warehousing, and leisure and hospitality.

Another useful way of assessing the Pioneer Valley’s industry mix is to compare its industry share (in terms of jobs) to the MA and US averages (see Figure 2-6). Consistent with the previous graph, educational and health services jobs share is remarkably large, almost double the US average (14%) and above the MA average (20%, although it is also the largest industry statewide). This reflects the region’s long-standing economic foundations of hospitals and health care along with numerous higher education colleges and universities in both Hampden and Hampshire counties.

Public administration is the second largest industry in the Pioneer Valley, with a notably higher job share than the MA average (10%) but closer to the US average (12%). Other industry strengths in the Pioneer Valley (where there is a relatively high share of total jobs) include retail trade and manufacturing.

Figure 2-6: Industry share of total jobs relative to benchmarks (2019)



Source: GDP and Personal Income, BEA

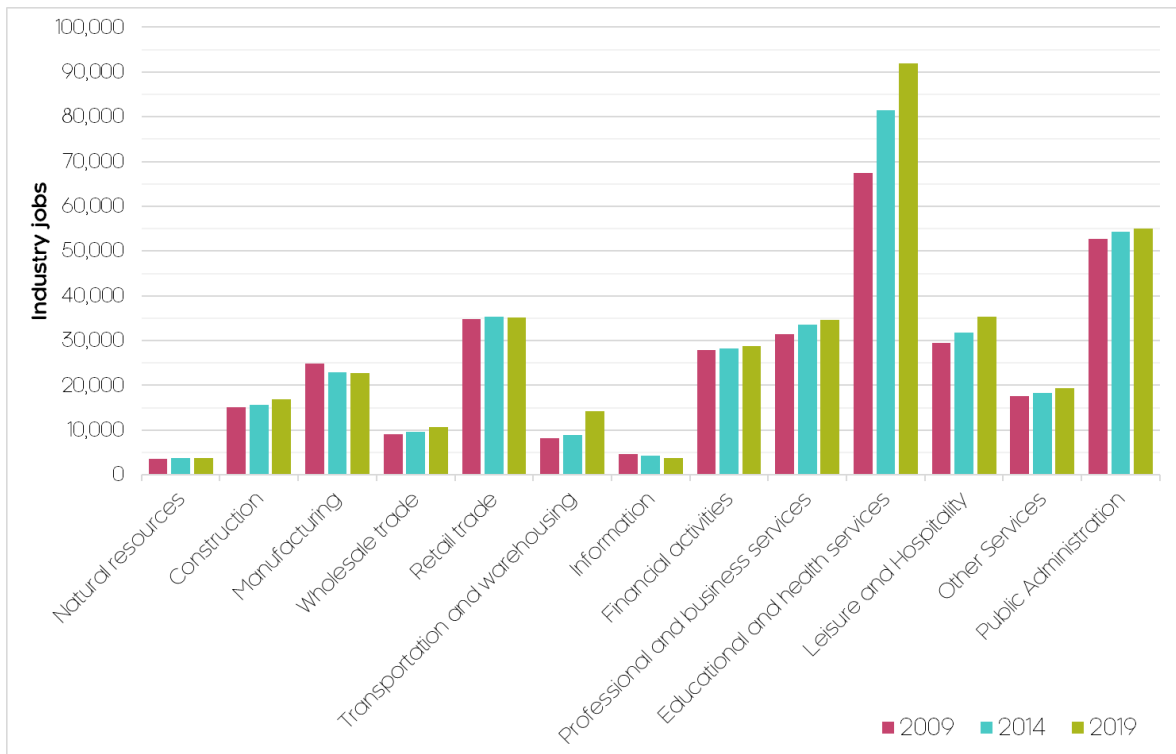
Industries underrepresented in the Pioneer Valley are largely related to business services, including information (only 1% of jobs, which is half the MA average), financial activities (8% of jobs, below the US and MA average of 10%), and professional services (9% of jobs, about half the MA average).

As earlier analysis showed, jobs growth in the Pioneer Valley was strong in the decade preceding the Covid-19 pandemic, with the creation of 44,900 additional jobs in the region. Of course, these changes over time were felt differently across industry sectors.

Figure 2-7 depicts the number of jobs by major industry in 2009 (the depth of the Great Recession), 2015 and 2019. Only a handful of industries experienced a fall in employment over this time; manufacturing, which shed 2,100 jobs (largely between 2009-2014) and information, which experienced 1,000 job losses.

The largest growth in the region, by some distance, was in the educational and health services sector (the Pioneer Valley’s largest employer), which created a substantial 24,300 additional jobs between 2009-2019 – more than half of all additional jobs in the region over this time.

Figure 2-7: Industry jobs overtime in the Pioneer Valley (2009-2019)



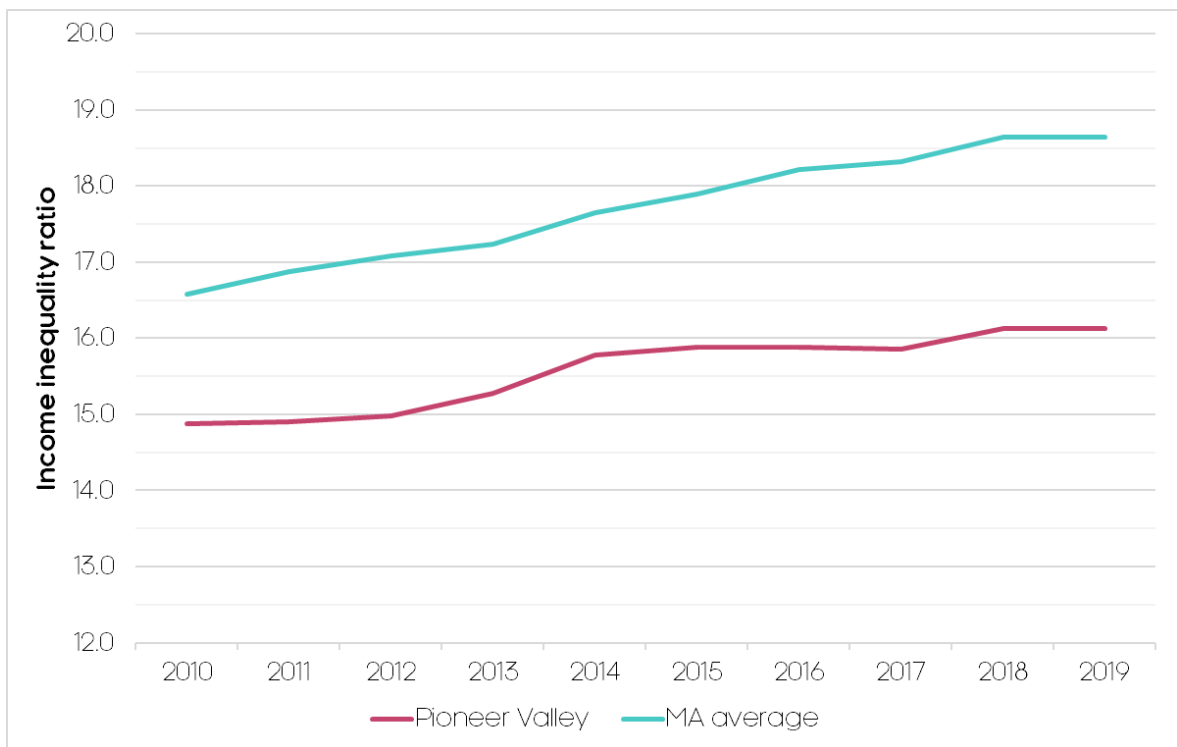
Source: GDP and Personal Income, BEA

Other industries that experienced strong growth in the region include transportation and warehousing (+6,000 additional jobs), leisure and hospitality (+5,700), and professional and business services (+3,300). Steadier growth was observed in other industries, with construction, wholesale, other services and public administration seeing gains of between 1,500-2,500 jobs over this period.

Equitable and inclusive economy

Our analysis so far has only considered the higher-level performance of the Pioneer Valley economy, which does not always capture some of the significant and stubborn inequalities and inclusivity gaps in the region.

We have already shown how incomes are lower and slower growing in the Pioneer Valley, but as Figure 2-8 shows, they have also become more unevenly distributed, with the incomes of the highest earners 16 times that of its lowest earners in 2019, up from 15 times a decade ago.

Figure 2-8: Income inequality ratio relative to benchmarks (2010-2019)

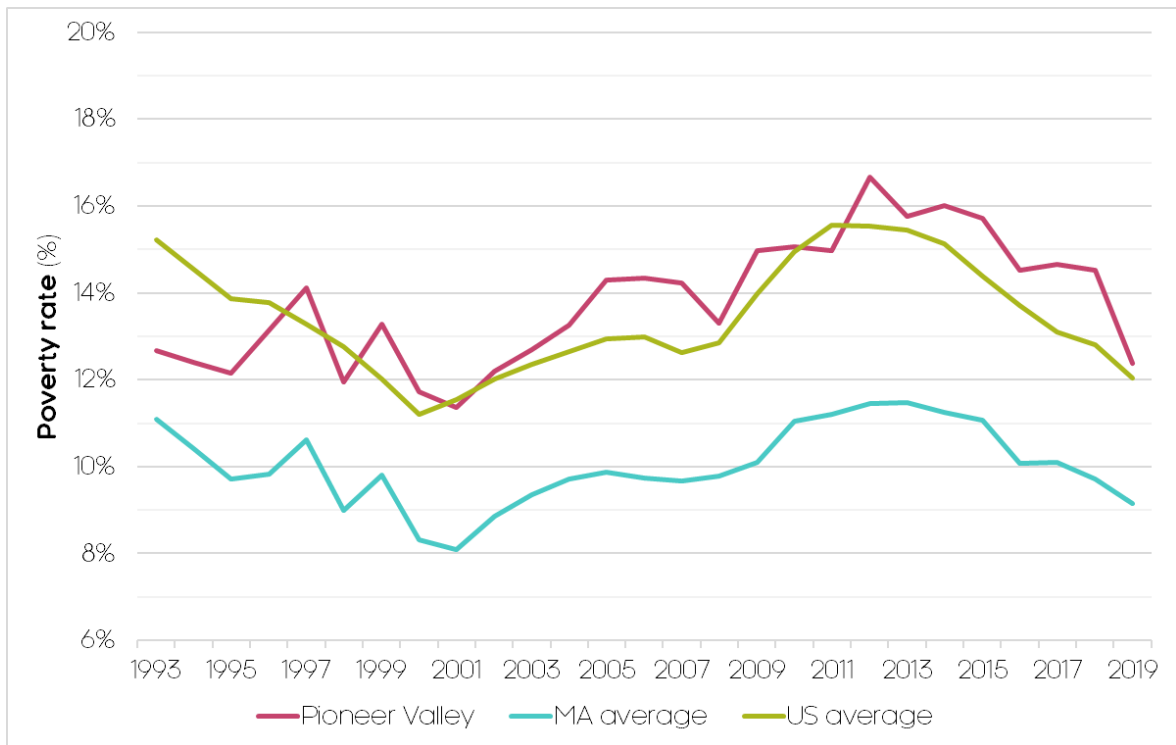
Source: Small Area Income & Poverty Estimates, USCB. Note: data represents the ratio of the mean income for the highest quintile of earners divided by the mean income of the lowest quintile of earners

And despite per capita incomes 28% below the MA average, income inequality in the Pioneer Valley is only 13% below the statewide average (with MA itself often [ranked one of the most unequal states](#)), and over the past decade, income inequality has been increasing at a faster rate than the statewide average.

As Figure 2-9 shows, poverty rates are also above average in the Pioneer Valley, with 12% of residents (of all ages) classified as being in poverty in 2019. In recent years progress has been made in driving this rate down, with 27,100 residents moving out of poverty since its peak in 2012.

Despite this, significant variations and stubborn gaps still exist; for instance, 31% of BIPOC residents were classified as being in poverty in 2019, in contrast to only 9% of White residents. Likewise, child poverty rates were above the rate for adults, at 18%, with 21,900 children living in poverty.

Figure 2-9: Poverty rate (all ages) relative to benchmarks (1993-2019)



Source: Small Area Income & Poverty Estimates, USCB

Certain groups are also often disadvantaged in their access to the labor market; BIPOC residents in the Pioneer Valley, despite accounting for only 26% of the population in the region, represented more than half (53%) of all continued UI claims at the start of 2020.

Likewise, only 1 in 21 BIPOC residents are business owners, in contrast to 1 in 10 White residents, while across the US, 1 in 11 BIPOC residents are business owners. This entrepreneurial gap can limit the economic growth and job creation potential of BIPOC communities.

An additional obstacle to income and wealth generation in BIPOC communities are the lower relative rates of home ownership; in 2017, only 31% of BIPOC households were homeowners, in contrast to 71% of White households, and 47% of BIPOC households across the US.

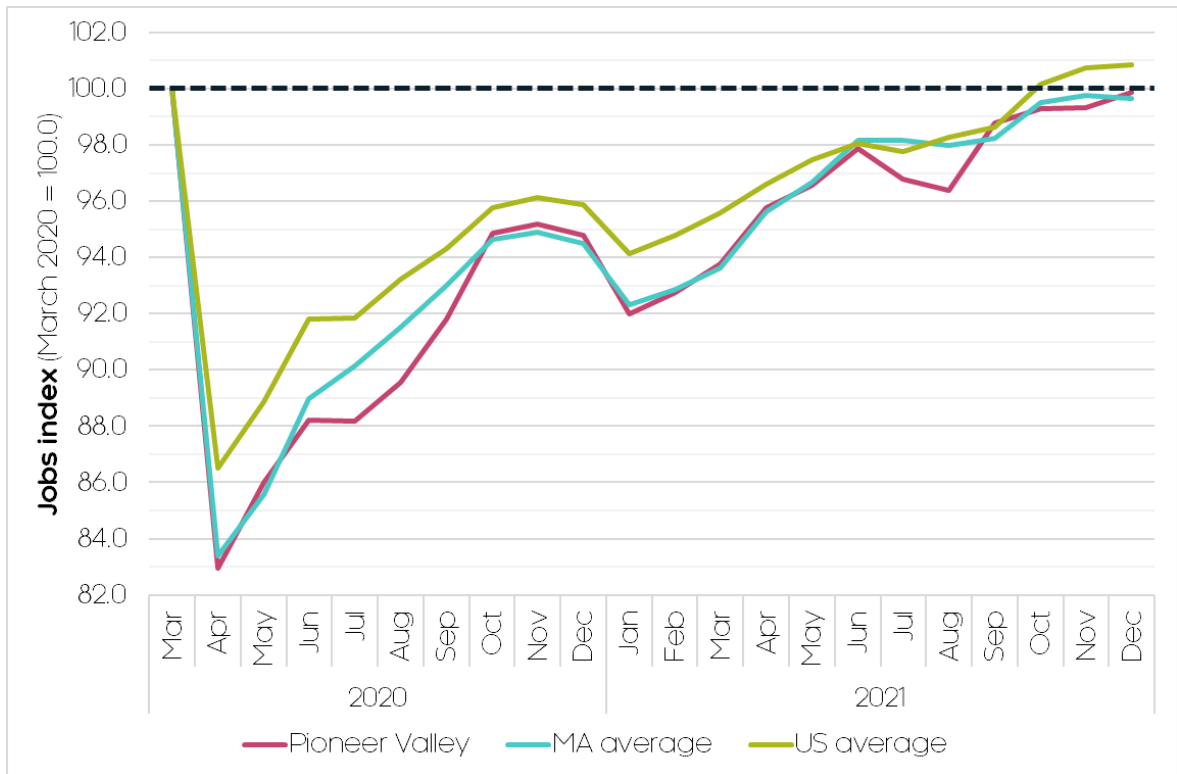
Covid-19 impacts and recovery

The Covid-19 pandemic caused a significant shock to the Pioneer Valley economy throughout 2020 and into 2021 and 2022, the latest data shows.

During the first few months of the pandemic, local employers shed some 46,500 jobs, more than four times that incurred at the height of the Great Recession. Equating to a reduction of -17%, this was larger than the US average (-13%), but in line with the MA average.

As Figure 2-10 shows however, after this sharp contraction and the early uncertainties of the pandemic, the labor market recovered strongly, and by the end of 2021 job totals had all but returned to pre-pandemic levels, with the Pioneer Valley recovering in line with the MA average.

Figure 2-10: Monthly jobs index relative to benchmarks (2020-2021)



Source: Quarterly Census of Employment and Wages, BLS. Note: data provisional and subject to change

Of course, the impact of the pandemic on industries in the Pioneer Valley has been highly uneven. Initial job losses were concentrated in those most vulnerable to 'stay-at-home' and social distancing restrictions including:¹

- Leisure and hospitality, which experienced the sharpest reduction in jobs (-58%) with an initial 14,600 job losses, although by the end of 2021 the industry had returned to pre-pandemic levels of employment.
- The education and health services industry, the largest employer in the Pioneer Valley, experienced 10,200 initial job losses (-13%), but had all but recovered to pre-pandemic levels of employment by the end of 2021.
- Trade, transportation, and utilities – including wholesale and retail - saw 8,600 initial job losses (-19%), but by the end of 2021 had exceeded pre-pandemic levels of employment.
- Other services (excluding government) also underwent a sharp contraction (-35%) with an initial 3,100 job losses, and by the end of 2021 employment was still some 6% below pre-pandemic levels.

These job losses resulted in a sharp and sudden increase in unemployment in the Pioneer Valley. As Figure 2-11 shows, the unemployment rate peaked at 17% in the early months of the pandemic, well above the 11% recorded during the Great Recession.

This rate also exceeded the US average (14%) but was in line with the MA average. The recovery of the labor market saw this rate halve by the end of

¹ Note that the following analysis covers private sector jobs only

2020, and by the start of 2022, it had all but returned to pre-pandemic levels, though retained a persistent gap relative to benchmarks.

Figure 2-11: Monthly unemployment rate relative to benchmarks (2020-2022)



Source: Current Population Survey, BLS. Note: data provisional and subject to change

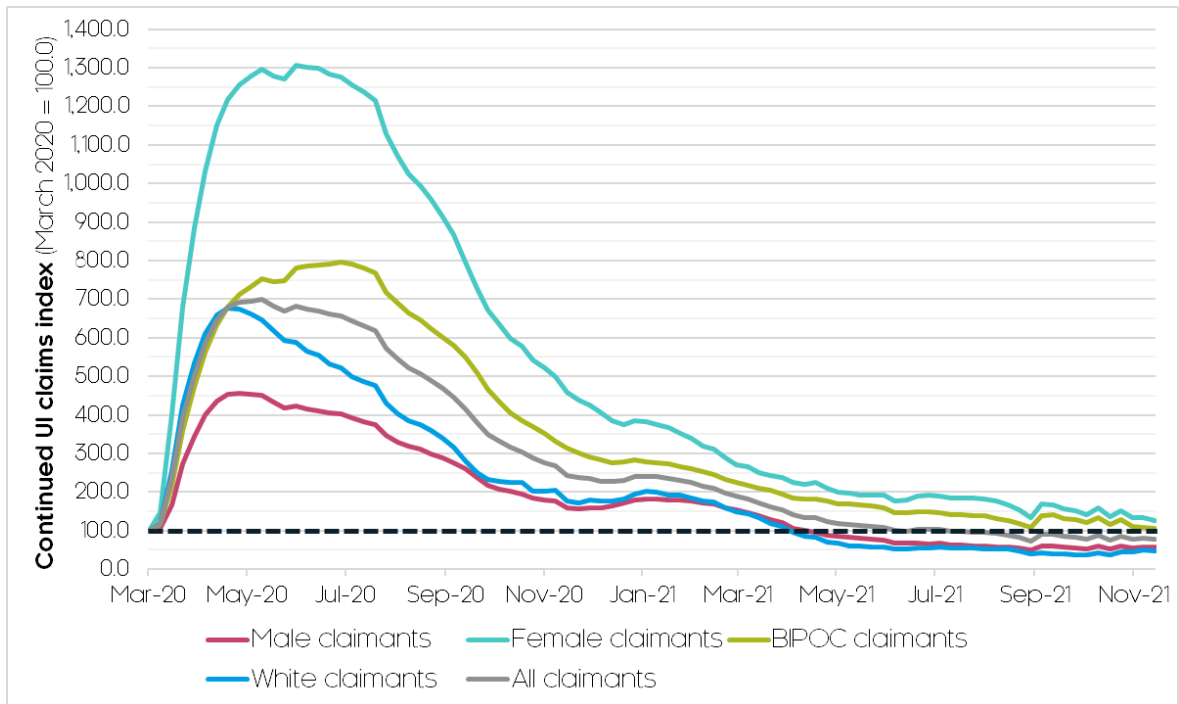
In GDP terms, the pandemic has cost the Pioneer Valley economy an initial \$1.5 billion (in real terms). This equates to a real term contraction of -5.4%, double the -2.6% experienced during the Great Recession, and larger than the US (-3.4%) and MA (-3.7%) contractions over the same period.

The pandemic has also accelerated the decline of the Pioneer Valley population, with provisional data for 2021 showing 3,100 less residents in the region relative to 2019 – a fall of -0.7% (meanwhile, the statewide average saw an increase of 1.3%).

The inequality dimension of the pandemic has also been significant. The decline in the Pioneer Valley’s poverty rate ground to a halt in 2020, while income inequality increased, as higher earners avoided the worse impacts of the pandemic.

And critically, as Figure 2-12 shows, the labor market impacts were highly uneven, with both female and BIPOC residents in the Pioneer Valley disproportionately impacted by job losses and unemployment during the pandemic.

Figure 2-12: Continued UI claimants index in the Pioneer Valley (2020-2021)



Source: MA Department of Unemployment Assistance. Note: data provisional and subject to change

At its peak during the summer of 2020, there were nearly eight times as many BIPOC claimants than before the pandemic, whilst the number of female claimants increased thirteen times over. Both groups have also seen a slower decline in claims, and by the end of 2021 were still above pre-pandemic levels.

Summary

This background data profile of the Pioneer Valley economy, especially the lingering economic challenges faced by BIPOC populations and communities, is a foundation for the economic scenario planning work in two ways.

First, it provides the baseline information and gaps in performance that are carried forward in terms of how we can envision future success and improvement at key metrics such as workforce participation, BIPOC homeownership, and slower economic productivity growth in key sectors.

Second, it reinforces stakeholder and regional leaders imperatives to focus on the top priority of working towards a more equitable and inclusive economy.

2.3 Economic Scenario Planning Options

To help ensure the most suitable economic scenario planning options and methods for this project, we identified and scrutinized three categories from low to medium to high in terms of cost, complexity, and sophistication of analytical tools and workshop engagements.

This was informed by extensive research and discussions with experts in regional economic planning, including consideration of state and nationwide 'best practice' examples. These options were presented to and scrutinized by the project team, with Option 2 identified as the most practical, cost-effective and relevant method for this project focused on economic recovery.

Option 1: Low / More Qualitative

This option would be the lowest level of effort in terms of analytics and data, relying more on qualitative / descriptive scenarios. This approach might use some existing data trends and forecasts from publicly available sources, including from PVPC. For example, the UMass Donahue Institute produced population projections for all Massachusetts municipalities and counties in 2018 (forecasts to 2040 in five-year increments).

The majority of the work for this kind of scenario planning process would be formulating possible future scenarios in descriptive terms (e.g., continuation of remote work, transition to clean energy economy), and then discussing the pros and cons (benefits and costs) of strategic priorities to help the region anticipate change and position for success. While more qualitative, this kind of discipline, including explicit consideration of the likelihood of various opportunities and risks, can be a very effective way of conceptualizing future scenarios to gain a clearer understanding of potential future pathways.

Option 2: Medium / Regional Economic Modeling of Scenarios

This medium level option would focus on applying a regional economic forecasting and simulation model customized to the Pioneer Valley region to evaluate various future scenarios. This would broadly take place in four categories (or steps):

1. Baseline forecast – establish a mostly likely ‘baseline’ forecast for the region based on existing trends, and the MA and US economy forecasts. The baseline could be adjusted based on ‘known’ (committed) investments or projects that the model would not otherwise know about (e.g., a major redevelopment project or industry expansion opportunity). The baseline would then be compared to alternative future scenarios.
2. Explore internal and external drivers and uncertainties – this is an opportunity to think through possible future scenarios and strategic regional initiatives related to remote work and commuting, policy goals to develop a more equitable economy, clean energy transitions, how we enable growth in the region (e.g., downtowns and village centers), or a major infusion of federal transportation / infrastructure investment. This step requires significant input from stakeholders to shape the bounds of what is most important for the region, and what areas require the most attention to improve local and regional conditions.
3. Define economic success for the region based on identified scenarios – where do we need to improve on our baseline forecast to achieve success? This could be factors such as median income, poverty rates, industry employment, population growth, wages, housing affordability, etc. Within and outside the model, we can create a new scenario of where we would like to be as a regional economy within 10 to 20 years, and quantitatively create the metrics that matter for each scenario.
4. Test and quantify strategies to achieve regional success – as we develop strategic priorities for the Pioneer Valley, we can assess how various initiatives could help lead to regional economic impacts and a more inclusive economy. These could be in areas such as workforce training and skills, broadband connectivity and digital literacy, R&D and innovation, small business and entrepreneurship, inclusivity and equality programs, infrastructure and target industry strategies. For

each scenario to test, we could workshop more specifics about what is needed (or would make an impact) in different areas and then quantify that within a regional economic model.

This process is intended to always be focused on helping the region build support around identifying a select number of strategic initiatives, with a clearer understanding of their potential to create positive change, leading the way to further discussion of implementation and the resources/capacity needed to sustain each strategy. Each scenario area for quantitative analysis should include at least one stakeholder workshop to vet the scenario assumptions and discuss the kinds of actions needed to realize the potential improvement.

Option 3: High / Complex integrated regional modeling

Some regions have undertaken dedicated and extensive scenario planning efforts that are usually focused on imagining the next 20-30 years of demographic and economic growth. These efforts are usually conducted in regions that are grappling with growth and sprawl, and where to locate future housing and jobs, and how that interacts with transportation and other geo-spatial planning and infrastructure considerations.

The most well-known example is Envision Utah, which was a multi-year visioning and scenario planning and stakeholder engagement project for greater Salt Lake City, and that effort led to similar efforts as part of HUD's sustainable planning initiative and paved the way for scenario planning tools like Envision Tomorrow and Urban Footprint. But, these models generally do not include economic modeling capabilities to assess jobs, income, and other regional economy metrics.

In some cases, this type of scenario planning process (which includes substantial stakeholder engagement and workshops), can also be linked to regional economic models to better understand: the broader economic implications of growth scenarios (macro-view), or how and where jobs and businesses can be allocated geographically in a region (micro-view).

2.4 Approach to Economic Scenario Planning

Working from the Option 2 regional economic modeling approach for scenario planning, we have implemented a highly iterative process, with a strong emphasis on ensuring scenario options and associated inputs are thoroughly tested and worked through with both the client and wider stakeholder teams.

In short, it required a strong and sustained collaborative effort to craft the scenarios in ways that can be analyzed and assessed as part of the wider strategy development. Generally, our approach to the economic scenario planning entailed the following:

1. First, the client and/or stakeholder teams would help to identify and scrutinize some early conceptual scenario ideas. Some of these were suggested by the consultant team, based on existing and emerging research, literature, strategies, and plans.
2. The consultant team would then conduct research to define the relevant literature and data metrics, and calculate possible data inputs to model and quantify the impacts of each scenario.

3. This modeling approach, outlining the data inputs, definitions, and sources, is then brought back to the client and/or stakeholder team to review and refine, etc. Critical to this step was the assessment of 'aspirational' and 'transformational' future goals related to increasing the labor force participation rate, BIPOC homeownership and small business success, population growth and target industry sector growth.
4. Using these signed off inputs, the consultant team would then proceed to undertake the economic scenario modeling, using CE's Local Economy Futures Model (LEFM).
5. The Model (LEFM) quantifies the economic impacts and implications of what the scenario would mean in terms of regional jobs, output, and household income, and overall regional economic impacts.

This process resulted in the identification and consideration of a wide range of scenario planning options, which were discussed and refined with the project Task Force and other key stakeholders. Explored in further detail below, these could generally be distinguished between the following thematic areas:

- **Strategic initiatives** driven by regional leaders such as developing a more equitable economy, and identifying specific private industry opportunities for future economic vitality and resiliency.
- **External trends** that will impact the regional economy such as climate change and the transition to clean energy; COVID-19 accelerated impacts to remote work, online shopping, etc.; and future economic disruptions from as-yet unknown causes.

Regional Strategic Initiatives for Scenario Analysis

Scenario planning options considered included:

1. More equitable/inclusive economy

- Increase workforce participation for disconnected workers, with appropriate supports (childcare, transportation, mental health, etc.)
- Increased home ownership of BIPOC communities and increasing housing production
- Increased small business ownership for BIPOC populations and success/sustainability of businesses
- Increased spending by regional anchor institutions/employers to local / BIPOC suppliers (building from the Western Mass EDC's Anchor Collaborative)

2. New or enhanced regional economic/industry opportunities

- Growth in tech/digital sector companies – cybersecurity, big data
- Clean energy economy
- Food system, ag products, farm-to-table, suppliers to anchor institutions
- Critical infrastructure upgrades – broadband, east-west rail, etc.
- Supporting other critical employment sectors in the region such as health care, education, manufacturing, outdoor recreation/tourism, and cannabis cultivation.

Based on our initial research and data findings, we determined data-driven targets for regional improvement (e.g., increase employment rate to the state average) which were presented to the Task Force and key stakeholders.

This resulted in the identification of three core equitable/inclusive economy scenarios, based around:

- Improving workforce participation, especially for BIPOC populations which tend to have higher unemployment and face more obstacles to employment
- Increase in home ownership rates for BIPOC populations (and associated increase in regional housing delivery)
- Increased small business ownership and expansion of BIPOC populations

And two regional industry opportunity scenarios, focused on:

- Growth of the clean energy sector
- Growth of the cybersecurity and tech sector

External Trends

Other scenario planning options that were considered and discussed by the Task Force included:

1. Covid-19 implications to working, commuting, shopping, tourism

- Increase in remote work, and decrease in demand for office space
- Increased viability to live/work outside major cities, could lead to more opportunities for lower-cost Western Mass
- Online shopping and challenges for downtowns and retail
- Increased demand for outdoor adventure / recreation

2. Clean energy transition and climate change

- Accelerate transition to clean/renewable energy, de-emphasis on fossil fuels (coal, oil, gas)
- Local economic opportunities for installation (solar panels), energy efficiency, etc.
- R&D opportunities tied to UMass and innovative local utilities
- Climate adaptation

While these are all critical trends, given the complexity of some of these scenario themes, and relatively limited supporting data and evidence, we were only able to identify a limited range of data-driven targets for the scenario analysis. These were presented to the Task Force and key stakeholders.

This resulted in the identification of two external trends-based scenario, relating to:

- A reversal and increase in population growth (assisted by the improved viability to live/work outside major cities as a result of the pandemic)
- Growth of the clean energy sector (shared with the regional industry opportunity above)

The Local Economy Futures Model (LEFM)

Using our Local Economy Futures Model (LEFM), we were able to consider and model the impacts of a wide range of scenario planning options.

The LEFM is a forecasting and economic impact tool developed specifically for the US market to help decision-makers and strategic investors estimate the potential impact of future economic trends, policies and investments on their local economies.

The model has a strong theoretical underpinning, incorporating the latest thinking on factors determining local and regional economic competitiveness, yet at the same time is grounded in ‘real world’ empirical evidence.

The LEFM can be configured for local areas (cities and counties), regions and metro areas, as well as states or multi-state areas to address a wide-range of policy topics including infrastructure and transportation, workforce and skills, climate change and clean energy, taxes and public finance, or local economic development projects.

Unlike other local economy models, the LEFM acknowledges local competitiveness is determined by more than just costs of production. In the LEFM, agglomeration, sectoral clustering, and the knowledge economy – both through the skills of the workforce and the ‘knowledge’ content within products – all have a role in determining long-term economic competitiveness and performance. Their relative importance varies between sectors and across places.

In the LEFM, these forces and other behavioral responses emerge from the data – through past experiences – rather than being heavily reliant on theoretical assumptions.

From a scenario planning perspective, key features of the model include:

- ability to focus on the medium and long-term: annual time series results for all indicators to 2050
- a baseline projection consistent with underlying macroeconomic trends against which alternative scenarios can be compared
- a high degree of sectoral and other detail (64 industries, 23 occupations), with a wide-range of economic and demographic variables across employment, wages, output, productivity, etc.
- innovative treatment of the supply-side competitiveness grounding the intellectual rigor of evolutionary economic geography in ‘real world’ experience

More detail on the LEFM can be [found in the technical appendix of this report](#). The particular version of the LEFM used for this project had a data baseline of 2020 (with projections over 2021-2050, based on our assumptions during Spring 2022).

3 Economic Scenario Planning: Results and Analysis

3.1 Introduction

Following the economic scenario analysis approach and background data presented in the previous chapter, Chapter 3 provides the economic impact scenario results for six strategic initiatives aimed at creating a more equitable and resilient Pioneer Valley economy, including:

7. Improving Workforce Participation and Sustainable Employment Opportunities;
8. Supporting BIPOC Business Ownership and Expansion Opportunities;
9. Expand Regional Housing Options and Increase BIPOC Homeownership Rates;
10. Reversing Stagnant Population Trends;
11. Expanding the Clean Energy Industry Cluster; and
12. Leveraging New Opportunities in Cybersecurity and Related Tech Sectors

Each scenario and corresponding strategic initiative has been analyzed using CE's Local Economy Futures Model (LEFM) based on the identification of aspirational and transformative visions of the potential economic opportunity for the Pioneer Valley.

3.2 Improving Workforce Participation and Sustainable Employment Opportunities

Background

Workforce participation and employment rates in the Pioneer Valley have been stubbornly below Massachusetts and US averages, leading to a smaller share of working-age population in productive employment, and a greater share unemployed and economically inactive. And we know this trend disproportionately affects lower income, less educated populations especially in urban areas with larger concentrations of BIPOC populations.

Metrics and ambitions

Our LEFM model covers a range of metrics related to this ambition. We identified the resident **employment-population ratio** (i.e., the employment rate) as the best fitting scenario metric, as in contrast to the participation rate this metric does not include retirees, students and trainees (who do not provide an accurate portrayal of workforce participation).

Using the LEFM's baseline projections, we observed the metric's historic trend and longer-term outlook, and then worked closely with the Task Force group to scrutinize and agree two ambitious scenarios for the region. The metric definition and sources, recent performance, and proposed scenario assumptions are summarized in Table 3-1.

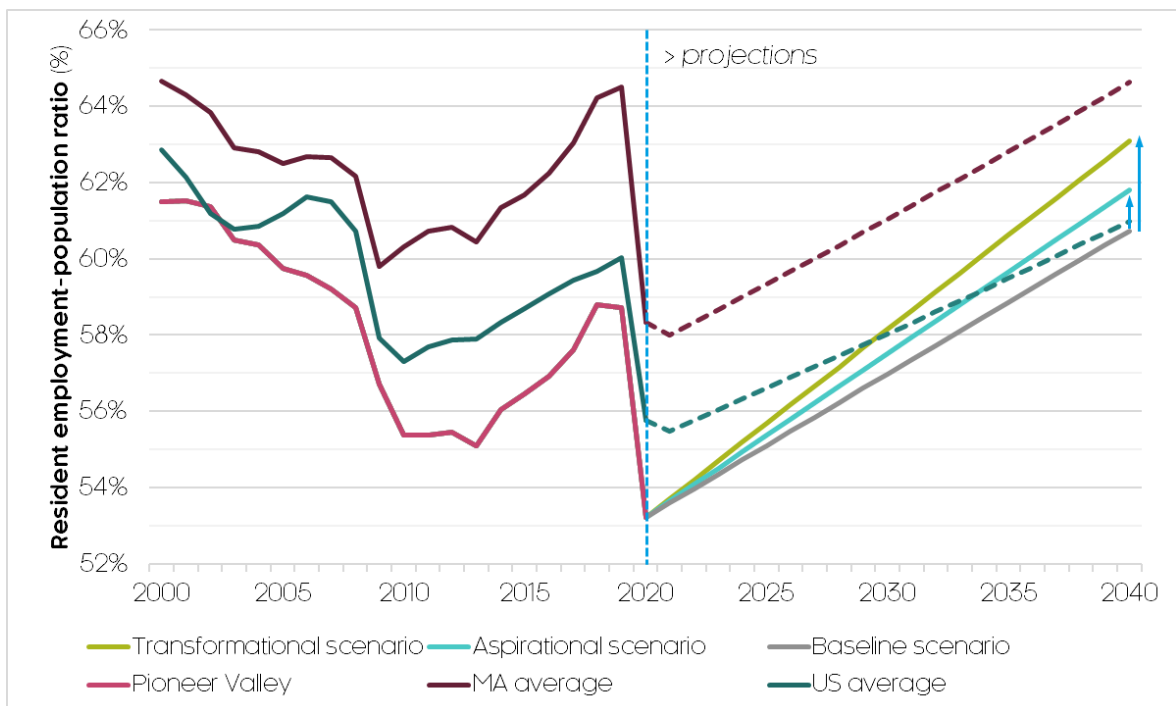
Table 3-1: Overview of the proposed workforce participation metric and scenarios

Proposed metric	Recent Pioneer Valley performance	Proposed scenarios	Impacts to be entered into model
<ul style="list-style-type: none"> Employment-population ratio <ul style="list-style-type: none"> Proportion working age population (aged 16+) in active, paid employment Source: Current Population Survey, BLS 	<ul style="list-style-type: none"> Historically tracked US avg. Stubborn gap relative to MA avg. Significant drop 2020-onwards, as a result of Covid-19 pandemic 	<ul style="list-style-type: none"> Baseline: ratio improves in line with recent PV performance Aspirational: ratio improves to early-2000's levels Transformational: ratio exceeds US avg. and closes gap with MA avg. 	<ul style="list-style-type: none"> Additional residents in employment Apply LEFM to estimate impacts in terms of jobs, output, incomes, commuting etc.

As presented in Figure 3-1, we proposed two ambitious scenarios relative to the baseline expectation of 342,700 total residents in employment by 2040:

- An *aspirational scenario* where the region sees its employment-population ratio return to levels last experienced in the early 2000s. This would result in 6,000 additional residents in employment by 2040 (a 2% increase on baseline).
- A *transformational scenario* where the region is able to exceed the US average, as it did in the early 2000's, and close the gap with the MA average. This would result in 13,200 additional residents in employment by 2040 (a 4% increase).

Figure 3-1: Proposed workforce participation scenarios



Source: Cambridge Econometrics (based on USCB data). Note: data 2021-onwards strictly projections

Logic and modeling

We developed the following logic model for this scenario, which illustratively demonstrates the basic modeling assumptions for this metric, and the relevant economic relationships and dependencies within the model.



The associated resident workforce expansion for each scenario directly enters the model, which then calculates the wider regional economic impacts (results presented below).

A key consideration for this scenario is that not all new employed residents are expected to work in the Pioneer Valley; currently 15% of employed residents commute out of region for work, and the LEFM assumes a continuation of this.

Results Table 3-2 presents the key modeling results for this scenario.

Table 3-2: Workforce participation scenario results

Economic impact scenario results relative to baseline		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: employment-population ratio improves to early-2000's levels	Jobs	1,000	2,800	4,600	7,000
	Output (\$m)	\$140	\$370	\$680	\$1,170
	Household income (\$m)	\$80	\$210	\$380	\$650
Transformational scenario: employment-population ratio exceeds US average, closes gap with MA	Jobs	2,200	5,900	9,700	14,800
	Output (\$m)	\$300	\$780	\$1,420	\$2,450
	Household income (\$m)	\$170	\$440	\$800	\$1,380

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *aspirational scenario* could support:

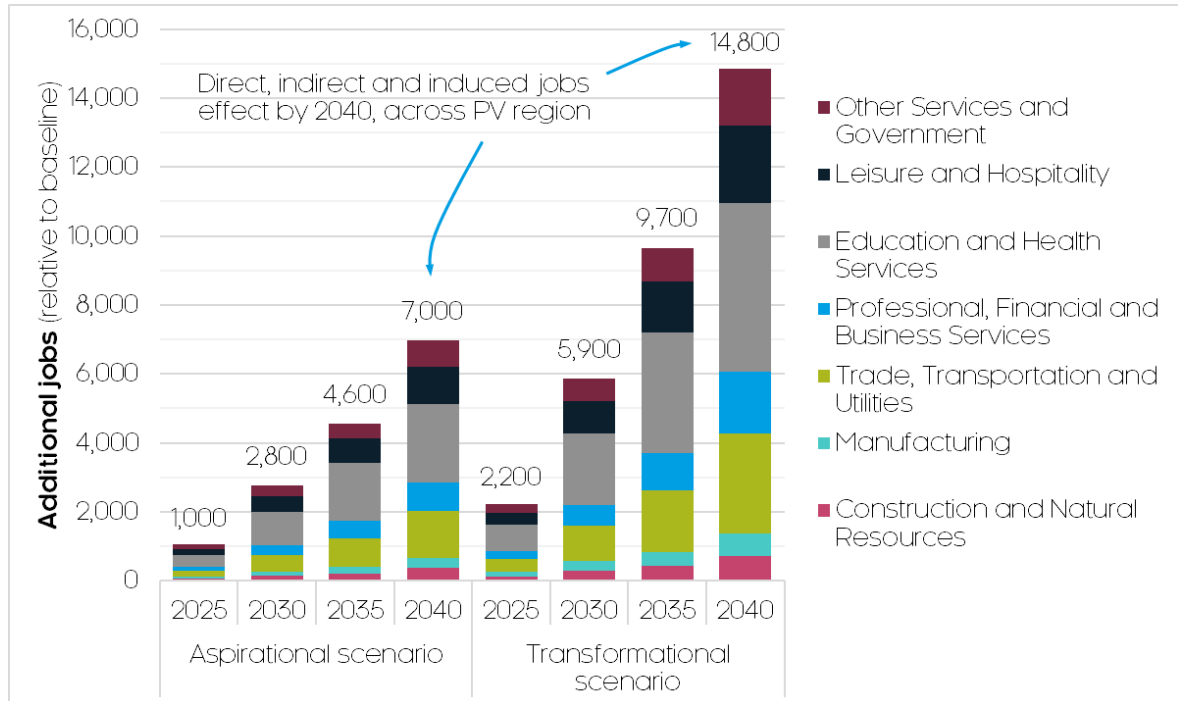
- The creation of an additional 7,000 direct, indirect, and induced jobs, 2% above the baseline
- \$1.2 billion of additional output for regional firms
- A \$650 million boost to household incomes

Relative to the baseline, by 2040 the *transformational scenario* could support:

- The creation of an additional 14,800 direct, indirect, and induced jobs, 4% above the baseline
- \$2.5 billion of additional output for regional firms
- A \$1.4 billion boost to household incomes

Looking specifically at jobs, Figure 3-2 profiles the industry breakdown of potential impacts. Impacts are concentrated in industries with high rates of entry for unemployed and inactive workers, such as education and health, trade and transportation, and leisure and hospitality.

Figure 3-2: Workforce participation scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

3.3 Supporting BIPOC Business Ownership and Expansion Opportunities

Background

Increasing the number and growth of BIPOC-owned businesses is a central goal to build a more equitable and inclusive Pioneer Valley economy. Based on the most current data, minority-owned businesses (14%) lag far behind their share of the population (26%). Nationally, this relationship is much closer with about 34% of the population in minority population categories and just 30% of businesses.

Metrics and ambitions

We identified the **BIPOC business ownership share** as the most relevant scenario metric for this ambition. Using data on past performance and our own qualitative assessment (drawing on stakeholder evidence), we worked closely with the Task Force group to scrutinize and agree two ambitious scenarios for the region. The metric definition and sources, recent performance, and proposed scenario assumptions are summarized in Table 3-3.

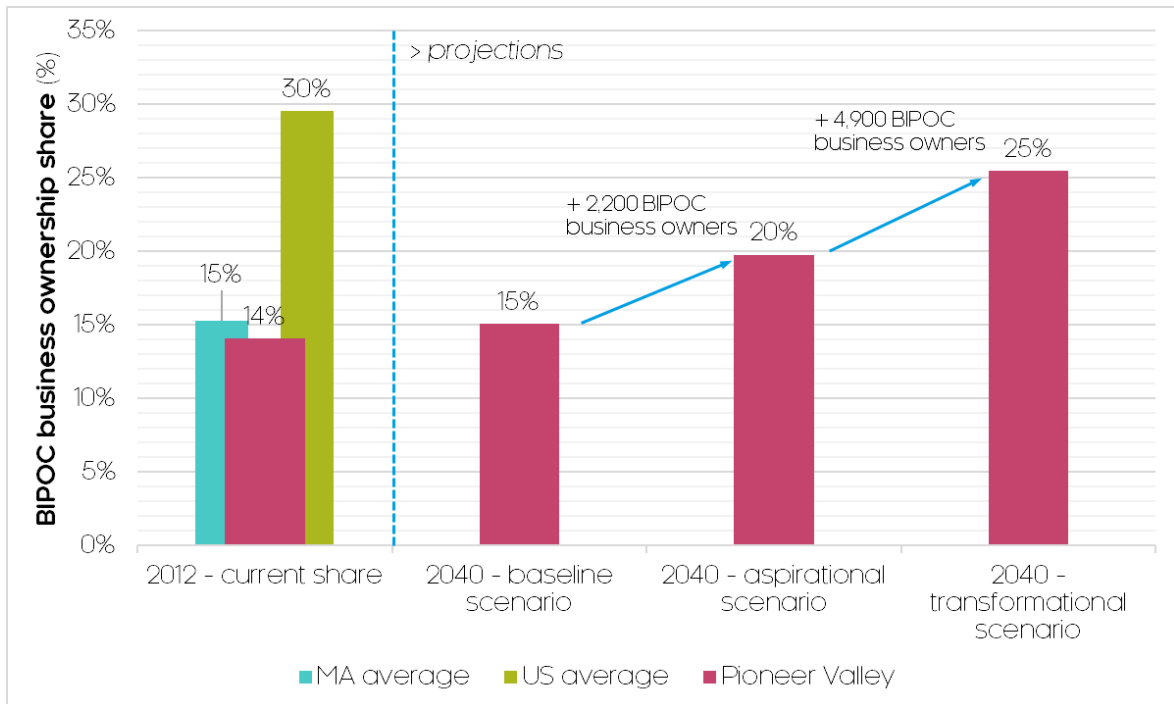
Table 3-3: Overview of the proposed BIPOC business ownership metric and scenarios

Proposed metric	Recent Pioneer Valley performance	Proposed scenarios	Impacts to be entered into model
<ul style="list-style-type: none"> • BIPOC business ownership share <ul style="list-style-type: none"> ○ Proportion of businesses owned by BIPOC ○ Source: Survey of Business Owners and Self-Employed Persons, USCB 	<ul style="list-style-type: none"> • Underperforms MA and US average • 26% population share, only 14% business ownership share • Data predates Covid-19, but impacts could be positive 	<ul style="list-style-type: none"> • Baseline: ownership share maintained at a similar rate to current PV avg. • Aspirational: ownership share halves the gap relative to population share • Transformational: ownership share equals BIPOC population share 	<ul style="list-style-type: none"> • Higher levels of BIPOC-owned businesses, sales, and jobs • Additional employment and spending/sales (from increased business activity)

As presented in Figure 3-3, we proposed two ambitious scenarios relative to the baseline expectation of 7,000 total BIPOC business owners by 2040:

- An *aspirational scenario* where the BIPOC business ownership share halves the gap relative to the BIPOC population share. This would result in 2,200 additional BIPOC business owners by 2040 (a 28% increase on baseline)
- A *transformational scenario* where the BIPOC business ownership share equals the BIPOC population share. This would result in 4,900 additional BIPOC business owners by 2040 (a 70% increase)

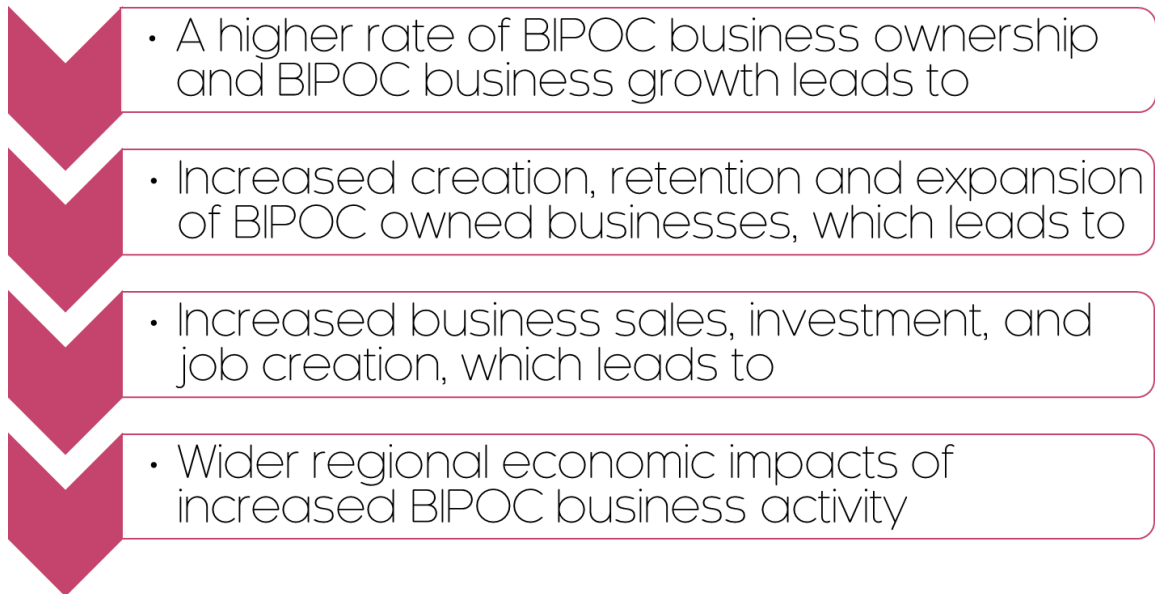
Figure 3-3: Proposed BIPOC business ownership scenarios



Source: Cambridge Econometrics (based on USCB data). Note: data 2012-onwards strictly projections

Logic and modeling

We developed the following logic model for this scenario, which illustratively demonstrates the basic modeling assumptions for this metric, and the relevant economic relationships and dependencies within the model.



Because the LEFM does not directly account for this metric in its modeling framework, we had to apply some additional steps and assumptions to accurately capture the scenarios in the model.

This was achieved by estimating an associated jobs expansion for the increase in business ownership. This was informed by existing research and evidence on the economic impacts of BIPOC business ownership², using data from the [Survey of Business Owners and Self-Employed Persons](#) (produced by the USCB).

These impacts were estimated as 3,400 direct jobs by 2040 for the aspirational scenario, and 7,900 direct jobs for the transformational scenario. These were then allocated to relevant industries (including construction, retail, business services, health care) and directly entered into the model, which calculates the wider regional economic impacts (results presented below).

Results Table 3-4 presents the key modeling results for this scenario.

Table 3-4: BIPOC business ownership scenario results

Economic impact scenario results relative to baseline					
		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: ownership share halves the gap relative to BIPOC population share	Jobs	1,000	2,500	4,300	6,000
	Output (\$m)	\$140	\$370	\$700	\$1,080
	Household income (\$m)	\$80	\$210	\$390	\$610
Transformational scenario: ownership share equals BIPOC population share	Jobs	2,300	5,800	9,600	13,500
	Output (\$m)	\$330	\$850	\$1,540	\$2,400
	Household income (\$m)	\$190	\$480	\$870	\$1,350

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

² See for instance research by McKinsey [here](#) and [here](#), and by Brookings [here](#) and [here](#)

Relative to the baseline, by 2040 the *aspirational scenario* could support:

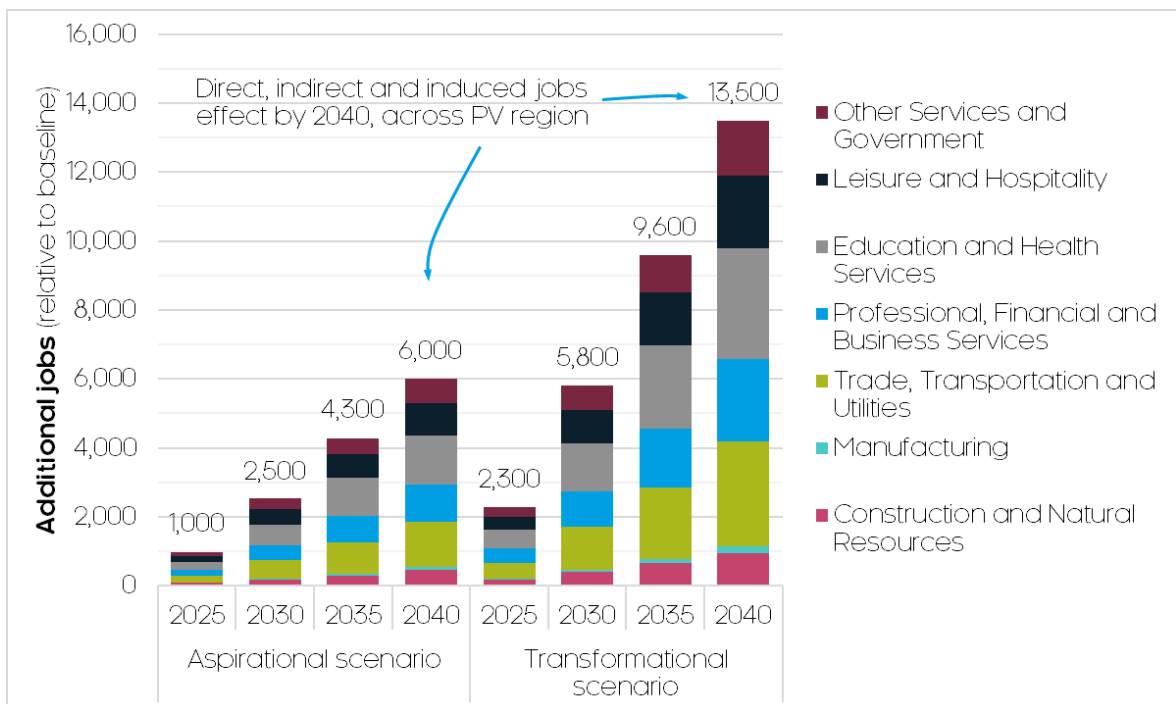
- The creation of an additional 6,000 direct, indirect, and induced jobs, 2% above the baseline
- \$1.1 billion of additional output for regional firms
- A \$610 million boost to household incomes

Relative to the baseline, by 2040 the *transformational scenario* could support:

- The creation of an additional 13,500 direct, indirect, and induced jobs, 3% above the baseline
- \$2.4 billion of additional output for regional firms
- A \$1.4 billion boost to household incomes

Looking specifically at jobs, Figure 3-4 profiles the industry breakdown of potential impacts. Impacts are concentrated in industries with high shares of BIPOC business ownership, including trade and transportation, education and health, leisure and hospitality, and professional, financial and business services.

Figure 3-4: BIPOC business ownership scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

3.4 Expand Regional Housing Options and Increase BIPOC Homeownership Rates

Background

It increasingly recognized that housing is closely interlinked with economic development and population growth. In the Pioneer Valley, BIPOC households only own 31% of their housing units compared to an average of 47% nationwide, with a homeownership rate over 70% among white populations in the region. And we know from multiple research studies that homeownership is one of the strongest pathways to build wealth.

Metrics and ambitions

We identified the **BIPOC home ownership rate** as the most relevant scenario metric for this ambition. Using data on past performance and our own qualitative assessment (drawing on stakeholder evidence), we worked closely with the Task Force group to scrutinize and agree two ambitious scenarios for the region. The metric definition and sources, recent performance, and proposed scenario assumptions are summarized in Table 3-5.

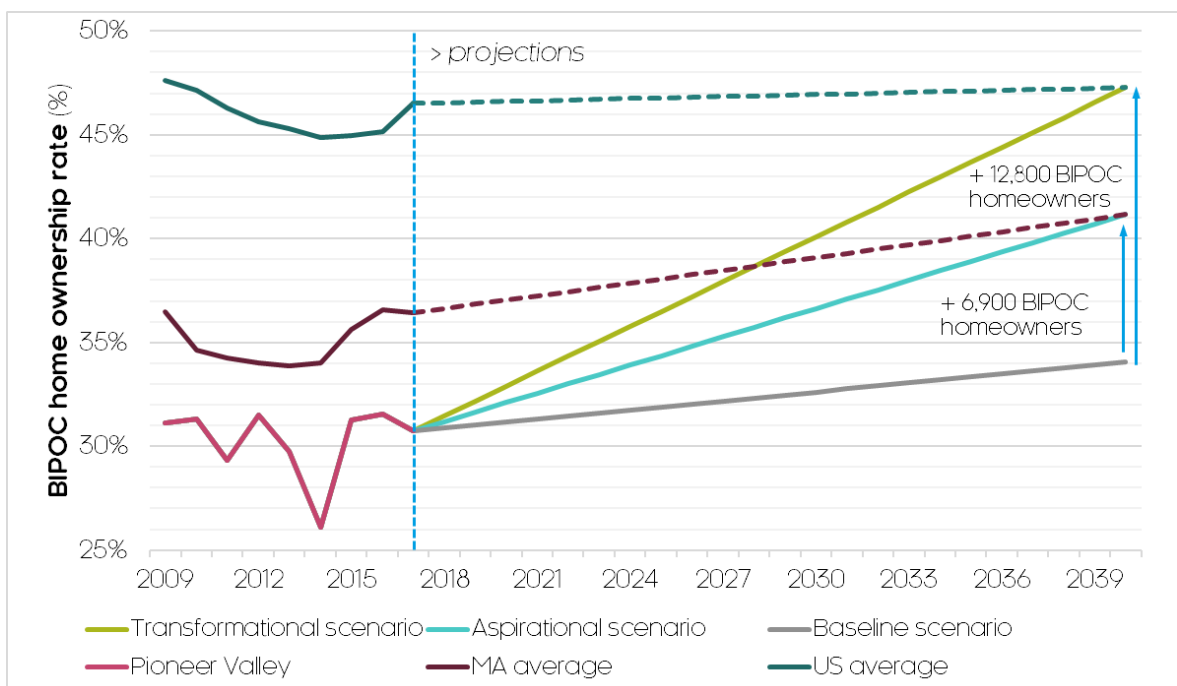
Table 3-5: Overview of the proposed BIPOC home ownership metric and scenarios

Proposed metric	Recent Pioneer Valley performance	Proposed scenarios	Impacts to be entered into model
<ul style="list-style-type: none"> • BIPOC home ownership rate <ul style="list-style-type: none"> ○ BIPOC-occupied housing units that are owner-occupied ○ Source: American Community Survey, USCB 	<ul style="list-style-type: none"> • Underperforms MA and US avg. • Some improvement 2015-onwards • Data predates Covid-19, but impacts have likely been negative 	<ul style="list-style-type: none"> • Baseline: ownership rate improves in line with recent PV performance • Aspirational: ownership rate improves to match MA avg. • Transformational: ownership rate improves to match US avg. 	<ul style="list-style-type: none"> • Additional wealth of BIPOC homeowners leads to increased spending/sales in the region • Required expansion of housebuilding also provides temporary construction sales/jobs

As presented in Figure 3-5, we proposed two ambitious scenarios relative to the baseline expectation of 33,000 total BIPOC homeowners by 2040:

- An *aspirational scenario* where the BIPOC home ownership rate improves to match the statewide average. This would result in 6,900 additional BIPOC homeowners by 2040 (a 17% increase on baseline)
- A *transformational scenario* where the BIPOC home ownership rate improves to match the US average. This would result in 12,800 additional BIPOC homeowners by 2040 (a 32% increase)

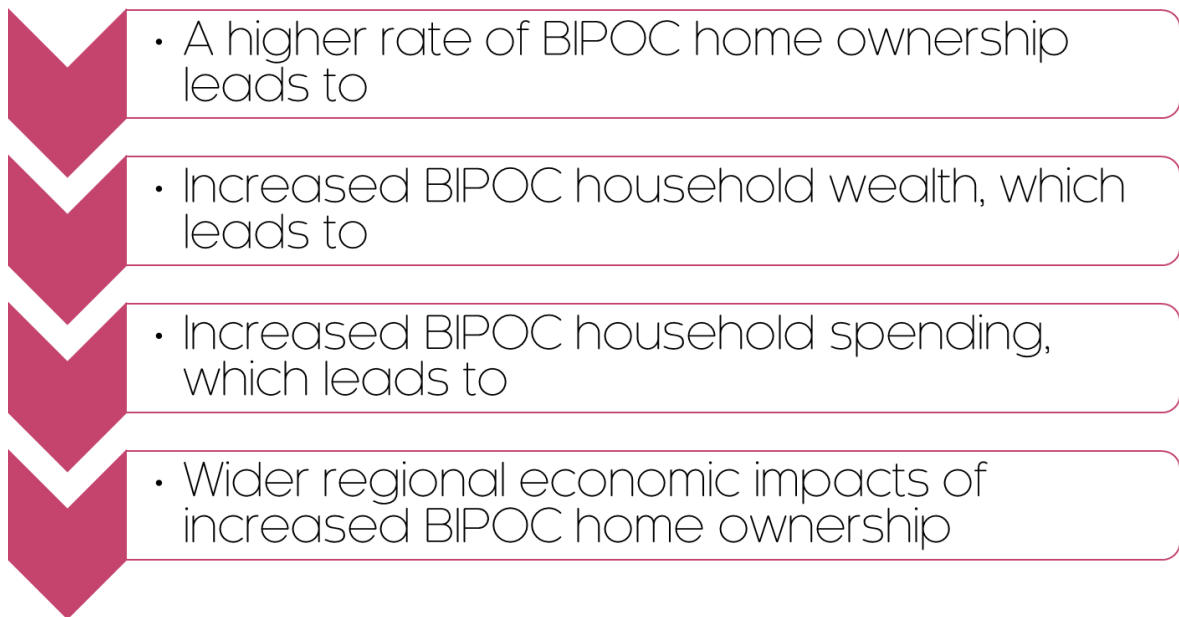
Figure 3-5: Proposed BIPOC home ownership scenarios



Source: Cambridge Econometrics (based on USCB data). Note: data 2017-onwards strictly projections

Logic and modeling

We developed the following logic model for this scenario, which illustratively demonstrates the basic modeling assumptions for this metric, and the relevant economic relationships and dependencies within the model.



Because the LEFM does not directly account for this metric in its modeling framework, we had to apply some additional steps and assumptions to accurately capture the scenarios in the model. This was achieved by estimating an associated household spending expansion for the increase in home ownership. This was informed by existing research and evidence on household wealth, income, and spending impacts of home ownership³, using data from the [Consumer Expenditure Survey](#).

These impacts were estimated as an additional \$1.2 billion household spending by 2040 for the aspirational scenario, and \$2.4 billion for the transformational scenario. These increases in household spending were directly entered into the model, which calculates the wider regional economic impacts (results presented below).

Separately, a recent UMass study⁴ found that the region has a deficit of about 20,000 housing units and that the Pioneer Valley is one of the most segregated regions in the US. Consequently, given their relatedness and interdependence, it was agreed that this scenario should also focus on expanding housing production and options throughout the region.

As a result, we additionally modeled the associated impacts from the higher rate of required housebuilding. We estimated a requirement of 15,000 additional (mostly multi-family) housing units built by 2040 to assist the transformational ambition, and 9,000 for aspirational.

To calculate these housebuilding impacts in the model, we estimated the increased sales opportunities (and multipliers) for the local construction sector. This included up to \$136m of additional construction revenues per year. Unlike household spending, these revenues do not accrue overtime.

³ See for instance research by the Urban Institute [here](#), by Habitat for Humanity [here](#), and by LISC [here](#)

⁴ "Springfield and Pioneer Valley Housing Phase II" by the UMass Donahue Institute for Wayfinders, January 2022.

Results Table 3-6 presents the key modeling results for this scenario.

Table 3-6: BIPOC home ownership scenario results

Economic impact scenario results relative to baseline					
		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: BIPOC home ownership rate improves to match MA average	Jobs	3,200	6,200	7,500	9,100
	Output (\$m)	\$440	\$880	\$1,210	\$1,650
	Household income (\$m)	\$250	\$490	\$680	\$930
Transformational scenario: BIPOC home ownership rate improves to match US average	Jobs	6,700	12,900	16,500	18,500
	Output (\$m)	\$920	\$1,860	\$2,700	\$3,450
	Household income (\$m)	\$520	\$1,040	\$1,520	\$1,940

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *aspirational scenario* could support:

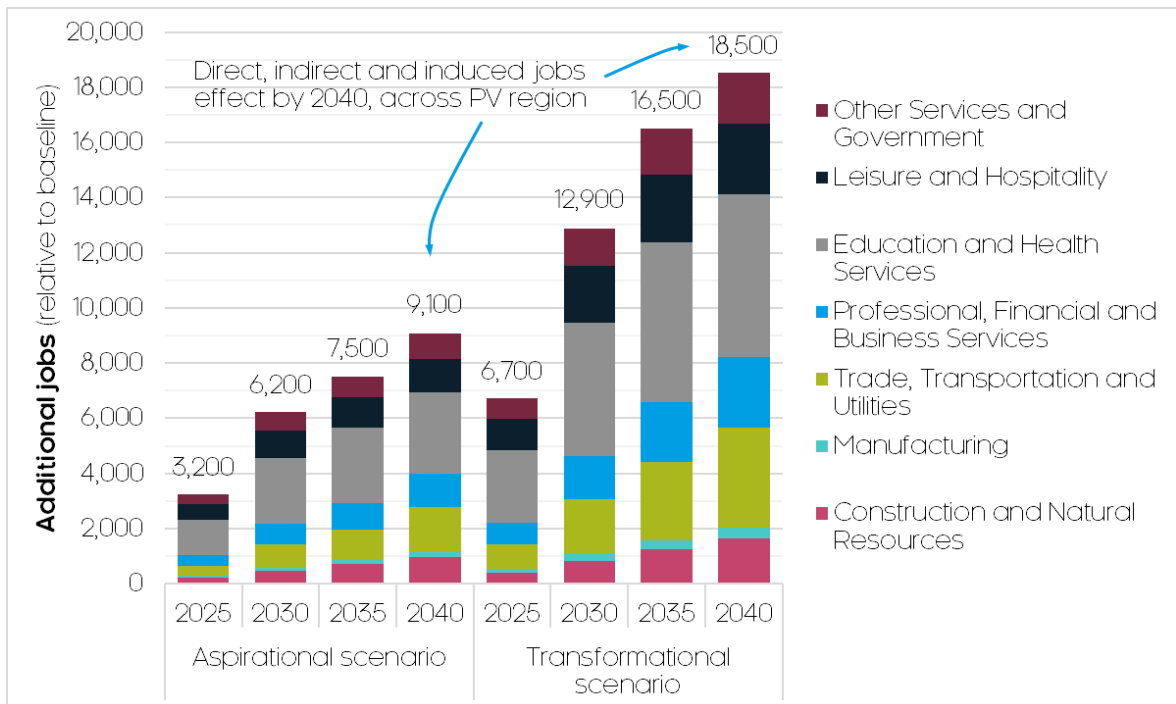
- The creation of an additional 9,100 direct, indirect, and induced jobs, 2% above the baseline
- \$1.7 billion of additional output for regional firms
- A \$930 million boost to household incomes

Relative to the baseline, by 2040 the *transformational scenario* could support:

- The creation of an additional 18,500 direct, indirect, and induced jobs, 5% above the baseline
- \$3.5 billion of additional output for regional firms
- A \$1.9 billion boost to household incomes

Looking specifically at jobs, Figure 3-6 profiles the industry breakdown of potential impacts. Impacts are concentrated in industries that are expected to benefit from an increase in household spending, notably trade and transportation, leisure and hospitality, and education and health.

Figure 3-6: BIPOC home ownership scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

3.5 Reversing Stagnant Population Trends

Background

The Pioneer Valley has long experienced relatively flat population growth, with some instances of declining population such as in traditional cities and more rural areas. For example, over the 30-year period from 1990 to 2020, the Pioneer Valley’s population only grew by 3.6% compared to growth of almost 17% for the statewide MA average and 33% at the US level. This slowdown in population growth can impact on the growth potential and competitiveness of the Pioneer Valley economy.

Metrics and ambitions

The total resident population, the required scenario metric, is directly available in the LEFM. Using the LEFM’s baseline projections, we observed the metric’s historic trend and longer-term outlook, and then worked closely with the Task Force group to scrutinize and agree two ambitious scenarios for the region. The metric definition and sources, recent performance, and proposed scenario assumptions are summarized in Table 3-7.

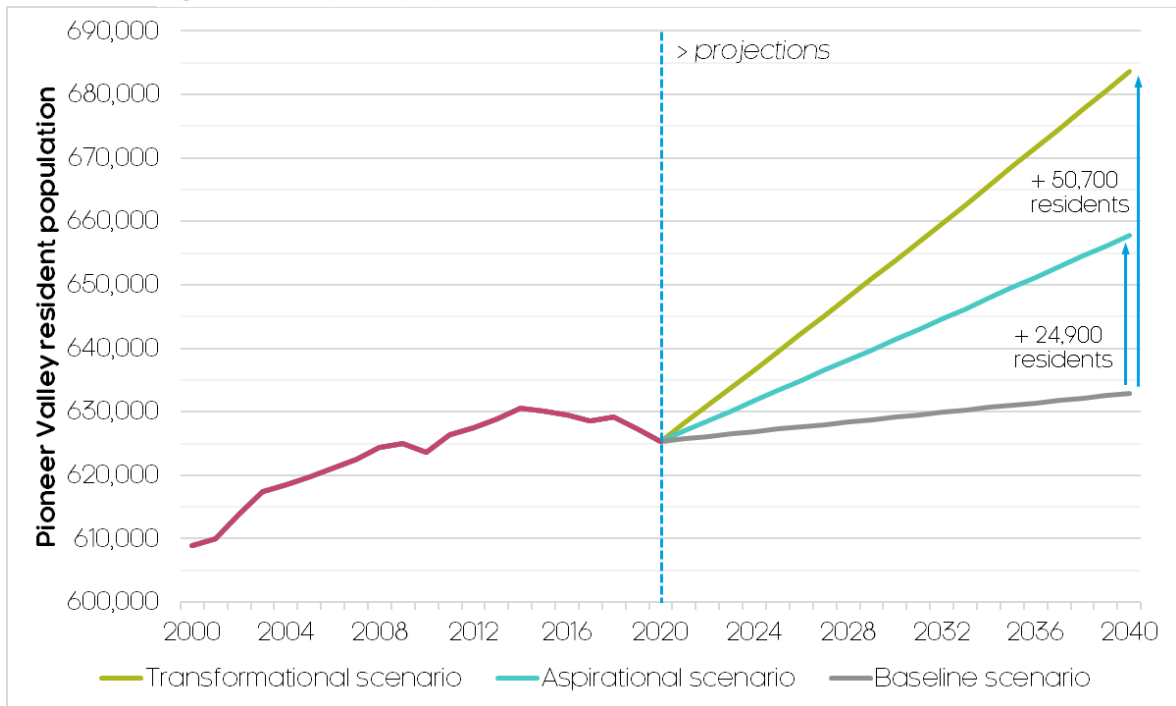
Table 3-7: Overview of the proposed population trends metric and scenarios

Proposed metric	Recent Pioneer Valley performance	Proposed scenarios	Impacts to be entered into model
<ul style="list-style-type: none"> Resident population <ul style="list-style-type: none"> The total number of people, of all ages, resident in an area Source: Population Estimates Program, USCB 	<ul style="list-style-type: none"> Industrial decline led to slow pop growth Since then, averaged 1/3 of MA avg; population growth and a 1/10 of US avg. Growth averaged zero 2010-20 	<ul style="list-style-type: none"> Baseline: population grows in line with recent PV performance Aspirational: population grows at a rate similar to pre-Covid UMass projections Transformational: population grows at same rate as recent MA avg. 	<ul style="list-style-type: none"> Additional resident population Apply LEFM to estimate impacts in terms of jobs, GDP, wages etc.

As presented in Figure 3-7, we proposed two ambitious scenarios relative to the baseline expectation of a total resident population of 632,900 by 2040:

- An *aspirational scenario* where the region sees its population grow more strongly, at a rate similar to pre-Covid UMass projections. This would result in 24,900 additional residents by 2040 (a 4% increase on baseline)
- A *transformational scenario* where the region is able grow its population at a similar rate to the recent 10-year MA average. This would result in 50,700 additional residents by 2040 (an 8% increase)

Figure 3-7: Proposed population trends scenarios



Source: Cambridge Econometrics (based on USCB data). Note: data 2020-onwards strictly projections

Logic and modeling

We developed the following logic model for this scenario, which illustratively demonstrates the basic modeling assumptions for this metric, and the relevant economic relationships and dependencies within the model.



The associated resident population expansion for each scenario directly enters the model, which then calculates the wider regional economic impacts (results presented below).

A key consideration for this scenario is that not all residents are expected to be economically active or of working age (which the model has based on recent and projected migration and population growth trends).

Results Table 3-8 presents the key modeling results for this scenario.

Table 3-8: Population trends scenario results

Economic impact scenario results relative to baseline					
		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: population grows at a rate similar to pre-Covid UMass projections	Jobs	1,500	3,700	6,000	9,400
	Output (\$m)	\$180	\$480	\$910	\$1,610
	Household income (\$m)	\$100	\$270	\$510	\$900
Transformational scenario: population grows at same rate as recent MA average	Jobs	3,000	7,600	12,600	19,600
	Output (\$m)	\$370	\$990	\$1,890	\$3,350
	Household income (\$m)	\$210	\$560	\$1,060	\$1,890

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *aspirational scenario* could support:

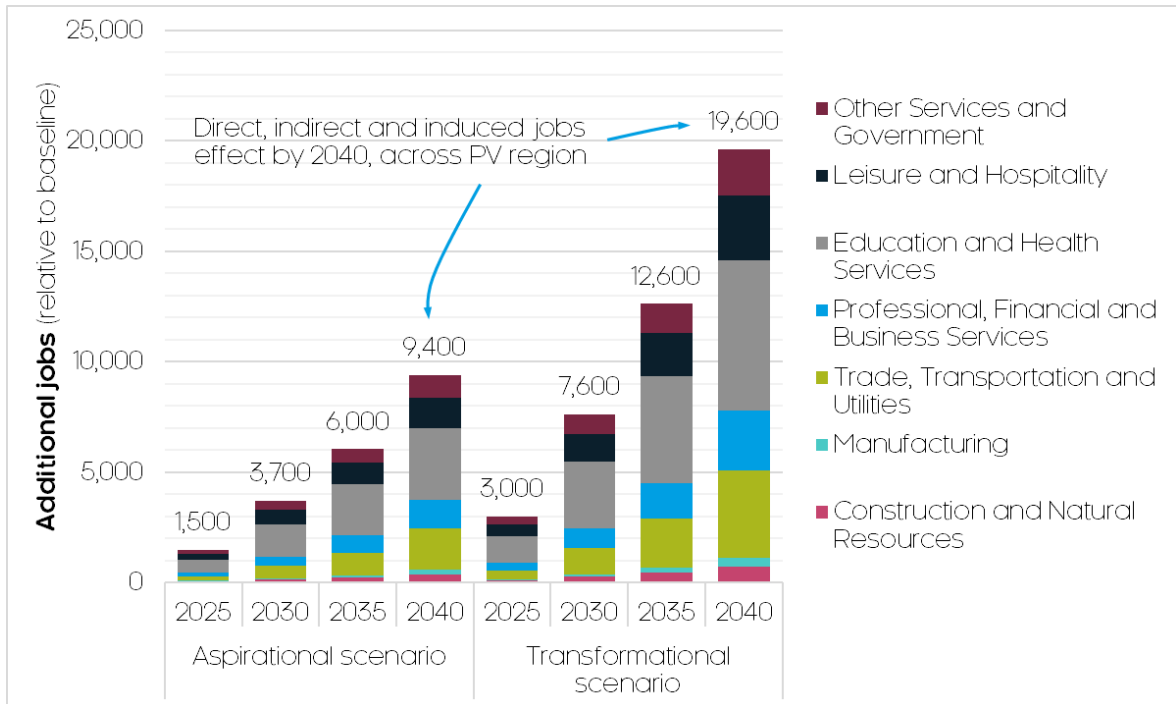
- The creation of an additional 9,400 direct, indirect, and induced jobs, 2% above the baseline
- \$1.6 billion of additional output for regional firms
- A \$900 million boost to household incomes

Relative to the baseline, by 2040 the *transformational scenario* could support:

- The creation of an additional 19,600 direct, indirect, and induced jobs, 4% above the baseline
- \$3.4 billion of additional output for regional firms
- A \$1.9 billion boost to household incomes

Looking specifically at jobs, Figure 3-8 profiles the industry breakdown of potential impacts. Impacts are concentrated in industries that are expected to have a strong presence in the region as its population grows, notably education and health and trade and transportation.

Figure 3-8: Population trends scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

3.6 Expanding the Clean Energy Industry Cluster

Background

The Pioneer Valley was an early leader in developing its clean energy economy. While the clean energy sector has grown more rapidly in recent years in other parts of the Commonwealth, the Pioneer Valley’s share of clean energy jobs remains well above the state-wide average, and opportunities continue to exist for the cluster to drive regional economic growth as state and federal policy accelerate the clean energy transition.

Metrics and ambitions

The number of clean energy jobs, the required scenario metric, can be directly captured by the LEFM. By drawing on [Massachusetts Clean Energy Center \(MassCEC\)](#) evidence and research, we observed the metric’s historic trend and longer-term outlook, and then worked closely with the Task Force group to scrutinize and agree two ambitious scenarios for the region. The metric definition and sources, recent performance, and proposed scenario assumptions are summarized in Table 3-9Table 3-1.

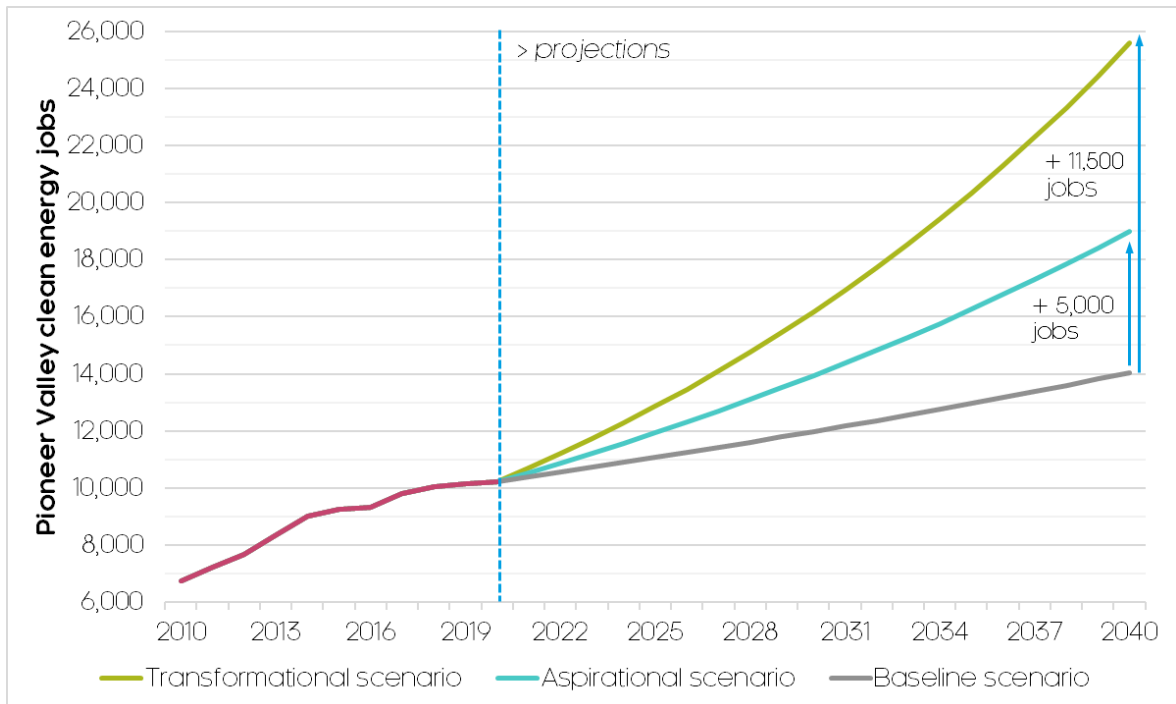
Table 3-9: Overview of the proposed clean energy metric and scenarios

Proposed metric	Recent Pioneer Valley performance	Proposed scenarios	Impacts to be entered into model
<ul style="list-style-type: none"> Clean energy jobs <ul style="list-style-type: none"> The total number of jobs, across all industries, that are in clean energy Source: MassCEC 	<ul style="list-style-type: none"> Clean energy jobs more prevalent in PV (3.7% of all jobs, MA avg. 3.2%) But have grown slower than the MA avg. (almost by half) Data predates Covid-19, but impacts appear limited 	<ul style="list-style-type: none"> Baseline: clean energy jobs grow in line with recent PV performance Aspirational: clean energy jobs grow at a faster rate than recent PV performance Transformational: clean energy jobs grow in line with recent MA performance 	<ul style="list-style-type: none"> Additional jobs in clean-energy related industries and occupations <ul style="list-style-type: none"> Installations and construction, manufacturing, tech services, R&D, utilities, etc.

As presented in Figure 3-9, we proposed two ambitious scenarios relative to the baseline expectation of 14,000 total clean energy jobs by 2040:

- An *aspirational scenario* where the clean energy sector in the region grows at a faster rate than recent performance. This would result in 5,000 additional clean energy jobs by 2040 (a 4% increase on baseline)
- A *transformational scenario* where the clean energy sector in the region grows at a similar rate to the recent 10-year MA average. This would result in 11,500 additional clean energy jobs by 2040 (an 8% increase)

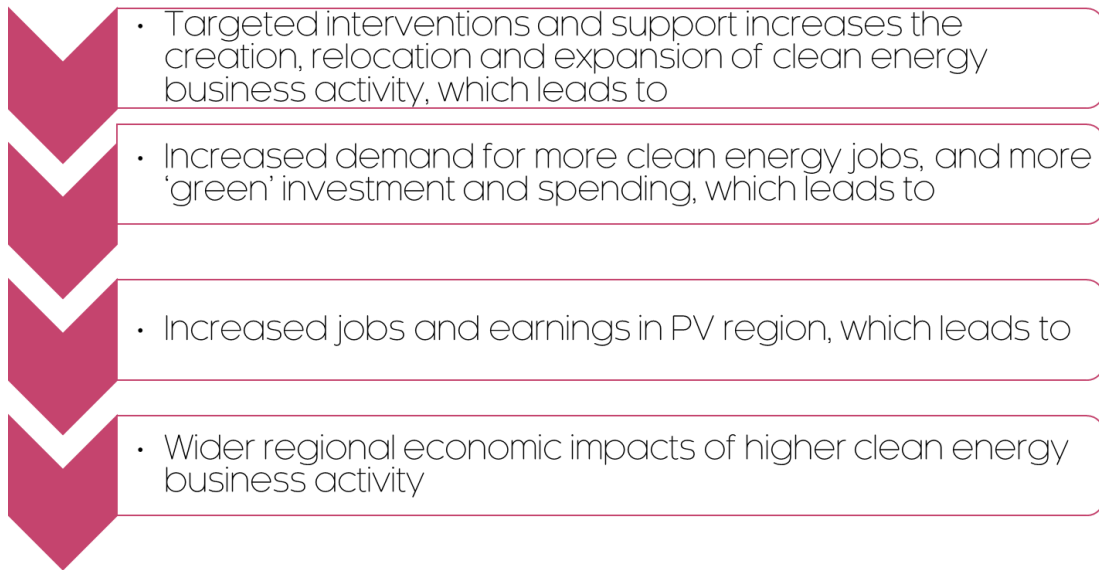
Figure 3-9: Proposed clean energy scenarios



Source: Cambridge Econometrics (based on USCB data). Note: data 2020-onwards strictly projections

Logic and modeling

We developed the following logic model for this scenario, which illustratively demonstrates the basic modeling assumptions for this metric, and the relevant economic relationships and dependencies within the model.



A key consideration for this scenario was allocating the clean energy jobs expansion to relevant NAICS-derived sectors within the LEFM. To achieve this, we profiled the specialisms of the Pioneer Valley clean energy sector (using MassCEC data), and allocated the jobs expansion to the following LEFM sectors:

- Utilities: 10% of all additional clean energy jobs
- Construction (including installation): 35%
- Machinery: 8%
- Computer and electronic products: 8%
- Electrical equipment, appliances, and components: 8%
- Miscellaneous manufacturing: 8%
- Professional, scientific, and technical services: 25%

The associated clean energy jobs expansion for each scenario then directly enters the model, which calculates the wider regional economic impacts (results presented below).

Results Table 3-10 presents the key modeling results for this scenario.

Table 3-10: Clean energy scenario results

Economic impact scenario results relative to baseline					
		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: <i>clean energy jobs grow at a faster rate than recent PV region performance</i>	Jobs	1,700	4,200	7,100	11,000
	Output (\$m)	\$370	\$880	\$1,550	\$2,510
	Household income (\$m)	\$210	\$490	\$870	\$1,410
Transformational scenario: <i>clean energy jobs grow in line with recent MA performance</i>	Jobs	3,900	9,500	16,200	25,300
	Output (\$m)	\$860	\$2,000	\$3,550	\$5,790
	Household income (\$m)	\$490	\$1,120	\$2,000	\$3,250

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *aspirational scenario* could support:

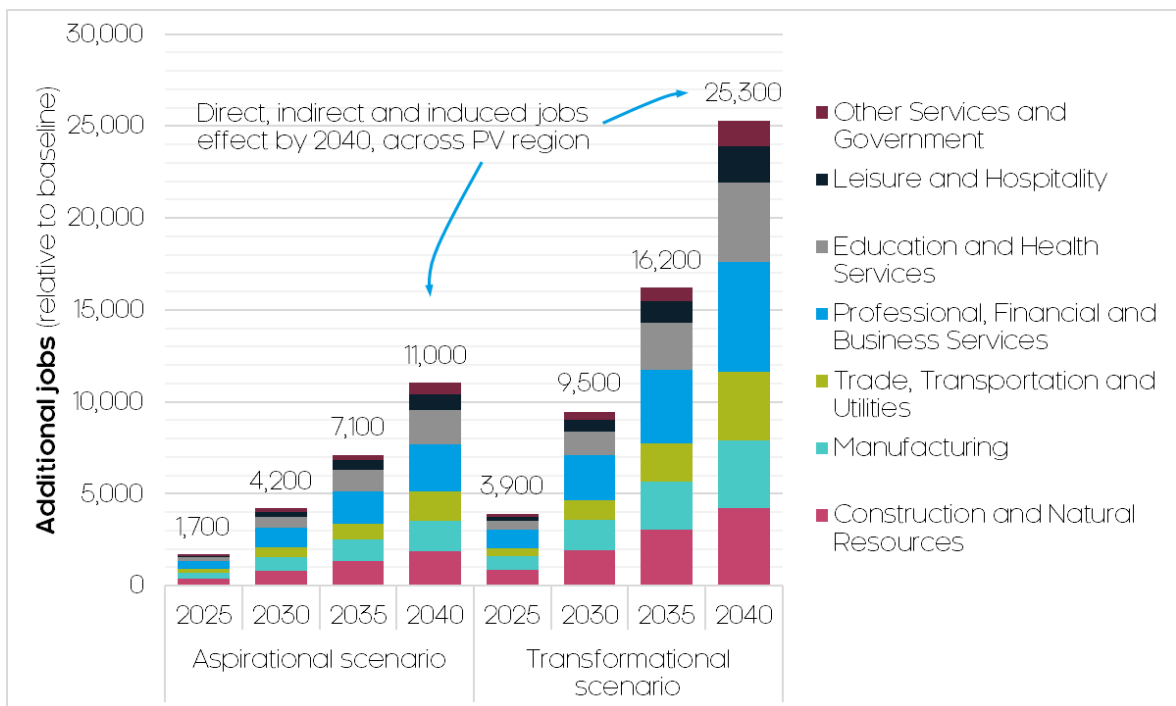
- The creation of an additional 11,000 direct, indirect, and induced jobs, 3% above the baseline
- \$2.5 billion of additional output for regional firms
- A \$1.4 billion boost to household incomes

Relative to the baseline, by 2040 the *transformational scenario* could support:

- The creation of an additional 25,300 direct, indirect, and induced jobs, 6% above the baseline
- \$5.8 billion of additional output for regional firms
- A \$3.3 billion boost to household incomes

Looking specifically at jobs, Figure 3-10 profiles the industry breakdown of potential impacts. Impacts are concentrated in industries highly related to the clean energy sector in the region, including construction and natural resources, manufacturing, and professional, financial and business services.

Figure 3-10: Clean energy scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

3.7 Leveraging New Opportunities in Cybersecurity and Related Tech Sectors

Background

Cybersecurity represents an emerging opportunity for industry growth and job creation in the Pioneer Valley. Larger employers (including those in the region) do not have sufficient supplies of talent to meet their workforce needs, and remote workers are being utilized increasingly across the country to meet demand. Assets in the Pioneer Valley include a large research university with

nationally-ranked programs in computer science and cybersecurity, numerous additional higher education institutions investing in degree programs in cybersecurity and related fields, and additional investments which support cybersecurity talent production and entrepreneurship.

Metrics and ambitions

Given the difficulty of capturing the cybersecurity and related tech sector using conventional NACIS codes, we used a slightly broader but still related scenario metric for this ambition. Specifically, we looked at the **information and professional/tech sectors job share**, which is also readily available in the LEFM.

Using the LEFM’s baseline projections, we observed the metric’s historic trend and longer-term outlook, and then worked closely with the Task Force group to scrutinize and agree two ambitious scenarios for the region. The metric definition and sources, recent performance, and proposed scenario assumptions are summarized in Table 3-11.

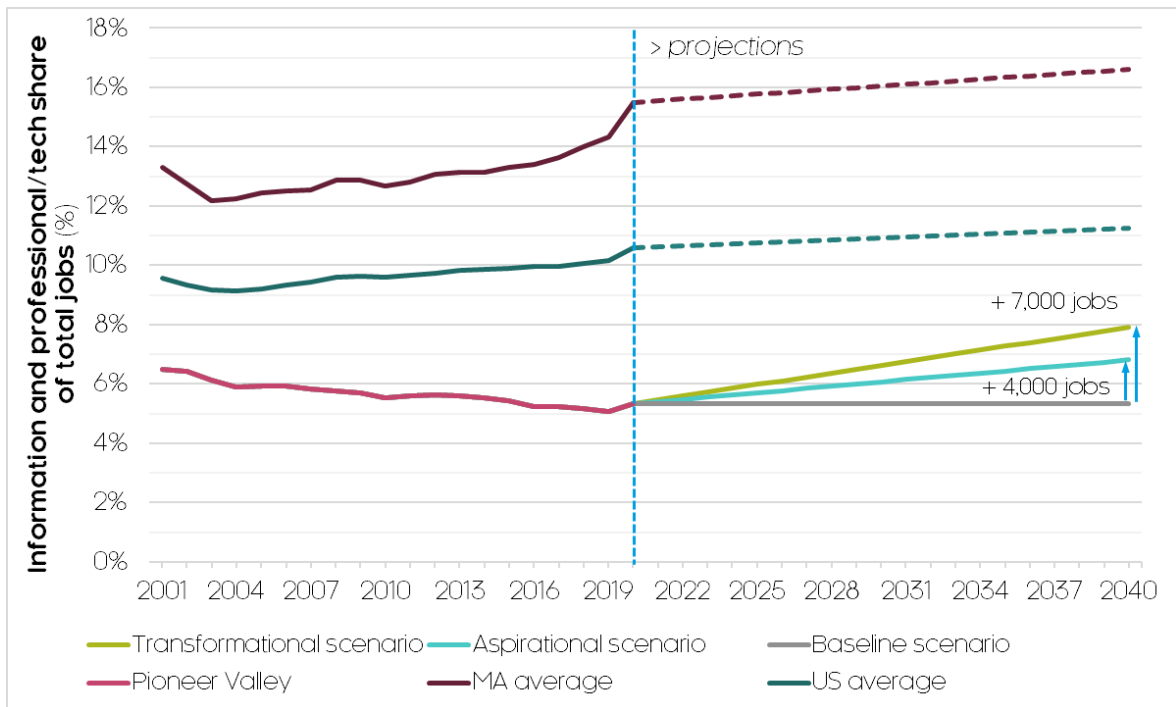
Table 3-11: Overview of the proposed cybersecurity and tech metric and scenarios

Proposed metric	Recent Pioneer Valley performance	Proposed scenarios	Impacts to be entered into model
<ul style="list-style-type: none"> • Information and professional/tech sectors job share <ul style="list-style-type: none"> ○ Proportion of total jobs in information and professional industries ○ Source: Quarterly Census of Employment and Wages, BLS 	<ul style="list-style-type: none"> • Underperforms MA and US avg. • Gap has widened over the past 20 years • Covid-19 impacts limited 	<ul style="list-style-type: none"> • Baseline: industry share remains stable in line with recent PV performance • Aspirational: industry share improves to early-2000’s levels (when gap was smallest) • Transformational: industry share closes gap with US avg. 	<ul style="list-style-type: none"> • Additional jobs in information and professional/tech sectors • Apply LEFM to estimate wider impacts – the industry is one of the highest paying (thus higher incomes, consumption etc.)

As presented in Figure 3-11, we proposed two ambitious scenarios relative to the baseline expectation of 14,500 information and professional/tech sector jobs by 2040:

- An *aspirational scenario* where the information and professional/tech sector job share in the region increases to early 2000’s levels. This would result in 4,000 additional information and professional/tech sector job jobs by 2040 (a 28% increase on baseline)
- A *transformational scenario* where the information and professional/tech sector job share in the region closes the gap with the US average. This would result in 7,000 additional information and professional/tech sector job jobs by 2040 (a 48% increase)

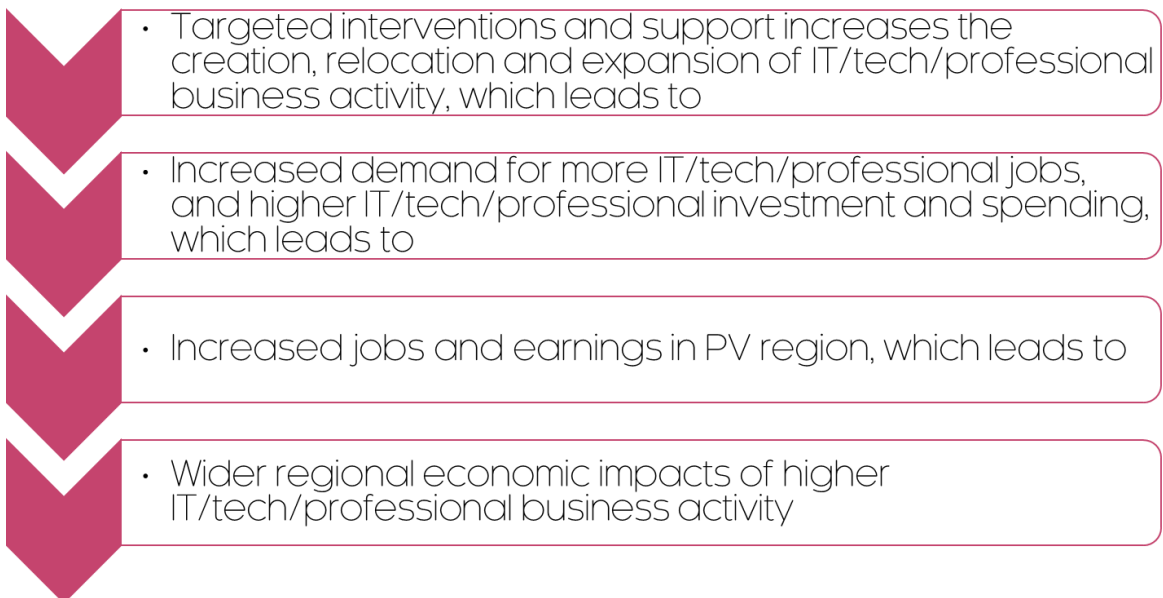
Figure 3-11: Proposed cybersecurity and tech scenarios



Source: Cambridge Econometrics (based on BLS data). Note: data 2020-onwards strictly projections

Logic and modeling

We developed the following logic model for this scenario, which illustratively demonstrates the basic modeling assumptions for this metric, and the relevant economic relationships and dependencies within the model.



The associated information and professional/tech sector jobs expansion for each scenario then directly enters the model, which calculates the wider regional economic impacts (results presented below).

The larger economic impacts for this scenario reflect the relatively high wages of this industry sector and the corresponding large multiplier effects to estimate potential economic gains.

Results

Table 3-12 presents the key modeling results for this scenario.

Table 3-12: Cybersecurity and tech scenario results

Economic impact scenario results relative to baseline					
		By 2025	By 2030	By 2035	By 2040
Aspirational scenario: tech/IT, big data, prof/tech services share improves to early-2000's levels	Jobs	1,500	4,300	7,600	12,400
	Output (\$m)	\$290	\$770	\$1,470	\$2,570
	Household income (\$m)	\$160	\$430	\$830	\$1,440
Transformational scenario: tech/IT, big data, prof/tech services share closes the gap with US average	Jobs	2,600	7,300	13,300	21,200
	Output (\$m)	\$500	\$1,330	\$2,580	\$4,440
	Household income (\$m)	\$280	\$750	\$1,450	\$2,500

Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

Relative to the baseline, by 2040 the *aspirational scenario* could support:

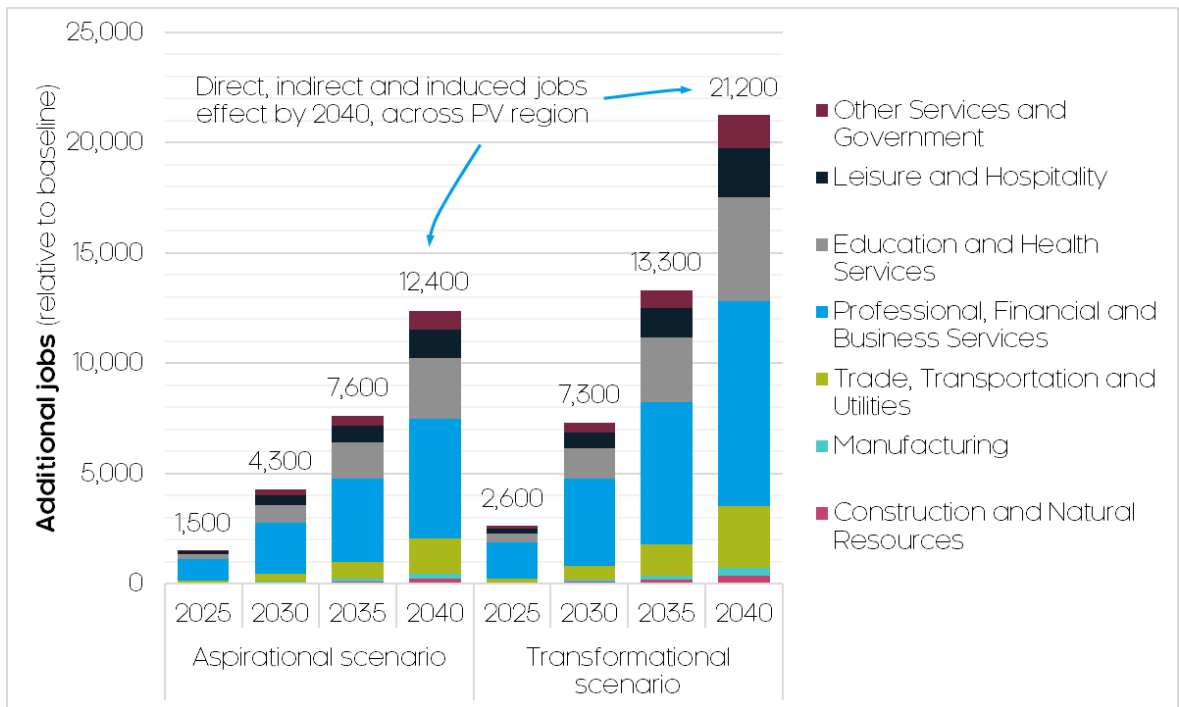
- The creation of an additional 12,400 direct, indirect, and induced jobs, 3% above the baseline
- \$2.6 billion of additional output for regional firms
- A \$1.4 billion boost to household incomes

Relative to the baseline, by 2040 the *transformational scenario* could support:

- The creation of an additional 21,200 direct, indirect, and induced jobs, 5% above the baseline
- \$4.4 billion of additional output for regional firms
- A \$2.5 billion boost to household incomes

Looking specifically at jobs, Figure 3-12 profiles the industry breakdown of potential impacts. Impacts are concentrated in industries highly related to the cybersecurity and tech sector in the region, most notably professional, financial and business services

Figure 3-12: Cybersecurity and tech scenario results by industry (job impacts only)



Source: Local Economy Futures Model, Cambridge Econometrics. Note: Results are relative to baseline, and include direct, indirect and induced economic effects across Pioneer Valley region

4 Regional Economic Strategic Initiatives

4.1 Introduction

Building from the results of the economic scenario analysis, this section provides greater detail on specific actions and partners that will lead on the identified regional strategies. As shown in the graphic below, the strategic priorities are organized around two key themes: 1) creating a more equitable and inclusive economy; and 2) supporting a more resilient and diversified economy.

The first three rows of strategies (six in total) are a direct link to the detailed scenario analysis presented in prior section. These six strategic areas were explored in significant detail with stakeholders and the task force to develop the ideas on actions, next steps, resources needed that are presented below.

Pioneer Valley Economic Recovery Strategy



Actively Create a More Equitable and Inclusive Economy	Support a More Resilient and Diversified Economy
Improve workforce participation and remove obstacles to sustainable employment	Reverse stagnant population trends with regional housing, east-west rail, and vibrant downtowns and town centers
Expand regional housing options and BIPOC homeownership rates	Cybersecurity and other tech/big data industry opportunities
Grow the number of BIPOC-owned businesses and support their growth	Expand the region's clean energy industry
Address the 'digital divide' and expand affordable broadband access	Understand Covid-19 impacts on hybrid work and transition real estate for new uses
Implement the Anchor Institution Initiative to expand BIPOC and local hiring and supplier opportunities	Support other key industry sectors – manufacturing, health care, education, farms and food, outdoor recreation

In two instances (addressing the digital divide/expanding broadband access, and implementing the anchor institution initiative), those strategic ideas are embedded within strategies to improve population trends and support growth of BIPOC small businesses.

Other strategic areas identified through this project, such as Covid-19 impacts on hybrid work and real estate as well as the need to support other key regional industries, are critical ongoing and evolving economic strategy areas for the region. So, while this report does not present details on those two items, they are worth highlighting here as they tie directly to ongoing workforce training, business support and other active regional efforts.

4.2 Improving Workforce Participation and Sustainable Employment Opportunities

Objective

Workforce participation and employment rates in the Pioneer Valley have been stubbornly below Massachusetts and US averages, leading to a smaller share of working-age population in productive employment. And we know this trend disproportionately affects lower income, less educated populations especially in urban areas with larger concentrations of BIPOC populations. One reason for this underemployment challenge is the wide-range of obstacles that individuals face to be sustainably employed from child care and transportation to mental health and housing, with these issues exacerbated by Covid-19. The objective of this strategic initiative is to increase the number of adults productively engaged in work which would mean thousands of additional jobs in the region, increasing income levels and spending, alleviating job vacancies, and reducing public subsidies.

Regional Economic Opportunity

Increasing the share and number of working age adults in the workforce would lead to thousands of additional jobs and broader regional economy benefits. We evaluate two forward-looking scenarios to 2040: 1) returning employment rates to levels seen in the 2000s and above 60% which would add 6,000 workers; and 2) an even more transformational scenario where the region would exceed the US average and close the gap with Massachusetts statewide resulting in roughly 13,000 additional workers.

To estimate the total regional economic impacts of removing obstacles to employment and increasing the number of adults actively engaged in the workforce, we applied the Local Economy Futures Model (LEFM) for the Pioneer Valley. This analysis revealed that increasing the number of residents in employment, could generate 7,000 to 15,00 total regional jobs at businesses and organizations in the Pioneer Valley by 2040 (depending on scenario). This is an understatement of total impacts as workers living in Hampden and Hampshire counties would also commute to jobs in nearby areas such as Hartford to the south and Franklin County to the north. These job gains represent an increase of 2 to 4% above the baseline, and would lead to household income gains of \$650 million to \$1.4 billion by 2040.

Key Stakeholders

Hampden and Franklin/Hampshire MassHire Workforce Boards, community colleges (STCC, HCC, GCC), Western Mass EDC/Springfield Works, vocational schools, Pioneer Valley regional workforce group (already established), community-based organizations (CBOs), and training providers (e.g., Tech Foundry), and higher ed institutions.

Action Steps

Priority actions to support this strategic initiative include:

- Enhance and regionalize efforts to remove obstacles to employment – Springfield Works and STCC are two examples of recent workforce development programs that emphasize targeted engagement with hard-to-reach individuals in lower income/BIPOC communities. They include efforts to meet potential workers in their community, determine

options to mitigate obstacles to employment, and help match individuals with hiring employers. Programs like this, which are labor intensive and require ‘hand holding’ over multiple meetings, are promising efforts to help more people become sustainably employed and address the ‘cliff effect’ that can occur if new wages threaten public subsidies (e.g., food stamps). These efforts should be coordinated, with dedicated/committed funding and extended throughout the region (building from efforts thus far in Springfield).

- Increase funding to community-based organizations (CBOs) – a critical aspect of delivering a program to remove obstacles to employment is partnering with CBOs who are best positioned to engage individuals in their communities. CBOs are also accustomed to working across the multiple categories of obstacles faced such as child care, transportation, mental health, English as a second language, etc.
- Work towards sustained and meaningful employer engagement – successful workforce development initiatives require meaningful engagement with private sector and non-profit employers. While community college and vocational schools typically include industry representatives to help craft occupational and technical curriculum, more engagement, input and funding is needed from employers to raise the magnitude and quality of training matched to specific job/industry opportunities.
- Engage our youth and high school students earlier – best practice suggests that there are opportunities to engage high school students (and younger) in career awareness, internships, and college prep. For example, increased communications should be explore around the kinds of successful and lucrative careers that can be had in trades (electricians, carpenters, plumbers) and manufacturing (where local employers are constantly looking for new workers).
- Continue the Pioneer Valley Labor Market Blueprint – led by a state initiative about five years ago to increase partnerships between education, workforce and economic development, the Pioneer Valley has a well-established group of partners who have identified priority industries (e.g., health care, education, manufacturing) and occupations (including IT/tech services). Slowed by the pandemic, this partnership work should continue, evolve as needed, and expand their reach and influence in terms of workforce training.

Resources needed for implementation

Successful implementation of this regional initiative will likely require:

- Increased funding and staff to support programs to address / mitigate obstacles to work, such as Springfield Works, STCC
- Increased funding towards community-based organizations (CBOs) with emphasis on CBOs active in lower income / BIPOC communities
- Recommend a dedicated staff position to be the liaison between employers and workforce training providers, focused on meaningful and sustained employer engagement

- Increased advocacy for funding to community colleges, child care, mental health and addressing other obstacles to work

4.3 Supporting BIPOC Business Ownership and Expansion Opportunities

Objective

Increasing the number and growth of BIPOC-owned businesses is a central goal to build a more equitable and inclusive Pioneer Valley economy. Based on the most current data, minority-owned businesses (14%) lag far behind their share of the population (26%). Nationally, this relationship is much closer with about 34% of the population in minority population categories and just 30% of businesses owned by minorities so there is much work to do in the Pioneer Valley. Further, the recently established Anchor Collaborative led by the Western Mass EDC is trying to help increase procurement opportunities for BIPOC-owned businesses but initial work reveals challenges in both identifying these businesses and their capacity to grow and become supplier to major anchor institutions like Baystate, UMass, etc.

Regional Economic Opportunity

Increasing the number of BIPOC-owned businesses as well as their capacity to grow and add jobs, could produce substantial economic gains for the Pioneer Valley while helping to address the decades' of inequity in our broader economy. To quantify this potential impact, we model two scenarios of BIPOC-owned businesses and expansion: 1) halving the gap compared to the regional population share (2,000 new or expanded businesses); and 2) a more transformational scenario that would see BIPOC-owned businesses proportional to population share. These scenarios would represent 2,000 to 5,000 new or expanded businesses over the next 20 years.

To estimate the total regional economic impacts of a significant expansion of BIPOC-owned business growth, we allocated business opportunities to industries (e.g., retail, construction, food services, etc.) and applied the Local Economy Futures Model (LEFM) for the Pioneer Valley. This analysis revealed 3,400 to 7,900 direct jobs at BIPOC-owned small businesses by 2040. The projected total regional economic impacts grow over time to 6,000 to 13,500 jobs depending on the growth scenario, along with \$600 million to \$1.3 billion in additional household income by 2040.

Key Stakeholders

Common Capital, Western Mass Small Business Development Center, Valley Venture Mentors, Western Mass EDC, Mass Latino Chamber of Commerce, Healing Racism Institute of the Pioneer Valley, Urban League of Springfield, local banks, local economic development officials, community development corporations (CDCs), Black Economic Council of MA, Mass Coalition for an Equitable Economy, PVPC, Holyoke EforAll.

Action Steps

Priority actions to support this strategic initiative include:

- Continue and Expand Community Connector Outreach – PVPC and the Healing Racism Institute initiated an effort at working with Community Connectors to identify BIPOC community leaders who

could help connect with a broader set of businesses and residents. This effort, including outreach to BIPOC business owners and entrepreneurs, should be expanded to help link them to the wide variety of small business support programs.

- Increase awareness, participants and effectiveness of Western Mass Means Business – the Pioneer Valley has a great start at coordination on small business and start-up support programs, resources, and communications with a strong set of organizations involved. This effort can be further expanded to include organizations that focus on supporting minority-business growth (e.g., Mass Latino Chamber, Urban League) and to further raise the profile of this initiative to provide a coordinated ecosystem of small business/start-up resources.
- Expand and fund the staffing for small business support – implementing effective small business support programs requires staff. Covid-19 exacerbated a long-known reality that there are not sufficient staff at organizations like the Small Business Development Center to handle all of the small business inquiries and opportunities, which often require direct technical assistance to individual businesses and start-ups.
- Advance the Anchor Collaborative – this initiative led by the Western Mass EDC is off to a promising start with commitments from major institutions like Baystate, UMass, and the city of Holyoke to better understand the baseline of BIPOC and local hiring and supplier spending. This work has a chance to become a national model, leveraging our historical strengths in ‘eds and meds’, and partnering with the business community to facilitate more local procurement spending captured in the region and supporting BIPOC-owned businesses.
- Tap into statewide initiatives to support a more equitable economy – ARPA and other funding resources, as well as state-level organizations like the Coalition for a More Equitable Economy, provide momentum, resources and policy advocacy that can be leveraged to help grow the Pioneer Valley’s BIPOC businesses.

Resources needed for implementation

Successful implementation of this regional initiative will likely require:

- Leveraging ARPA and state funding specifically-aimed at helping Latino and Black businesses
- Sustained funding to support more staff positions at small business support programs
- Partner with local banks and Common Capital to increase access to capital
- Funding programs to help mitigate the start-up and expansion costs for small businesses

4.4 Expand Regional Housing Options and Increase BIPOC Homeownership Rates

Objective

It is increasingly recognized that housing is closely interlinked with economic development and population growth. In the Pioneer Valley, BIPOC households only own 31% of their housing units compared to an average of 47% nationwide, with a homeownership rate over 70% among white populations in the region. And we know from multiple research studies that homeownership is one of the strongest pathways to build wealth. Separately, a recent UMass study found that the region has a deficit of about 20,000 housing units and that the Pioneer Valley is one of the most segregated regions in the US. Consequently, this strategic initiative recognizes the dual objectives of (1) expanding housing production and options throughout the region and (2) increasing the rate of homeownership for BIPOC communities.

Regional Economic Opportunity

These two housing-related priorities could have strong and lasting economic impacts for the region, and is a critical element of facilitating stronger population growth. To assess an increase in BIPOC homeownership rates, we examined increases of 7,000 to 13,000 additional homeowners (either renters converting to owners or new residents) which can lead to increased wealth and future household spending up to \$169 million by 2040. Examining increased housing production, we modeled an additional 9,000 to 15,000 housing units (above the baseline) which could result in up to \$2.7 billion in increased housing construction over the next twenty years.

To estimate the total regional economic impacts of higher BIPOC homeownership and expanded housing production and construction, we applied the Local Economy Futures Model (LEFM) for the Pioneer Valley. This analysis revealed that higher levels of wealth and spending power, combined with the stimulus of increased housing production, could generate 9,000 to 18,500 total regional jobs by 2040 (depending on scenario). The projected total regional economic impacts grow over time as larger numbers of BIPOC-residents own homes, build equity and increase wealth and spending. Business output (sales) are projected to increase by \$1.6 to \$3.4 billion by 2040, with household income gains up to \$1.9 billion by 2040.

Key Stakeholders

Way Finders, Pioneer Valley Planning Commission, Franklin Regional Council of Governments, community development corporations (CDCs) such as OneHolyoke, Valley CDC, Springfield Neighborhood Housing Services, and Hilltown CDC; Community Connectors to BIPOC communities; local housing authorities and organizations; Western Mass EDC; local banks.

Action Steps

Priority actions to support this strategic initiative include:

- Leverage ARPA and other state/federal funding for the Pioneer Valley – ARPA has led to unprecedented funding levels and programs to support housing, and Massachusetts continues to set statewide policies that prioritize increasing housing options. Now is the time for the Pioneer Valley to work regionally to ensure we get our fair share of

the funding and that we focus on our housing priorities, such as stronger first-time home buyer programs for BIPOC communities, and increasing housing production at all levels throughout the region.

- Increase awareness and success of first-time home buyer educational programs – first-time home buyer programs can be a critical pathway for low to middle income families to start building equity and wealth through homeownership. And while these programs are largely paid for by banks and their Community Reinvestment Act (CRA) funds, efforts should be focused on increasing awareness of these programs and their importance, along with hand-holding to help people completing that program convert into homeowners.
- Pilot and expand homebuyer programs – the Springfield City of Homes pilot project is a new effort aimed at identifying blighted homes that can be rehabbed and sold to first-time home buyers thereby improving the aging housing stock and matching these homes with first-time home buyers to increase homeownership rates. The region should learn from this pilot and seek to expand this idea to other cities and towns throughout the region.
- Partner with banks and local realtors – growing homeownership rates is a multi-pronged issue that requires educated and helpful realtors that can properly guide prospective homeowners through realistic financing options. And it also takes local banks willing to make loans and ideally modernize how they deploy CRA funds to meet the region's challenges and opportunities.
- Advocate for more financing and housing options – it has long been recognized that costs of constructing new housing in Western Mass are similar to greater Boston but with significantly lower market rates and sales prices. Consequently, the region needs more creative financing support and enticing options for private residential developers to build more housing. The recently proposed expansion of the Housing Development Incentive Program (HDIP) is a great start as it specifically affects the region's Gateway Cities, but more options are needed to help spread housing opportunities in our rural areas and towns.

Resources needed for implementation

Successful implementation of this regional initiative will likely require:

- Leverage ARPA and state funding for housing production and ownership opportunities
- Funding to sustain and replicate the Springfield City of Homes pilot project
- Create a Regional Housing Collaborative (with at least one FTE) to lead track and facilitate funding opportunities, first-time home buyer program success, and partnerships with local banks and realtors
- Increased advocacy for housing solutions and funding that work for Western Mass

4.5 Reversing Stagnant Population Trends

Objective

The Pioneer Valley has long experienced relatively flat population growth, with some instances of declining population such as in traditional cities and more rural areas. For example, over the 30-year period from 1990 to 2020, the Pioneer Valley's population only grew by 3.6% compared to growth of almost 17% for Massachusetts statewide and 33% at the US level. Consequently, the objective of this strategic initiative is to reverse these trends and ensure that the Pioneer Valley is attracting new residents and provides the workforce to support a vibrant economy. Along with other strategic initiatives identified in this Roadmap, we've identified multiple actions and priorities that can help provide the kinds of infrastructure, housing, and amenities to support stronger future population growth.

Regional Economic Opportunity

Reversing these trends could have a significant regional economic impact with more residents, households, workers, and local spending power. To quantify this opportunity, we investigated two growth scenarios over the next 20 years: 1) increasing regional population by about 25,000 over baseline projections; and 2) expanding population at a rate equal to recent Massachusetts growth, which would result in approximately 51,000 more residents.

To estimate the total regional economic impacts of reversing recent population trends and attracting more residents, we applied the Local Economy Futures Model (LEFM) for the Pioneer Valley. This analysis revealed modest job increases over the next 10 years with up to 9,400 to 19,600 additional jobs by 2040. The projected total regional economic impacts reflect stronger regional income and spending power with \$900 million to \$1.9 billion in additional household income by 2040.

Key Stakeholders

Pioneer Valley Planning Commission, Franklin Regional Council of Governments (FRCOG), Capitol Region Council of Governments (CRCOG), Western Mass EDC, regional tourism councils (RTCs), Wayfinders and housing partners.

Action Steps

Priority actions to support this strategic initiative include:

- Broadband infrastructure, accessibility and the digital divide – to support our existing population and help attract new residents, the region must be able to provide fast, reliable and affordable broadband internet access to all areas. Priorities in this area include: a) completing infrastructure upgrades to support broadband access in all areas, including our more rural towns; b) new programs and funding to increase the affordability of internet access, especially for lower-income residents in cities and rural areas; and c) expanding digital literacy to support effective use of the internet for education, work, etc.
- Support the advancement of intercity passenger rail projects and services – the Pioneer Valley is building momentum on passenger rail connections with the Valley Flyer providing access to Connecticut, New

York City, and beyond. And with expanded Federal rail investment funding, there is an opportunity to advance east-west rail to vastly improve rail connections to Boston, Worcester, and Pittsfield. Current plans are to establish a Western Mass Passenger Rail Authority to help implement and grow these rail services.

- Regional marketing – in addition to the efforts to grow regional tourism, there’s an opportunity to do a better job highlighting the Pioneer Valley as a great place to live, work and play. A marketing effort could be tailored to help attract remote (or hybrid) workers seeking lower cost of living with easier access to outdoor recreation assets (compared to larger cities), but still with relatively easy access to Boston and New York.
- Cultivate a diverse mix of inviting downtowns and town centers – the Pioneer Valley is blessed with a wide variety and scale of walkable town centers and downtowns. And most of these locations recently completed “Rapid Recovery Plans” to identify priority projects to help these places recover from the Covid-19 downturn and be positioned for future success. Implementing these projects, and leveraging expanded ARPA funds to support small businesses and residential opportunities, should be a pivotal aspect of this regional initiative.

Resources needed for implementation

Successful implementation of this regional initiative will likely require:

- Dedicated funding, potentially via ARPA funds, to boost lower-income broadband internet access
- New funding to support a regional marketing campaign geared towards live, work, play
- PVPC and FRCOG staff time supporting the establishment of a Western Mass Passenger Rail Authority
- A staff position to help coordinate and pursue funding to support town center and downtown projects and priorities

4.6 Expanding the Clean Energy Industry Cluster

Objective

The Pioneer Valley was an early leader in developing its clean energy economy – specifically solar, hydroelectric, and energy efficiency – by leveraging both research strengths at UMass Amherst and prioritization in both the public and private sectors of environmental protection and climate change response. While the clean energy sector has grown more rapidly in recent years in other parts of the Commonwealth, the Pioneer Valley’s share of clean energy jobs remains well above the state-wide average, and opportunities continue to exist for the cluster to drive regional economic growth as state and federal policy accelerate the clean energy transition.

Regional Economic Opportunity

Clean energy (defined to include water technologies as well as energy efficiency) remains an area of strength for the region, with significant potential for growth. We identified targets to increase the level of employment in the

region in clean energy by 5,000 and 11,500 jobs by 2040. The lower estimate reflects a rate of growth higher than what the region has seen since 2014. The higher estimate is on par with the rate of growth state-wide in recent years.

To estimate the total regional economic impacts of stronger clean energy sector economic growth, we allocated employment opportunities to industries (e.g., manufacturing, technical services, construction) and applied the Local Economy Futures Model (LEFM) for the Pioneer Valley. This analysis revealed 11,000 to 25,000 total regional jobs by 2040 (depending on scenario). The projected total regional economic impacts grow over time with business output (sales) expanding from about \$500 million in the near future to potentially over \$3 billion by 2040, with household income gains of \$1.4 billion to \$3.2 billion by 2040.

Key Stakeholders

Western Mass EDC, UMass Clean Energy Extension (and other UMass departments), Massachusetts Clean Energy Extension, Pioneer Valley Planning Commission, municipal utilities, Eversource, FirstLight, National Grid

Action Steps

Priority actions to support this strategic initiative include:

- Support Investment in UMass Water Technologies Testbed – The proposed water technologies testbed at UMass provides a unique asset for deployment and testing of innovations in wastewater management, water treatment and other areas. These innovations, led by nationally recognized researchers at UMass, have significant commercial potential and will also benefit municipalities by lowering operating costs.
- Develop Models for and Implement Local Acquisition of Clean Energy Assets – Community shared solar continues to be a success story for consumers and municipalities across the Commonwealth. A next step to generate significantly greater value is development of financing mechanisms that enable public investment and ownership of solar generation capacity at the local or regional level, thereby capturing a larger share of the benefit in the region. The UMass Clean Energy Extension has researched these financial models and can be a strong partner to help with implementation.
- Increase Focus on Energy Efficiency Programs for the Built Environment – While significant progress has been made on energy efficiency of the region’s building stock, the pace of transition needs to accelerate. This includes programs to promote adding insulation and energy loss reduction activities, as well as promoting the transition to “clean heat” systems such as heat pumps and thermal energy. The Massachusetts Clean Heat Commission will be helping to accelerate this transition statewide, and there’s an opportunity or existing contractors and workers in the Pioneer Valley to participate in this wide-range of building efficiency and electrification.
- Market Clean Energy Deployment – Greater awareness is needed regarding options for adoption and use of clean energy technologies by local businesses. The Western Mass EDC can work with chambers of

commerce throughout the region to help communicate the opportunities for business to adopt and use clean energy technologies.

- Invest in Pilot- and Demonstration-scale Advanced Manufacturing Capabilities for Energy Storage – Access to start-ups and established companies in the battery innovation and energy storage cluster provides opportunities for the region’s manufacturers to play a significant role in production for early-stage deployment. With the continued transition to a clean energy economy, this represents a significant market opportunity, especially for our small to mid-size precision manufacturers.

Resources needed for implementation

Successful implementation of this regional initiative will likely require:

- WMEDC and local chambers staff time to market clean energy deployment opportunities for local businesses, and support supply chain opportunities for manufacturers
- Mass Clean Energy Center funding and grant opportunities, along with federal funding via the Bipartisan Infrastructure Law (including electric vehicle charging stations)
- Staff resources to help communicate and implement a community investment and ownership program for solar facilities
- Staff resources to help gather and track better information on regional clean energy economy activities (businesses, employees, clean energy generation)

4.7 Leveraging New Opportunities in Cybersecurity and Related Tech Sectors

Objective

Cybersecurity represents an emerging opportunity for industry growth and job creation in the Pioneer Valley. Larger employers (including those in the region) do not have sufficient supplies of talent to meet their workforce needs, and remote workers are being utilized increasingly across the country to meet demand. Per [CyberSeek](#), there are 1,000,000 workers in the cybersecurity workforce in the US and an additional 600,000 unfilled positions (totals for the Commonwealth are 26,000 workers and 17,000 unfilled positions). For companies which do not have cybersecurity professionals on staff, cybersecurity services is a growing share of IT procurement. Small and mid-sized companies in all sectors have an increasing need for these and related tech and big data services. Assets in the Pioneer Valley include a large research university with nationally-ranked programs in computer science and cybersecurity, numerous additional higher education institutions investing in degree programs in cybersecurity and related fields, and additional investments which support cybersecurity talent production and entrepreneurship.

Regional Economic Opportunity

The demand for workers with cybersecurity skills shows no signs of abating, and increased acceptance of remote employment provides new opportunities

for Pioneer Valley residents. Over time, a growing share of employers will hire staff into these roles, and more companies of all sizes will similarly invest in procurement of cybersecurity services. We identified targets to increase the level of employment in the region in information and professional/ technology jobs by 5,900 and 11,800 jobs by 2040 (the latter target closes the gap between the Pioneer Valley and national averages).

To estimate the total regional economic impacts of new opportunities in cyber, tech and big data, we allocated employment opportunities to industries (e.g., software and data processing, technical services) and applied the Local Economy Futures Model (LEFM) for the Pioneer Valley. This analysis revealed 12,000 to 21,000 total regional jobs by 2040 (depending on scenario), with the strongest multiplier effects of any scenario driven by the relatively high wages of these sectors and the resulting spending impacts. The projected total regional economic impacts grow over time with business output (sales) expanding from about \$400 million in the near future to potentially over \$4 billion by 2040, with household income gains of \$1.4 billion to \$2.5 billion by 2040.

Key Stakeholders

Western Mass Cyber Center of Excellence, Western Mass EDC, Pioneer Valley Planning Commission, Springfield Technical Community College (STCC), Bay Path University, UMass Amherst, Western New England University, Elms College, Springfield College, The Tech Foundry, City of Springfield, Mass Tech Collaborative / MassCyberCenter, Massachusetts Small Business Development Center Network, MassMEP.

Action Steps

Priority actions to support this strategic initiative include:

- Complete Build-out and launch of Western Mass Cyber Center of Excellence – To be located at Union Station (Springfield) with expected federal and state funding to support initial build-out and operations (small staff). Focus areas should include: 1) development of programming for its Cyber Range for professional development, preparation of entry-level cybersecurity professionals, and K-12 education and outreach; 2) promotion of its Security Operations Center services to potential government and private sector clients in the Pioneer Valley; and 3) outreach and awareness programs for small businesses.
- Build Academic Programs to Train the Next Generation of Cybersecurity Professionals – All higher education institutions with cybersecurity programs should prioritize efforts to secure recognition and funding from premier federal agency programs supporting talent development in cybersecurity (e.g., NSA’s National Centers for Academic Excellence, NSF’s Cybersecurity Innovation for CyberInfrastructure, CyberCorps Scholarships for Service, etc.).
- Support Business Start-up and Other Capacity-building to Address Needs of Small and Mid-sized Companies – Targeted training and entrepreneurial support should be provided to create start-up companies to provide cybersecurity services to small and mid-sized companies in the Pioneer Valley. Work within the region’s burgeoning

entrepreneurial eco-system (e.g., Valley Venture Mentors, EforAll, UMass, small business support organizations) to encourage and nurture new business start-ups in these fields.

- Develop and Promote Efforts to Increase Cybersecurity and Resilience of Municipalities and Other Local Public Entities – An inventory of resources (both free and fee-based) available to public sector entities should be developed, along with an infrastructure and systems that enable consistent information sharing and access to expertise on improving cyberdefense capabilities, including the Western Mass Cyber Center of Excellence. Advocacy efforts for increased Commonwealth and federal investments in local government cybersecurity should be prioritized.

Resources needed for implementation

successful implementation of this regional initiative will likely require:

- Final approvals of state and federal investment for establishment of Western Mass Cyber Center of Excellence.
- Continued coordination among Western Mass Cyber Center of Excellence partners and engagement with leading employers and potential clients.
- WMEDC and local chambers staff time to support outreach to small business owners in all sectors to provide access to relevant services that will make their enterprises more secure and resilient.
- Partnership and networking with higher education institutions (and their computer science / cyber programs), entrepreneurship support organizations, and existing tech / big data / cyber firms in the Pioneer Valley.

5 Actions and Next Steps

As discussed in great detail, this report makes the case that the Pioneer Valley economic recovery plan should focus on strategies to:

1. Create a more equitable and inclusive economy
2. Support a more resilient and diversified economy

The section above outlines fairly specific actions, partners/collaborators, next steps and resources needed to implement and achieve success for the strategic initiatives identified in this EDA-funded project led by PVPC. All of the identified strategies require resources (of some kind) for implementation, and this is where many economic plans fall short – a lack of follow-through to obtain resources (staffing, program dollars, investments). Hence, underlying this project and the core economic goals is a recognition that to be successful the region must increase its capacity to implement and sustain strategic economic initiatives (see graphic below).

Pioneer Valley Economic Recovery Strategy



Increase the Region's Capacity to Implement and Sustain Strategic Economic Initiatives

- Sustain and create collaboration and monitoring roles for the Economic Recovery Task Force
- Actively pursue state, federal and non-profit funding opportunities aligned with priorities
- Build on and sustain Community Connectors' engagement with BIPOC communities and businesses
- Ensure sufficient and sustainable resources for operations, programs and staffing to execute agreed upon strategic priorities

In the immediate future, PVPC plans to continue the Pioneer Valley Economic Recovery Task Force, and will continue to evolve that group's role to best support collaboration, implementation, and monitoring of progress towards the stated economic priorities. PVPC also plans to continue the work with Community Connectors to BIPOC communities and leaders. This effort, aligned with the Healing Racism Institute of the Pioneer Valley, has already proven useful at reaching people and perspectives on topics like homeownership, small business growth, and workforce.

As noted in the specific strategies, there are a number of federal and state funding resources currently available, many of which were amplified by the

American Rescue Plan Act (ARPA) of 2021 or the 2022 Bipartisan Infrastructure Law (BIL). In short, it means that there are more funding opportunities than typically available across areas like housing, workforce, and small business support. Finding ways to ensure the Pioneer Valley gets 'its share' of those funding programs, along with dollars for operations and staffing, will be critical to near-term implementation.

In sum, the Pioneer Valley region is an economic area with strong anchor institutions and higher education, a high-quality workforce, enviable outdoor recreation assets, innovative and competitive business sectors, and a diverse mix of urban, downtown, rural and town center areas. But it also faces challenges regarding economic segregation, pockets of poverty and disconnected workers. Focusing on specific mechanisms to improve economic equity, while also positioning the region for broader economic success and attracting workers and residents, should lead to a more prosperous, equitable and inclusive Pioneer Valley economy.

Technical Appendix – Local Economy Futures Model (LEFM)

Provided here is a technical summary of Cambridge Econometrics' proprietary Local Economy Futures Model (LEFM), which was used during the economic scenario planning phase of this project.

Background

The LEFM is a demand-led economic impact and forecasting model that models the relationships between firms, households, government and the rest of the world in a highly disaggregated framework (e.g. 64 sectors), which enables the impact on the economy (employment and value added) of demand-side factors (such as an increase in demand due to stronger world growth) to be analyzed.

This latest iteration of LEFM is a successor to the previous version, known as the Local Economy *Forecasting* Model, that was developed by Cambridge Econometrics (CE) in collaboration with the Institute for Employment Research at the University of Warwick. This was a software package tailored to model regional and local economies, commercially available since the early 1990s (since when it has been continually developed) and designed to empower organizations to undertake detailed economic analysis in-house. Different iterations of LEFM have been used extensively by national, regional and local agencies, and by CE for more specialized analysis often commissioned by local authorities, for the past three decades.

Over the lifetime of LEFM, substantial research has been undertaken within the academia as to the drivers of economic growth and development at the local and regional level. We include here fields such as Regional Science, New Economic Geography and Evolutionary Economics, and their insights into the role of the knowledge economy, specialization and related variety, and, in particular, agglomeration and clustering, in shaping economic growth patterns. The latest version of LEFM differs from previous iterations in that it explicitly attempts to augment its existing functionality by utilizing these now-widely accepted insights and capture these effects within the model.

It does this by explicitly utilizing a *complex systems* approach. This is to say, it does not assume the presence of these effects, or any other macro-level effects such as crowding out, by explicitly coding in system-level causal relationships, but instead provides sufficient detail in the nature of the relationships between economic actors, that allow the possibility that these effects may emerge spontaneously, as they would in any real-world economic system.

Overview of Model Design

LEFM has been designed to project economic indicators for a defined sub-national geography, usually a local area (county) or a contiguous group of local areas, by explaining the output of local sectors through an explicit representation of expenditure flows in the area and their links with the world outside the local area. In this it differs from other methods of local economy modeling which typically link local output or employment (by sector) directly to

national or regional output or employment. Such methods include shift-share or econometrically estimated equations. While these methods allow a user to derive projections for local output or employment growth from national or regional projections, they offer little scope for introducing an explanation of local performance relative to these higher levels, and they are typically not suitable for analyzing the indirect effects on the local economy arising from the opening of a new enterprise or the closure of an existing one.

LEFM is also distinguished from other approaches by its sectoral detail. It identifies 64 sectors (defined on NAICS codes), allowing (for example) electronics to be distinguished from electrical equipment, and IT services from other business support services. Detailed disaggregation by sector is usually valuable because different sectors have different prospects (e.g., technological change is driving much faster growth in electronics and computing than in the other sectors with which they are commonly combined), because they have different employment characteristics, and also because it allows local knowledge about specific firms to be more easily incorporated in the forecast. LEFM also includes explicit representation of the local workforce and population, disaggregating by both employment status (employed, unemployed, inactive working age, and non-working age) and 25 occupations (defined on SOC2010). Net commuting patterns are also accounted for. The local sectoral base and local population/labor market are not treated independently but rather as interacting subsystems.

As the model moves through multiple timesteps (the forecast time period), it deals with both demand and supply effects in different ways. As an input/output based model, the primary driver of short term changes in variables within the model is demand-driven. Examples of short-run demand-driven mechanisms include: the flow of demand up a value chain between sectors, the flow of investment demand for investment goods producing sectors, the flow of labor demand from local sectors to the labor market, and the flow of demand from the local population to local service providing sectors.

However, demand is not assumed to be unconstrained. Both local sectors and local labor markets have “supply-side” constraints that dictate the extent to which changes in demand lead to changes in real outputs and activity vs price or wage responses. These constraints are fixed in the short-term, but allowed to adjust over the longer run, in response to extended changes in levels of demand. It is the way in which these constraints slowly adjust over time that are the new feature of the modeling, and where we have relied on insights from the past two decades of academic evidence. This includes explicit consideration of a wide variety of variables, including sectoral investment, sectoral output capacity, sectoral product quality, sectoral product price, sectoral market share, occupational demand, occupational supply, and occupational wages.

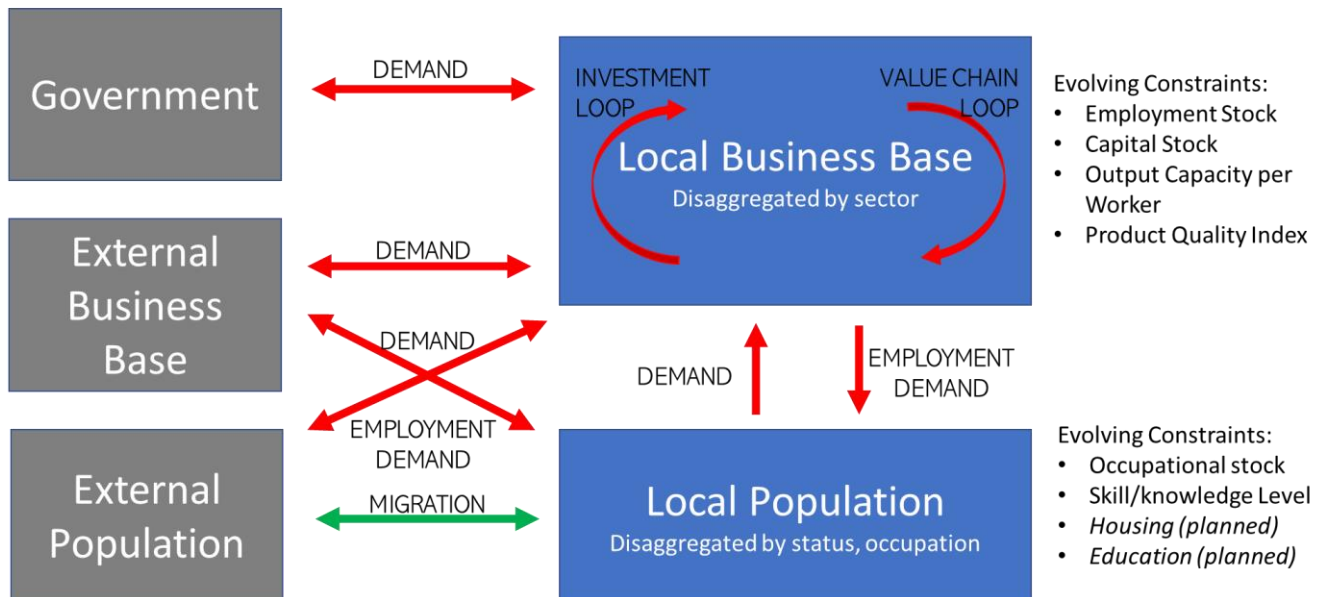
It is by allowing these supply-side variables to evolve over time according to a simple set of heuristics, that allow some of the features of agglomeration economies, for example the mutually beneficial coevolution of related sectors, or the gradually improved matching of local sectoral base and labor market, to emerge spontaneously.

LEFM's Main Relationships

Accounting structure

The graphic below summarizes the model's structure: the three broad groups of actors are: local business base (disaggregated by sector), local population (disaggregated by status and occupation), and external entities, including government, external firms, and external population.

LEFM Model Core Overview



How the main variables are determined

Employment in the local area generates incomes. Assumptions are made for net commuting, which determines the extent to which incomes from local employment accrue to non-residents. Similarly, some incomes in the local area are derived from employment outside the area, or from non-employment sources (e.g., dividends, interest, rent). Aggregate household expenditure by residents in the local area is determined by current and previous real household disposable incomes at local and regional/state level (deflated by the national household expenditure deflator). Household expenditure is then allocated across consumption categories in the same proportions forecast for the region.

Government final expenditure (disaggregated by five functions, 3 federal and 2 state/local) in the local economy is projected based on existing spending levels and changes in the local area's share of the state's population.

Investment by sector is determined by existing investment levels and real production, at local and regional/state level.

Intermediate expenditure by sector and commodity is determined by applying the national input-output coefficients to local economy gross output by sector.

Exports by sector have a base level which is a share of regional/state output. The share is determined by the ratios of local to regional/state levels of employment and output. This base level of exports changes in response to prices and quality of products.

Imports by sector to the local economy depend on the final and intermediate demand for commodities in the local economy and on assumptions for import shares.

Employment by sector is determined by previous employment by sector, changes in regional/state level employment, and changes in both local and regional/state level output.

Employment by gender and type is determined by employment by sector and national data on the shares of genders in employment in each sector. A similar procedure is followed for employment by occupation.

Projections for the resident workforce are derived from assumptions for the population that is of working age (by gender) and projected participation rates, which are in turn a function of the unemployment rate. 'Net commuting' (non-local workers travelling in to fill local jobs minus local workers travelling outside the area for work) is a residual, constrained by assumptions about how able the local workforce is to grow in response to employment opportunities.

Unemployment is the difference between the workforce, local employment and 'net commuting' of non-resident workers filling local jobs. This circular calculation between participation rate and unemployment is an example of the non-linear, systems approach used in calculating the model's outputs.

The baseline LEFM projections are economic projections based on historical growth in the local area relative to the regional/ state level or national level (depending on which area it has the strongest relationship with), on a sector-by-sector basis. They assume that those relationships continue into the future. Thus, if a sector in the local area outperformed (or underperformed) the sector in the region or nation as a whole in the past, then it is assumed that it will outperform (or underperform) in the future.

US LEFM: Forecast Assumptions and Main Outputs

The main input assumptions used in LEFM are:

- Forecasts for the US and state in which the local economy lies for selected variables, including:
 - value-added and employment by 64 sectors
 - components of personal incomes
- Outputs for the local economy include:
 - value-added and employment by 64 sectors
 - employment by gender and status (full-time, part-time, self-employed)
 - employment by 25 occupations (SOC2010)
 - disposable income and consumer spending
 - population and labor force by age (7 age bands) and gender
 - net commuting
 - implications for qualifications

The table below shows the 64 sectors for which data are available for in the LEFM.

Sector
Farms
Forestry, fishing, and related activities
Oil and gas extraction
Mining, except oil and gas
Support activities for mining
Utilities
Construction
Food and beverage and tobacco products
Textile mills and textile product mills
Apparel and leather and allied products
Wood products
Paper products
Printing and related support activities
Petroleum and coal products
Chemical products
Plastics and rubber products
Nonmetallic mineral products
Primary metals
Fabricated metal products
Machinery
Computer and electronic products
Electrical equipment, appliances, and components
Motor vehicles, bodies and trailers, and parts
Other transportation equipment
Furniture and related products
Miscellaneous manufacturing
Wholesale trade
Retail trade
Air transportation
Rail transportation
Water transportation
Truck transportation

Transit and ground passenger transportation
Pipeline transportation
Other transportation and support activities
Warehousing and storage
Publishing industries, except internet (includes software)
Motion picture and sound recording industries
Broadcasting and telecommunications
Data processing, internet publishing, and other information services
Federal Reserve banks, credit intermediation, and related activities
Securities, commodity contracts, and investments
Insurance carriers and related activities
Funds, trusts, and other financial vehicles
Real estate
Rental and leasing services and lessors of intangible assets
Professional, scientific, and technical services
Management of companies and enterprises
Administrative and support services
Waste management and remediation services
Educational services
Ambulatory health care services
Nursing and residential care facilities
Social assistance
Performing arts, spectator sports, museums, and related activities
Amusements, gambling, and recreation industries
Accommodation
Food services and drinking places
Other services, except government
Federal general government (defense)
Federal general government (nondefense)
Federal government enterprises
State and local general government
State and local government enterprises