UMASS DONAHUE INSTITUTE

Berkshire Advanced Manufacturing Study

For the Pittsfield Economic Revitalization Corporation

Prepared by

UMass Donahue Institute
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Acknowledgements

This project was funded by the Pittsfield Economic Revitalization Corporation (PERC), an organization whose primary purpose is to further the economic development and social welfare of the City of Pittsfield and Berkshire County to increase employment opportunities and facilitate growth and development of small businesses.

This economic and industry research study was completed by the Economic and Public Policy Research (EPPR) group at the UMass Donahue Institute. Key project members included:

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Purpose and Background

The UMass Donahue Institute was engaged by the Pittsfield Economic Revitalization Corporation (PERC) to study advanced manufacturing in Berkshire County to help local leaders create a strategy for business and job growth for the region. The PERC sectors of interest include nanotechnology, plastics molding and medical devices, and life sciences manufacturing. But this study recognizes that advanced manufacturing can and does occur within any manufacturing industry sector, so we are not limiting the analysis to particular sectors but rather exploring manufacturing opportunities more broadly, including the workforce needs and challenges of manufacturing in the Berkshires. PERC is interested in understanding the region's assets and opportunities to support and grow its manufacturing sector through business attraction and expansion. For example, one opportunity explored in this report is the potential of supply chain/vendor business opportunities in the Berkshires based on the Global Foundries significant and expanding semi-conductor facilities across the border in New York.

To accomplish this, we structured the economic development analysis and this report into four major components:

1. An overview of the identified advanced manufacturing industry sectors for Berkshire County based on an analysis of publicly available and proprietary data. This includes:

    a. An overview of manufacturing in the Berkshires – historical trends, share of jobs by industry

    b. An industry sector assessment of manufacturing in the Berkshires based on jobs, location quotients, growth trends, value added, and average wages

    c. Identification of manufacturing establishments in the Berkshires by location

2. Conduct targeted key informant interviews of Berkshire County business and industry leaders, educational institutions, and workforce leaders to get a more in-depth understanding of the existing assets, skills/expertise, opportunities and challenges facing advanced manufacturing in the Berkshires.

3. Develop applicable best-practices and lessons learned in terms of an advanced manufacturing initiative for the Berkshires. The best practices focus on workforce development and training, supply chain/supplier opportunities, and the necessary ecosystem attributes to grow an advanced manufacturing sector. Best practices and lessons learned are derived from:

    a. Existing Massachusetts state-level and regional efforts to enhance its manufacturing sectors;

    b. Recent studies/reports on manufacturing in MA and nationally; and

    c. Online research regarding the types of businesses that locate near semi-conductor plants and experiences from other major semi-conductor plants.

4. Based on the previous work steps, this report generates a set of findings and opportunities to help Berkshire County develop a focused, data-driven strategy to enhance and grow its advanced manufacturing sector.

The Importance of Advanced Manufacturing

PERC has identified subsectors of interest for the Institute to explore that all fall under a broader advanced manufacturing umbrella. Advanced manufacturing has garnered much attention in the last several years from both federal and state policymakers. President Obama has made the revitalization of manufacturing in the U.S. a top priority, launching the Advanced Manufacturing Partnership in June 2011, a collaboration of industry, academia and government. The Partnership was formed to help guide recommendations for investments and strategies for making the U.S. a leader in advanced manufacturing. As described more fully in the report, the Obama Administration has continued its efforts to enhance manufacturing through the establishment of advanced manufacturing institutes (centers of excellence) and a National Network of Manufacturing for Manufacturing Innovation. The emphasis on manufacturing also supports the National Export Initiative that seeks to expand U.S. exports.[1]

Massachusetts, identifying advanced manufacturing as an essential component of its innovation economy, has launched the Advanced Manufacturing Collaborative (AMC), a group comprised of leaders from industry, academia and government, to help identify on-going needs of the manufacturing industry in the Commonwealth. The agenda of the AMC is focusing on promoting manufacturing, workforce development, technical assistance and innovation, the cost of doing business, and access to capital. Advanced manufacturing has thus become one of the key economic development initiatives of the Patrick Administration, and Secretary Gregory Bialecki of the Executive Office of Housing and Economic Development has commented frequently about the desire to help facilitate greater success in this industry throughout the Commonwealth.

An important issue that many have considered is how best to define advanced manufacturing. The consensus appears to be shifting away from a focus on identifying specific, detailed industry sectors or products towards a more holistic definition that recognizes that advanced manufacturing can occur essentially within any manufacturing sector. Along those lines, the AMC, in *Building Bridges to Growth: A Roadmap for Advanced Manufacturing in Massachusetts*[2] has defined advanced manufacturing as "a way of producing" and uses the National Council for Advanced Manufacturing guidelines that describes advanced manufacturing as making "extensive use of computer, high precision, and information technologies integrated with a high performance work force in a production system capable of furnishing a heterogeneous mix of products in small or large volumes with both the efficiency of mass production and the flexibility for custom manufacturing in order to respond rapidly to customer demands." This report uses the same approach. It allows for a comprehensive profile of manufacturing in the Berkshires and exploring a wide range of possible opportunities that recognizes the diverse manufacturing businesses that reside and thrive in the region.

As shown in the economic data presented below, the decline in manufacturing jobs as a share of the total workforce is a long-term trend experienced at the U.S. level and even more severely in the Berkshires. That said, manufacturing still plays a vital role in the local, state and U.S. economies:

- Manufacturing provides almost 10 percent of all jobs in the U.S., and 12 percent of gross domestic product (GDP), meaning that the industry provides high value-added, and the long-term increase in the dollar value of manufacturing output reflects the growth in productivity and innovation of U.S. companies.
- Manufacturing generates the 13 percent of Massachusetts GDP, the highest share of all major sectors of the economy (slightly ahead of professional/technical services, finance and insurance and real estate).

[1] For more information, see http://trade.gov/nei/

[2] *Building Bridges to Growth: A Roadmap for Advanced Manufacturing in Massachusetts*, Massachusetts Technology Collaborative, 2011. It is located online at: http://www.mass.gov/hed/docs/eohed/building-bridges-to-growth.pdf

- Although manufacturing employment in the Berkshires has declined, there are approximately 125 manufacturing establishments located in the region, with relatively strong industry concentrations still present in paper, plastics, and textile products.

Related to these trends that show a relatively smaller role in the overall economy for manufacturing but a still vital contribution, a number of research-driven reports and books have been published in recent years (some of which are profiled in this report in terms of possible strategies for the Berkshires). The 2012 book *Producing Prosperity: Why America Needs a Manufacturing Renaissance* presents a number of reasons and evidence about why manufacturing is critical to the U.S. economy but the overall theme is valid for any region which is that the country's ability to innovate and be a leader in research and development (R&D) is closely aligned with its manufacturing sector.[3] Further, the book argues that the success of manufacturing is ultimately a joint responsibility of the private sector, government, and institutions – government policies related to R&D funding, workforce training and education and other factors can create an environment that is conducive to manufacturing but "ultimately management decisions [by the private sector] will determine what happens." Thus, one of the goals of this report is to best understand how the Berkshires can create "the right conditions" for advanced manufacturing to be retained and expand in the region.

The changes and evolutions of manufacturing in the U.S. are also being covered frequently by the popular press, with special emphasis on the notion of "onshoring" – returning manufacturing jobs from overseas. An article in the Wall Street Journal from June 10, 2013 titled "A Revolution in the Making: Digital technology is transforming manufacturing, making it leaner and smarter – and raising the prospect of an American industrial revival"[4] provides a good overview of recent trends and opportunities in advanced manufacturing, including the advent of 3-D printing, and the increased use of automation and electronic sensors. In particular, it notes that however manufacturing in the U.S. recovers and evolves "Almost certainly, it won't mean creating jobs the old way—building large factories that employ thousands of people. The real opportunity is in the growth of highly specialized, highly advanced microfactories and in legions of small entrepreneurial ventures making old things in new ways, as well as producing new products and custom-made items." To a large extent, this statement captures manufacturing in the Berkshires – less emphasis and reliance on a few big factories but significant dynamism in a range of small-medium sized firms utilizing advanced, highly technical and precise manufacturing methods.

Past and Current Industrial Context in the Berkshires

As presented in a documentary, much of Berkshire County was built along the Hoosic and Housatonic Rivers.[5] In the 18th century, the Housatonic River powered saw mills, dye works, and weaving and spinning factories. The remnants of many of these mills remain. Thirty years ago, manufacturing jobs supplied more than 40 percent of the county's employment base. Major manufacturers were located in North Adams, Pittsfield, Lee and other towns throughout the Berkshires. By the early 1990s, more than half of manufacturing jobs in the region were eliminated, with the departure of General Electric from Pittsfield garnering much of the headlines. In the last five years, over 18 manufacturing companies closed their doors, contributing to an additional 2,700 lost jobs. In addition, there are more than 1,300 contaminated sites in the county and brownfield assessments are needed to help determine the extent of contamination, the costs of site cleanup, and redevelopment uses.
At the same time, the Berkshires have become a best practice model across the Commonwealth for creative economy initiatives. This includes downtown revitalization efforts in Pittsfield, North Adams and Great Barrington, partly driven by artist galleries and related creative/design focused activities. It also includes promotion and collaboration with the region's significant cultural institutions and museums such as the Clark Institute in Williamstown, the Massachusetts Museum of Contemporary Art (Mass MOCA) in North Adams, the

[3] Pisano, Gary P. and Willy C. Shih, *Producing Prosperity: Why America Needs a Manufacturing Renaissance*, Harvard Business Review, 2012.
[4] http://online.wsj.com/article/SB10001424127887324063304578522812684722382.html
[5] See http://www.papertownprojects.org/projects.html

Norman Rockwell Museum in Stockbridge, and Tanglewood in Lenox and Stockbridge. The Berkshires have organized successfully in support of the creative economy and the Berkshire Creative[6] has over 6,000 people engaged in this industry with a mission "to stimulate job growth and economic opportunity in the region by sparking innovative collaborations between artists, designers, cultural institutions and businesses."

To complement the successes of the creative economy, this research study is focused on a data driven assessment of opportunities to further grow and diversify the economic and job opportunities in the Berkshires in advanced manufacturing. We attempt to profile high-tech manufacturing industries already present in the Berkshires, understand their issues and opportunities for growth, and consider strategies and ideas to further bolster this industry, including opportunities to tap into regional manufacturing initiatives, major companies, and the renewed national focus on creating an eco-system for innovative manufacturing in the U.S.

What is Advanced Manufacturing?

In the report *Building Bridges to Growth: A Roadmap for Advanced Manufacturing in Massachusetts (2011)*, the Massachusetts Technology Collaborative adopted a definition for advanced manufacturing in Massachusetts from the National Council for Advanced Manufacturing "as a process – a way of producing — that 'makes extensive use of computer, high precision, and information technologies integrated with a high performance work force in a production system capable of furnishing a heterogeneous mix of products in small or large volumes with both the efficiency of mass production and the flexibility for custom manufacturing in order to respond rapidly to customer demands.'"

With this in mind, UMDI reviewed previous work done statewide on advanced manufacturing sectors to create a list of specific examples of the types of manufacturing sectors most representative of advanced manufacturing. As mentioned earlier, we did not restrict our analysis to a narrow definition of advanced manufacturing, but it is instructive to consider the definitions of advanced manufacturing generated from other recent work. The review included the Institute's own industry work on information technology, medical devices, biopharma and the life sciences. Additionally, we reviewed recent work on the topic of advanced manufacturing by the Massachusetts Technology Collaborative, the Precision Manufacturing Regional Alliance Project, and Deloitte for the New England Council.

In 2010, the Precision Manufacturing Regional Alliance Project (PMRAP) defined the Pioneer Valley's precision machining cluster within the region's larger precision manufacturing sector.[7] Their work on precision manufacturing focuses primarily on the machining of metal products but incorporates into its definition the manufacture of products produced for a variety of industries including plastics, paper, machinery, instrument and electronics. Their work highlights the fact that "the precision manufacturing industry in general and the precision machining sector specifically, are either active or are targeting future business opportunities in the following markets: Aerospace; Defense, including Robotics; Medical Devices; Renewable Energy Devices; and Laboratory Instrumentation."

The firms within the precision manufacturing sector include firms focused entirely on the manufacture of advanced, technology-driven products and also firms that provide products to a wide range of industries. The definition thus includes advanced materials, medical equipment and supplies, as well as other manufacturing sectors. The PMRAP definition of sectors is included in its entirety and additional manufacturing sectors are highlighted to capture supplementary medical device manufacturing sectors and bio/pharmaceutical manufacturing.

[6] http://berkshirecreative.org/
[7] *Massachusetts Center for Advanced Precision Manufacturing Technology (MCAPMT): The Feasibility Study*

This list of manufacturing sectors is intended as a starting point from which to begin thinking about advanced manufacturing, providing tangible and specific examples of manufacturing sectors commonly associated with advanced manufacturing.

Table 1. Industry Sectors for Advanced Manufacturing

2012 NAICS	NAICS Description
Precision Manufacturing	
326	Plastics and Rubber Products Manufacturing
3315	Foundries
3321	Forging and Stamping
3322	Cutlery and hand tool manufacturing
3325	Hardware Manufacturing
3326	Spring and Wire Product Manufacturing
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing
3328	Coating, Engraving, Heat Treating, and Allied Activities
3329*	Other Fabricated Metal Product Manufacturing*
3332	Industrial Machinery Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing
3335	Metalworking Machinery Manufacturing
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing
3339	Other General Purpose Machinery Manufacturing
3391	Medical Equipment and Supplies Manufacturing
Other Medical Device Manufacturing	
334510	Electromedical and electrotherapeutic apparatus manufacturing
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation apparatus manufacturing
Bio/Pharmaceutical Manufacturing	
3254	Pharmaceutical and Medicine Manufacturing

Source: UMass Donahue Institute research

Profile of Manufacturing in the Berkshires

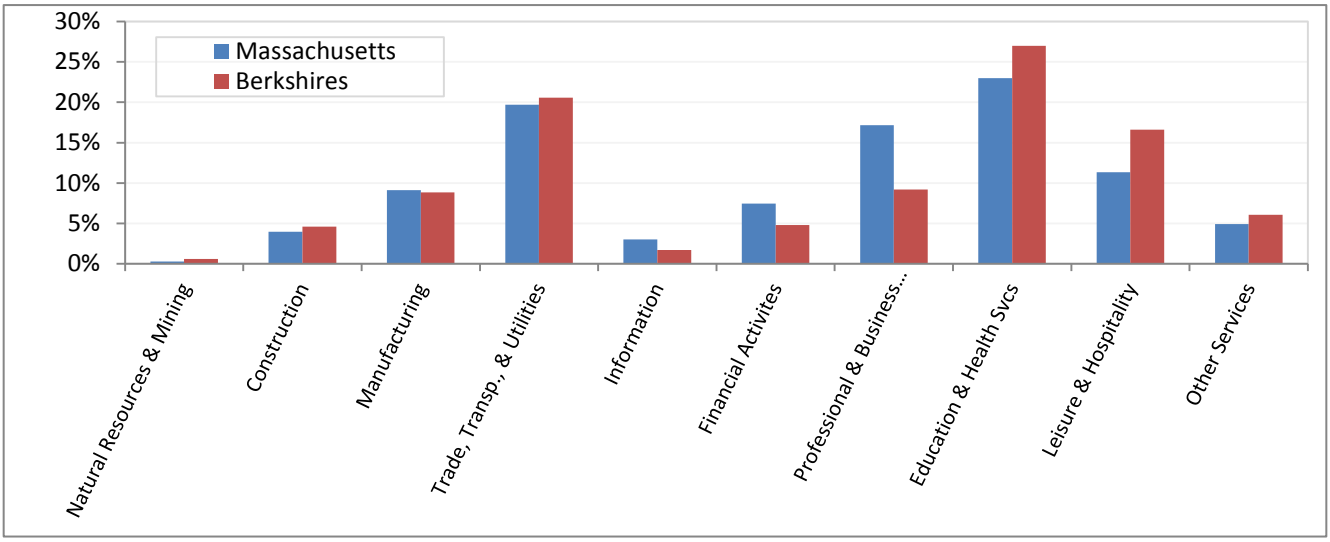
This section of the report provides a profile of the manufacturing industry sector in Berkshire County. All material in this section is generated from the latest industry-level and establishment-level data available to the research team in terms of jobs, wages, gross domestic product (GDP), and business locations.

Manufacturing Industry Trends

Manufacturing remains a critical part of the economy of Berkshire County. Key strengths reside primarily in paper manufacturing, plastics and rubber products, printing, chemicals, minerals, fabricated metal, and machinery. And in terms of total wages, manufacturing is the second-largest industrial sector in the county.

Despite shrinking over time (see below), manufacturing remains a crucial part of the Berkshire County economy, and the economic base of the state. Manufacturing provided 8.8% of all employment in the Berkshires in 2011 (the most recent data available), a slightly lower share of jobs than in Massachusetts statewide. Only the Health Care, Retail Trade, and Accommodation and Food Services industries are larger, as is also true for Massachusetts as a whole. The Berkshires have relatively strong concentrations in trade and transportation, education and health care services, and leisure and hospitality services.

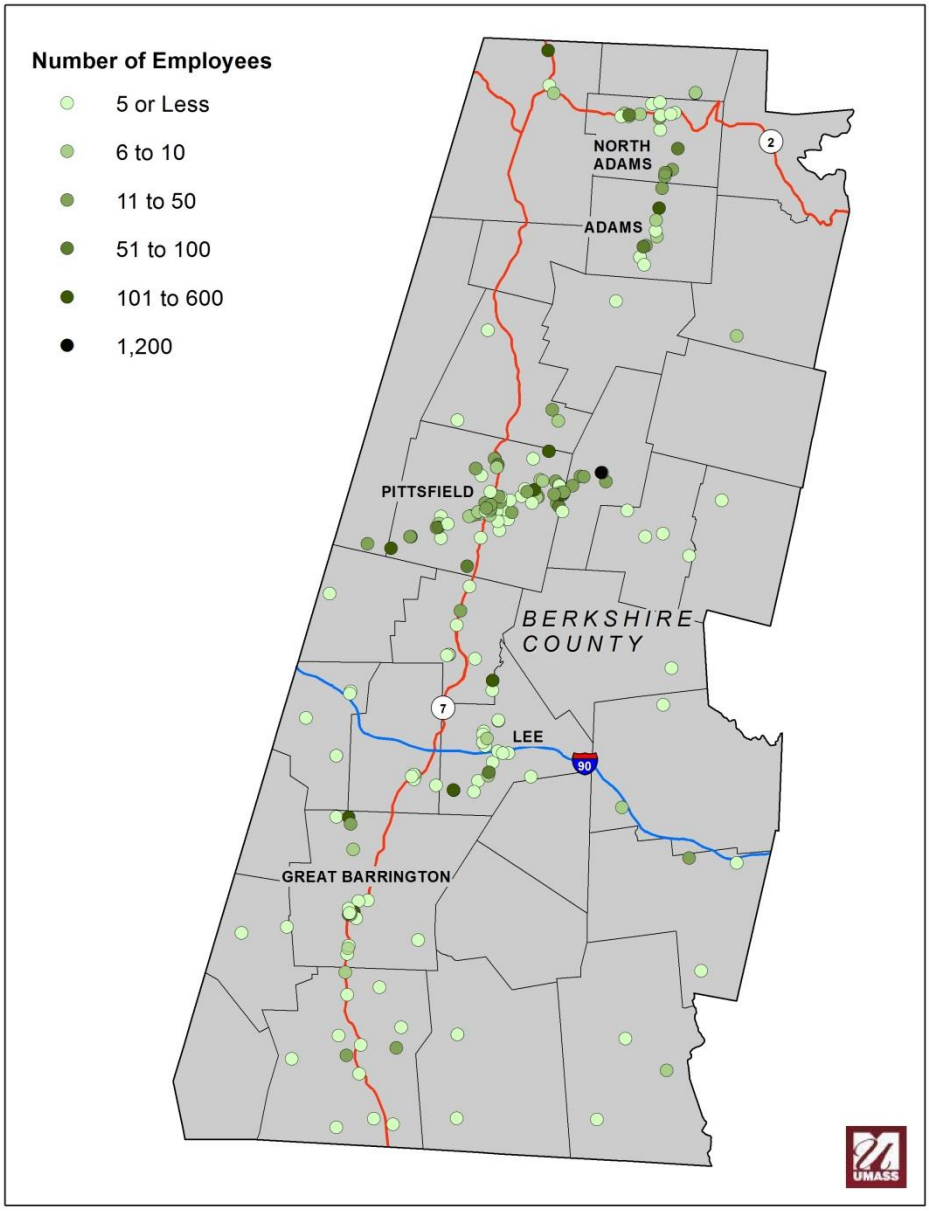
Fig. 1: Employment by Industry, 2011 (Privately Owned Only)



Source: US BLS Quarterly Census of Employment and Wages (QCEW), 2011

As shown in Figure 2, manufacturing activity is fairly evenly distributed through the Berkshires with the largest concentrations in the Pittsfield/Dalton area, North Adams and Adams, clusters of companies near Lee and the interchange with I-90, and near Rt. 7 in the Great Barrington area.

Fig. 2: Locations of Berkshire County Manufacturing Establishments



Source: National Establishment Time-Series (NETS), 2010, and ESRI and InfoGroup, July 2012

Manufacturing in Berkshire County has been declining since the mid-1970s with further decreases over the past decade in terms of overall employment, inflation-adjusted wages, and GDP. While employment trends over this time period showed decreases in the state and the country (see Table 2), with losses of approximately 30 percent of all manufacturing jobs, the decrease was even more pronounced in Berkshire County with a loss of

approximately 45 percent. In Massachusetts and the nation as a whole, real manufacturing wages and GDP rose between 2001- 2011, indicative of efforts to increase productivity and transition to more capital and technology intensive production. Over the same period, Berkshire County experienced decreases in both real wages and manufacturing GDP (though less pronounced than the drop in employment).

Table 2: Manufacturing Wages, Employment and GDP 2001 to 2011

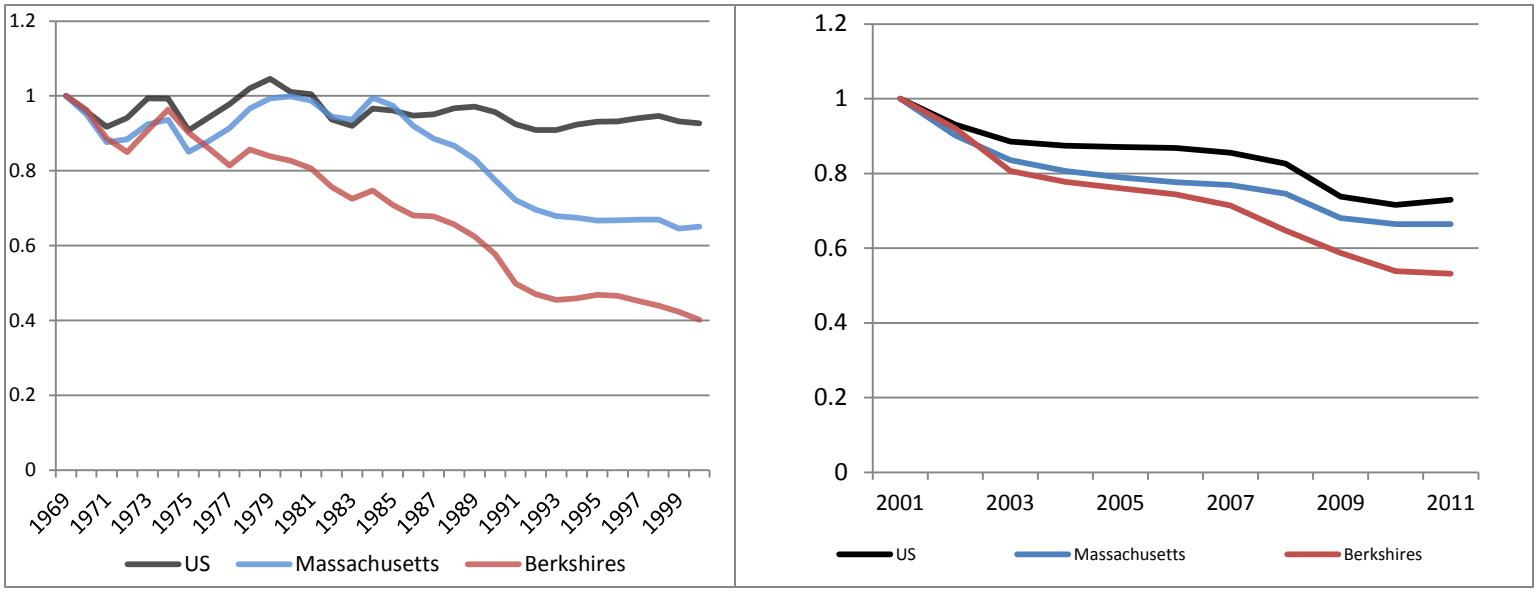
Real Manufacturing Wages (2011 Dollars)	2001	2011	% Change 2001-2011
US	$ 56,157	$ 59,210	**5%**
MA	$ 71,163	$ 77,572	**9%**
Berkshire County	$ 64,694	$ 59,210	**-8%**
Manufacturing Employment	**2001**	**2011**	**% Change 2001-2011**
US	16,386,001	11,701,497	**-29%**
MA	389,232	253,948	**-35%**
Berkshire County	8,410	4,622	**-45%**
Real Manufacturing GDP (2005 Chained Dollars)	**2001**	**2011**	**% Change 2001-2011**
US	1,326,063	1,674,500	**26%**
MA	27,604	45,454	**65%**
Berkshire County	670	528	**-21%**

Source: BLS QCEW, 2001, 2011; BEA Regional Real GDP, Mfg, 2001, 2011

As mentioned, manufacturing employment has been declining in Massachusetts and nationally over a long period. This has been felt in an even more pronounced way in Berkshire County since the 1970s, where the decrease in manufacturing employment has been consistently worse than in Massachusetts as a whole and as compared to the country overall. The following two charts show this decline from the 1970s, with 1969 and then 2000 indexed as 1, and any decimal lower than 1 as a decline from those points. In recent years, manufacturing employment continued to decrease more in the Berkshires than in the state, and more in the state than in the country.

[8] CA25N Total full-time and part-time employment by NAICS industry, Private nonfarm employment, and CA25 Total full-time and part-time employment by SIC industry: Manufacturing (index), Berkshire County. Note: 1969-1999 is on the basis of SIC codes and 2001-2011 is on the basis of NAICS codes. Among these codes there have been recodes over the period. The estimates of employment for 1969-74 are based on 1967 Standard Industrial Classification (SIC). The estimates for 1975-87 are based on the 1972 SIC. The estimates for 1988-2000 are based on the 1987 SIC. The estimates of employment for 2001-2006 are based on the 2002 North American Industry Classification System (NAICS). The estimates for 2007-2010 are based on the 2007 NAICS. The estimates for 2011 forward are based on the 2012 NAICS.

Figs. 3 and 4: Manufacturing Employment 1969-2000, Indexed to 1969, and 2001 to 2011, Indexed to 2001



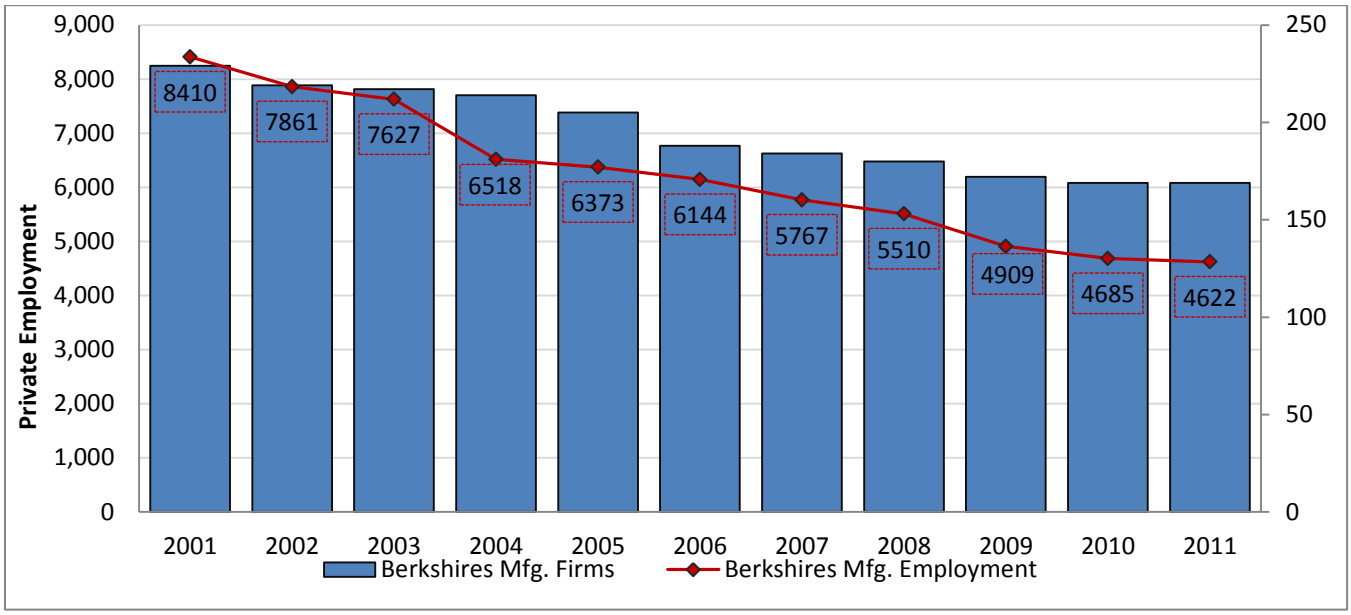
Source: US BEA, November 26, 2012

That said, manufacturing does represent a crucial share of wages paid in the region. Weekly wages in the Berkshires across all industries averaged $761 in the most recently available data, while manufacturing wages were the highest-averaging industry at the region, at $1,284 per week. Despite employing less than 9% of the regions workers, this higher average wage makes manufacturing the second-largest source of earnings in the region, after Health Care and Social Services. Manufacturing accounts for nearly 15% of all wages paid in Berkshire County.[9]

It is also worth comparing manufacturing trends in the Berkshires in terms of employment and the number of establishments (see Figure 5). Over the last decade, manufacturing employment in the Berkshires has nearly halved but the number of establishments decreased less rapidly from just over 225 in 2001 to just over 175 in 2011. These differing trend rates result in a decreasing average firm size as the Berkshire County portfolio of manufacturing has transitioned from reliance on very large employers to a highly dynamic, competitive field of small to medium sized manufacturing companies (consistent with trends at the state and national level).

[9] ES-202, EOLWD, 2011 (most recent data available).

Fig. 5: Manufacturing Employment and Establishments 2001 to 2011, Berkshire County

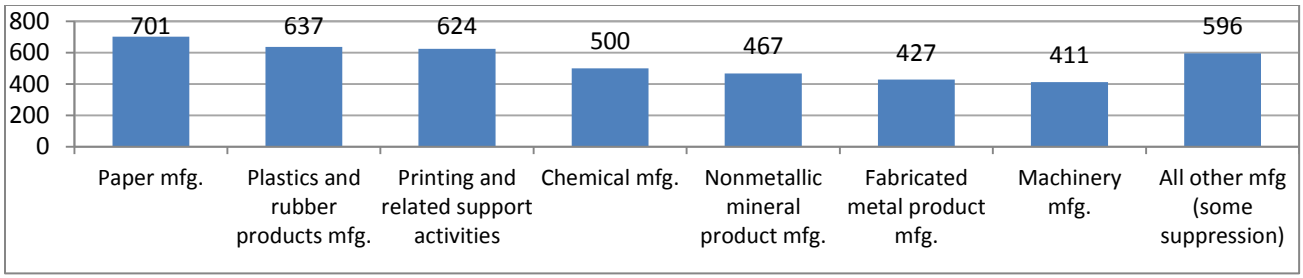


Source: US BLS QCEW, 2001-2011

Manufacturing Industry Sectors in the Berkshires

Examination of the top ten sectors of manufacturing in the Berkshires shows that the industry is now fairly evenly balanced across the top sectors with the most jobs in paper, plastics and printing (620 jobs or more). But as shown in Figure 6, four other sectors (chemicals, nonmetal minerals, fabricated metals, and machinery) have at least four hundred employees. So, similar to the trend in more small to medium sized companies, the mix of manufacturing is also less concentrated in a few sectors than it was in the past.

Fig. 6: Manufacturing by Sector in Berkshire County, 2011

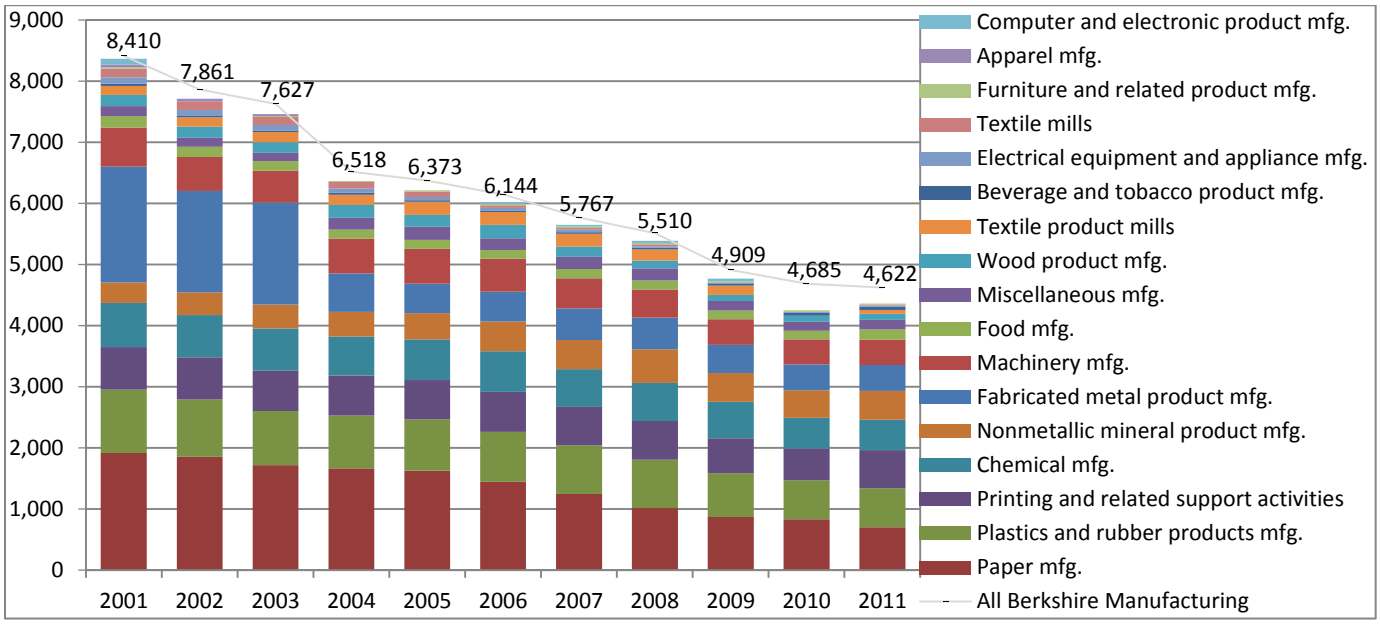


Source: US BLS QCEW, 2001-2011
Note: Suppression in some manufacturing reporting. 'All other mfg.' includes Computer/electronic, Apparel, Textile mills, Electrical equip/appliance, Beverage/tobacco, Textile product mills, Wood products, Misc mfg, and Food mfg.

Over time, the largest decreases in manufacturing have come from the paper and metal fabrication sectors. Paper manufacturing has dropped more steadily while metal fabrication declined rapidly between 2003 and 2004 and had not recovered. In fact, metal fabrication provided as many jobs in the region as paper manufacturing in the

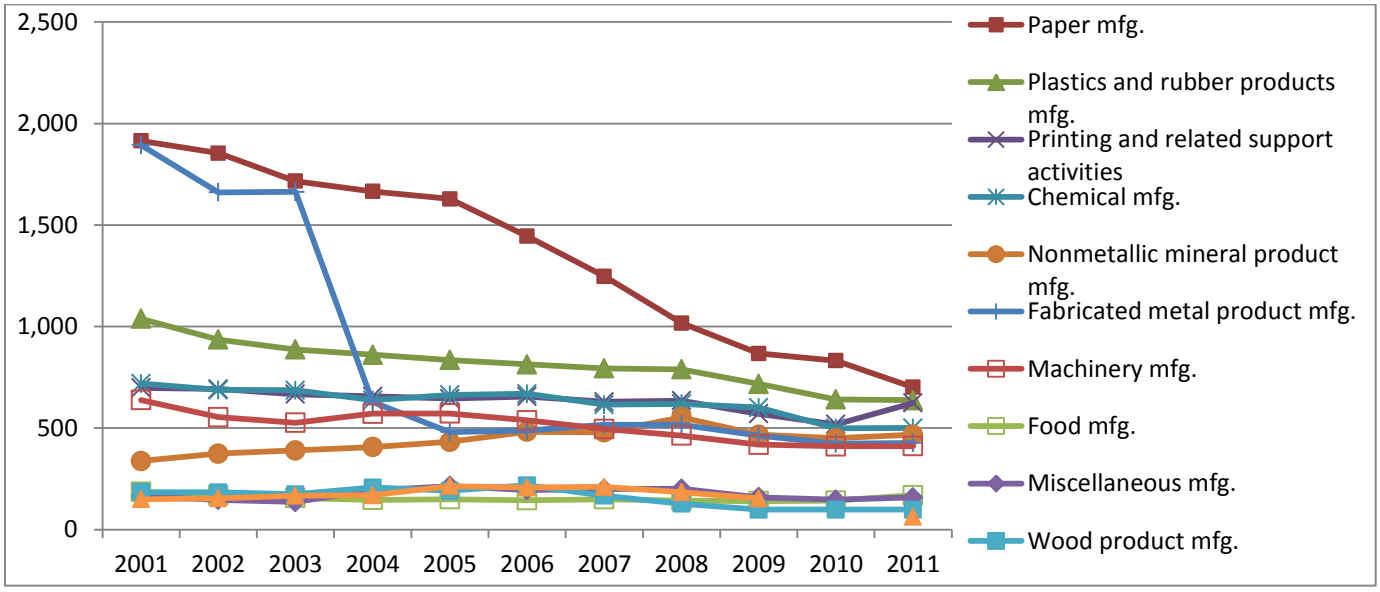
early 2000s before its decrease, notable in the following two figures. Decreases in other sectors, such as plastics, have been much more gradual over the past decade.

Fig. 7: Manufacturing Employment Trends by Type, Berkshire County



Source: US BLS QCEW, 2001-2011

Fig. 8: Employment Trends in Top Ten Manufacturing Types, Berkshire County

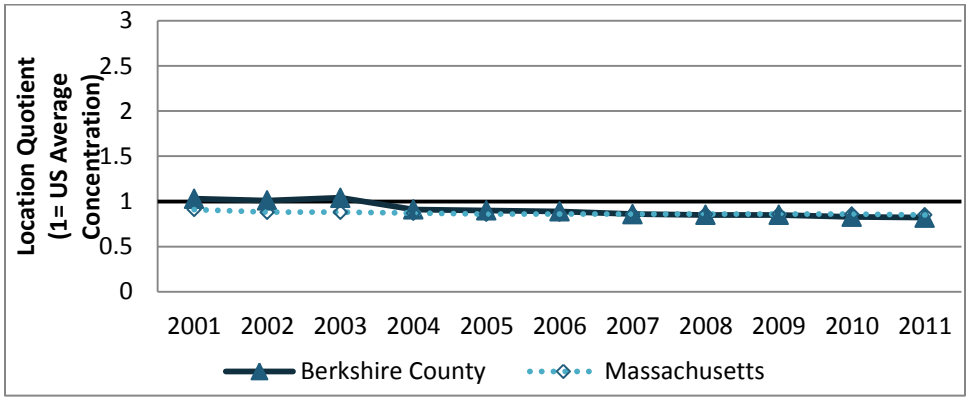


Source: US BLS QCEW, 2001-2011

The concentration of manufacturing in the Berkshires and Massachusetts as compared to the U.S. is represented below by the location quotient (LQ). A LQ of 1.0 indicates the industry offers the same share of employment in manufacturing as the industry mix of the U.S., while a value lower than 1.0 means that manufacturing is under-represented. In Massachusetts as a whole and in Berkshire County this has become increasingly true over time. The Berkshires have lost manufacturing share more recently than the rest of the state, post-2003 with the LQ

dipping below the state in 2004 and remaining at about 85-90% of the U.S. average concentration of jobs in manufacturing.

Fig. 9: LQ of All Manufacturing, Berkshire County and MA



Source: US BLS QCEW, 2001-2011

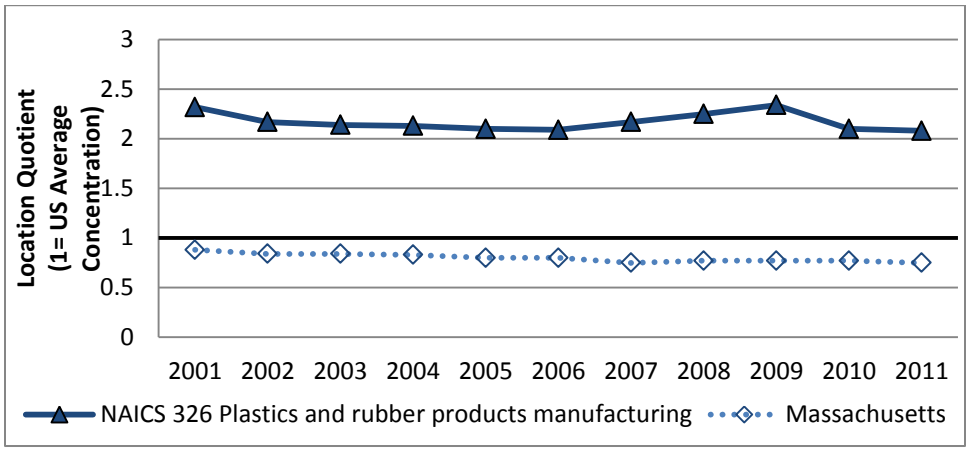
Examination of different sectors of manufacturing shows that while the overall shrinking trend is relatively consistent, some sub-sectors have been doing better than others and continue to have location quotients well-above 1. For example, as shown in Figure 10, textile product mills have been highly concentrated in Berkshire County compared to the state and the nation over the last decade, but have experienced a severe decrease since 2009.

Fig. 10: LQ of Textile Products, Berkshire County and MA

Source: US BLS QCEW, 2001-2011

Despite a gradual declining trend, plastic and rubber product manufacturing has been highly concentrated in the Berkshires as compared to the state and the nation at relatively steady levels since 2001 with a concentration more than twice as large as the U.S. and Massachusetts.

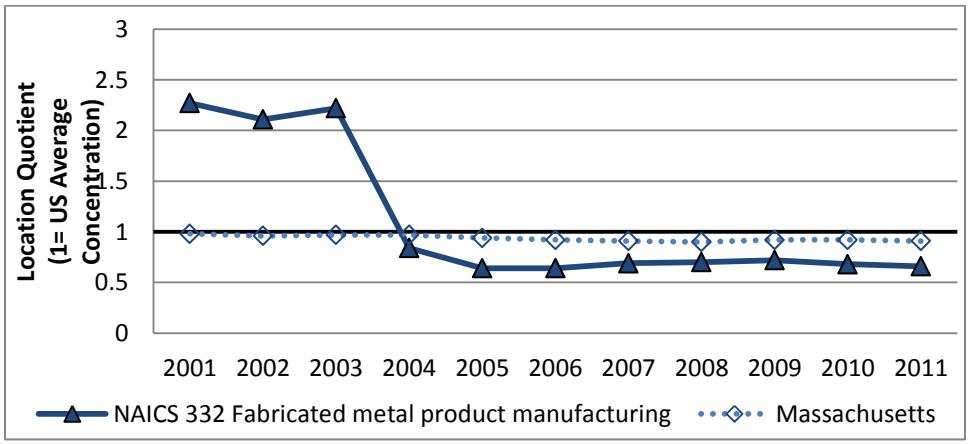
Fig. 11: LQ of Plastic and Rubber Products, Berkshire County and MA



Source: US BLS QCEW, 2001-2011

Fabricated metal manufacturing had a dramatic drop in 2003-2004, and is now less heavily concentrated in Berkshire County than it is in the state overall and in the nation, despite previously being very well represented in the area prior to 2004.

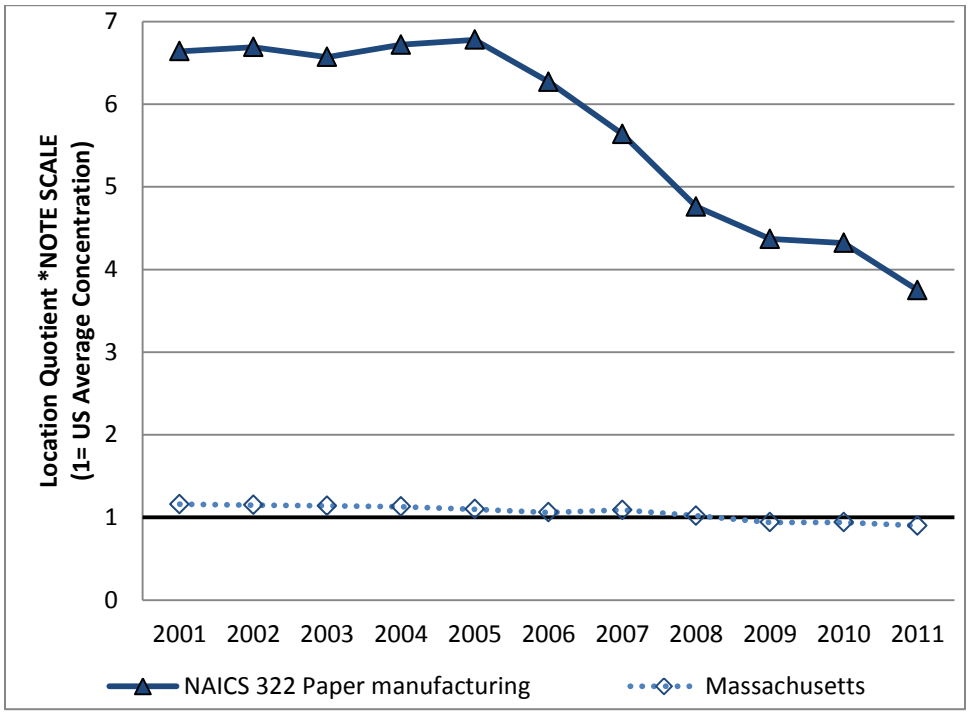
Fig. 12: LQ of Fabricated Metal Products, Berkshire County and MA



Source: US BLS QCEW, 2001-2011

Paper production remains very important in the region, despite recent declines, such that the Berkshires location quotient (LQ) cannot even be represented on the same scale as the other charts of industrial concentration. The LQ was over 6 from 2001 to 2006 but now is less than 4, meaning that the industry is still four times as concentrated in the Berkshires as the U.S. Massachusetts used to have slightly more employment in paper manufacturing than the nation, and now has slightly less.

Fig. 13: LQ of Paper Products, Berkshire County and MA



Source: US BLS QCEW, 2001-2011

To summarize this data-driven profile of manufacturing in the Berkshires, it is abundantly clear that the region has experienced steep declines in manufacturing, most pronounced in the number of jobs in paper and metal fabrication, with more gradual recent declines in other industries such as plastics. These declines have led to an overall concentration of manufacturing jobs similar to that in Massachusetts statewide, and less than U.S. – a notable change from an earlier period when manufacturing was a stronger force. That said, it is worth highlighting that:

- Manufacturing generates the second largest industry contribution of wages in the Berkshires, a key demonstration of the value of the industry;
- Multiple sub-sectors of manufacturing, led by plastics and paper, continue to generate relatively high concentrations of jobs for the region; and
- Consistent with manufacturing trends noted throughout the state, the Berkshires have shifted towards a greater share of dynamic small-medium sized companies with a diverse portfolio of manufacturing. As noted below in the summary of interview findings, many of these small-medium sized companies are highly competitive and productive, using a variety of advanced manufacturing techniques.

Summary of Findings from Interviews

In addition to the data-driven profile of manufacturing, the research team conducted a range of interviews with key informants spanning manufacturing companies in the Berkshires, higher education, economic development, and state government. These interviews were conducted with a goal of understanding more about current activities and initiatives in advanced manufacturing in Berkshire County, opportunities and challenges to expand success for the industry in the region, and best practices or initiatives that could promote industry growth. Across stakeholders interviewed in the region, several common themes emerged. Citations of government intervention, educational investment, and local labor workforce composition informed respondents' perceptions of current and future economic activity in the region.

Current Berkshire Manufacturing Activities and Initiatives

In general, the interviews provided strong evidence about a fairly wide range of vibrant, globally competitive manufacturing firms in the Berkshires. Most of the firms are small to medium sized establishments (less than 200 employees) producing a range of precision manufactured products in plastics, paper, metals and other materials. As noted below, many of the firms located in the Berkshires based on a combination of high quality of life and connections to the larger paper and plastics manufacturers that used to be in the Berkshires (Crane being one exception of a large manufacturer still present in the region). Based on the interviews, the region's firms appear to operate somewhat in isolation within the Berkshires (limited mentions of networking, collaboration, etc.) but share common workforce needs and other challenges.

Berkshire Community College (BCC) and two vocational and technical high schools – McCann Technical High School and Taconic High School – form the backbone of workforce development initiatives for advanced manufacturing firms in Berkshire County. A partnership among these three schools allows students at McCann and Taconic the opportunity to earn up to 16 college credits through the BCC Manufacturing Technology program. Meanwhile, BCC has proactively pursued educational grants to fund additional projects, often in conjunction with regional industry. Funding from a US Department of Labor grant for community colleges in Massachusetts has helped BCC expand and fine-tune its curriculum to train students in two areas: health care and manufacturing. The manufacturing training is focused on technical skills such as thin-film semiconductor lab work, among other electronic and mechanical skills, to support manufacturing companies in the Berkshires and beyond.

As mentioned earlier in this report, Global Foundries (GF) is a massive semiconductor company located in Malta, NY. They currently employ over 2,000 people and are investing to expand by another 1,000 jobs. Discussions with GF highlighted the opportunity to train Berkshire residents for the jobs at Global Foundries, with particular focus on clean room experience. As stated by GF, many of the job opportunities require applied electronic and mechanical skills but do not require a bachelor's degree, providing an opportunity for BCC to help train workers that could take advantage of the job opportunities. Using $3 million in grant funding, BCC has partnered with the Berkshire Applied Technology Council (BATC) to develop a curriculum emphasizing technical, critical thinking, problem solving, and teamwork skills. Also in conjunction with BATC, BCC is hoping to work with local businesses to help link them into the Global Foundries supply chain. As described by GF, the key for Berkshire County firms to be eligible for supplier opportunities is to join the Global Foundries approved supplier list and explore ways to supply GF's needs for specialized parts. While supplier opportunities are not currently abundant

for manufacturing firms,[10] the Berkshires proximity is attractive to GF so more work is needed to proactively understand the specific supplier opportunities that may develop in the future.

In reaction to GF's needs, some early bio-tech activity and related regional needs, BCC is pursuing opportunities to establish a cleanroom training lab or virtual cleanroom in the Berkshires. Companies like Global Foundries, and some medical supply manufacturers require employees with cleanroom training which involves simply getting candidates experience and comfort working in that environment.

A limited number of partnerships emerged from our interviews between industry and area technical high schools. At least one employee of an area firm serves on the board of one of the tech schools, and another firm has an active recruiting relationship with a tech school. Grant funds obtained by BCC through 'AMP it up!' have financed a middle school robotics competition. Looking out of state, one firm has developed a co-op program with RPI and the University of Maine to attract engineering students who may stay with the firm beyond graduation.

Firms tell a fairly consistent story of hiring and planned expansion. One manufacturing firm plans to enter new markets, which will require up to 25 new hires over the next five years – including at least one entry-level engineer per year. Others had open job postings for multiple positions including engineers, technicians and machinists, as well as positions in shipping and receiving, sales, and maintenance. One firm has opened satellite offices as market opportunities appeared outside Berkshire County in order to attract talent that might otherwise decline to relocate. Several firms we interviewed have engaged heavily in capital investment, building clean rooms, an aerospace machinist room, and specialized tools. Based on informant interviews, area firms are primarily undertaking research and development in-house. At the same time, the slow pace of global economic growth, in particular in Europe, has directly impacted some Berkshire manufacturing companies with slowdowns in production, reduced hours for labor, and potential layoffs if conditions don't improve.

Firms recognize the challenges presented by an aging workforce and have taken proactive steps to protect themselves from demographic trends. One firm has chosen to strategically hire younger workers to address the aging of its staff, bringing on workers from a temp agency and hiring them full-time after a trial period of three to four months. Another firm is participating in an initiative called Workforce 2020 to address the possibility that nearly half of its workforce will require replacement due to retirements or age in the coming decade.

Firms we interviewed claimed membership in several trade associations. Among these are the Associated Industries of Massachusetts, the American Mold Builders Association, the Society of Plastics Engineers, MassMEDIC, the Society of Simulation in Healthcare, the Thoracic Surgery Directors Association, and the western Massachusetts chapter of the National Tooling and Machining Association.

Advantages of locating in Berkshire County

While educational and governmental initiatives were also lauded, respondents nearly unanimously cited superior quality of life as the primary advantage to locating in Berkshire County – arts and culture, natural amenities, safe communities, and good schools were mentioned as attractive to employees. Multiple respondents cited the quality and skill of the local workforce as a resulting benefit. Legacy businesses have successfully attracted and retained a high number of skilled workers – one respondent characterized Berkshire County as a leader in workforce retention. The existing plastics cluster in Berkshire County that grew with the former presence of Stanley Electric and GE has established a legacy of excellence in the field, helping to grow a skilled workforce and establish zoned facility sites that firms feel they can utilize if necessary.

[10] Of note, Berkshire Corporation specializes in providing a wide variety of cleanroom suppliers. Though not interviewed as part of this project (they no longer manufacture in the Berkshires), it is worth noting this cleanroom connection in the Berkshires: http://www.berkshire.com/americas.shtml

Programs initiated by BCC were cited by several respondents as assets to advanced manufacturing in Berkshire County – particularly the proposal for the construction of a 1,000 square foot cleanroom training facility and training programs relative to skills demanded by Global Foundries. Availability of University of Massachusetts consortiums assisting with in-house research and development were cited by one respondent as potentially beneficial, but this particular firm could not afford to invest in the opportunity.

Some costs to advanced manufacturing firms located in Berkshire County compare favorably to other regions. While Berkshire County may appear to be somewhat isolated to, it is centrally located within a two-hour drive from major participants in the semiconductor supply chain located in the I-495 ring, the Hudson Valley, and Pioneer Valley, and is a short drive away from two international airports. Many Berkshire firms enjoy close proximity to I-90. Coupled with commuting proximity to the Albany area and Global Foundries, and with freight costs comparable to Pennsylvania and New Jersey, many firms cited geographic location as a primary asset. In addition, some firms in Berkshire County have enjoyed productive relationships with small local banks, and one firm cited low commercial real estate costs vis-à-vis the Boston metro area (128 Corridor) as an advantage.

The Pittsfield Economic Development Authority (PEDA), established to promote development of the former General Electric campus in Pittsfield, is working to secure a $6.5 million earmark to establish a life sciences building for the Massachusetts Life Sciences Center (MLSC) on the campus. This potential project would be a major boost for the emerging life sciences in the Berkshires, which currently has few major companies besides Nuclea Biotechnologies in Pittsfield. A challenge for the region is demonstrating enough scale of life sciences activity to justify the investment.

A MassDevelopment satellite office in Pittsfield has helped at least one firm qualify for a new equipment loan with favorable terms specific to exporters. One manager cited the western regional office of the Massachusetts Small Business Development Center as having provided “enormously helpful” advice and training during the firm’s start-up phase. 1Berkshire, a collaboration of the Berkshire Chamber of Commerce, the Berkshire Visitors Bureau, the Berkshire Economic Development Corporation, and the Berkshire Creative Economy Council, would like to encourage relationships between Global Foundries and businesses in Berkshire County. Some informants cited easy accessibility of state legislators relative to more populated areas as an asset, and one respondent saw the availability of tax increment financing as a valuable economic development program available in Berkshire communities.

Issues and challenges to locating in Berkshire County

Several respondents cited an aging workforce as the primary challenge to advanced manufacturing firms in Berkshire County. One firm estimated that 40% of its staff would need to be replaced due to retirements or age by the year 2020, while another assessed that young workers cannot immediately fill the shoes of pending retirees because of their largely inadequate training in STEM disciplines. Labor shortages have forced at least one employer to increase wages dramatically in the last decade, but firms still have difficulty competing with larger entities outside Berkshire County to recruit engineers from college campuses. Firms pointed to sustained interest from workers in nearby regions, but noted that many potential hires are unwilling to relocate to Berkshire County – perhaps because of the risk these workers face due to a shortage of competitive firms in the area requiring their specialized skills. Among local prospects, employers noted the inconsistent quality of workers found through temp agencies and the difficulty inherent in finding local industrial designers or job candidates with a background in medical devices.

A number of challenges related to the educational system also consistently emerged from our interviews. Several respondents shared that many young people in the region do not see the advanced manufacturing field as a reliable livelihood. Parents saw the departure of General Electric from Pittsfield in the late 1980s as a death knell for the

industry and discouraged their children from pursuing manufacturing as a career. With this perception came a lost generation of training for young workers, contributing to an already aging workforce. This trend is illustrated at McCann Technical High School, where increasing numbers of graduates are choosing to attend college rather than join the workforce or go through additional manufacturing training – a potentially positive development for the students, but an area of concern for manufacturing firms that wish to hire locally. Some students who receive machine shop training and choose technical careers opt to work as mechanics rather than as machinists. Among students who wish to enter the manufacturing workforce, few are willing to do shift work and many have not received adequate training in the technical (mechanical, electrical) skills most desired by precision manufacturing companies. One employer characterized the STEM pipeline as dry and suggested it will take ten to twenty years to replenish. The advanced manufacturing program at BCC has relatively low enrollment numbers and is primarily populated with incumbent workers looking for additional training – there is little demand among high school students to enroll in this program. One observer suggested that the current collaboration among manufacturing stakeholders driven by BCC is unsustainable for these very reasons, and that such partnership initiatives must be industry-led.

Costs also emerged as a primary area of concern among manufacturers. Energy costs in particular were cited by multiple firms as an impediment to growth, an issue in the Berkshires and throughout New England. One employer noted that comparable firms have relocated to North Carolina primarily because of cheaper utilities. Other firms expressed concern about high health care, technology, and equipment costs. Larger trends in the real estate market appear to affect the availability of labor. Several firms cited a lack of affordable housing as an obstacle to hiring – one respondent shared that prevailing wages in southern Berkshire County are not high enough to entice young people to either commute or move from northern Berkshire County. Young workers choosing to relocate may be drawn to major metropolitan areas, which offer more competitive wages than other regions.

Several firms cited bureaucratic barriers to growth. Economic development initiatives in particular emerged as an area of concern – some companies were unaware of current initiatives, while others felt that current initiatives are too weak or too poorly funded to spur any kind of meaningful economic growth. Several employers and stakeholders expressed a desire for MassDevelopment to be more active in the region, in particular related to the development of the former GE campus. Devens (near Ayer, MA) was cited as a best practice for redeveloping a major land holding, where MassDevelopment has played a central role in environmental clean-up, bring sites to the market, and incrementally adding a wide range of commercial businesses to the master planned project. Stakeholders remarked that a more path forward for the former GE campus could similarly rely less on a couple of major tenants, and instead go through a master planning process with small to large building pads available for locating business.

Some informants felt that an absence of tax breaks and other government incentives have failed to promote regional growth. One firm owner who claimed to have preserved local jobs after purchasing a firm from an out-of-state interest failed to qualify for an income tax benefit. Others attributed high tax rates to a geographic disconnect between Berkshire County and eastern Massachusetts – one noted that while New York has created an incentive program for firms to locate upstate, Massachusetts has no comparable program for western Massachusetts. Some respondents described a challenging regulatory environment in parts of Berkshire County, with both a slow permitting process and shortage of suitable sites due to protected environments.

Local infrastructure and capacity concerns also arose as important challenges to sustained success. Some firms expressed concerns regarding the capacity of local banks to effectively finance large firms in the region, while another found difficulty creating revenue-generating opportunities with so few related firms based in the region. Industry collaboration has proven difficult because most firms employ fewer than twenty workers and have neither the time nor the awareness to effectively collaborate on development projects. Other concerns included

challenges finding available sites for manufacturing facilities, a shortage of suitable lab space, and a lack of high-quality broadband access.

Prominent needs of key stakeholders

Specific needs cited by advanced manufacturing firms primarily focused on government assistance and reform of the educational system.

Several firms indicated demand for a strong regional economic development plan, in which individual businesses collaborate with local Chambers of Commerce, educational institutions, and economic development organizations. Some firms requested state investment in renewable energy projects, as there is currently no facility similar to the Holyoke hydroelectric power plant in Berkshire County and wind power generated in the region is currently sent to a municipality in central Massachusetts. Another firm was concerned about a necessary bridge repair that likely will not receive adequate local funding and will require state support to address. Others proposed sharing best practices from other regions, particularly lessons learned in the Pioneer Valley from the Precision Manufacturing Regional Alliance Project (PMRAP). In particular, stakeholders in the Berkshires and throughout Massachusetts have noted that the success of PMRAP is largely driven the organization's focus on maintaining good data on the region's manufacturing establishments, jobs, and training needs. PMRAP is now being discussed by the Commonwealth's Executive Office of Housing and Economic Development as a best practice that they hope to replicate in other parts of Massachusetts.

Firms uniformly expressed specific educational needs relative to their workforce. Primary among these is the demand for specific skill sets to be provided by technical schools and community colleges. Beyond a fundamental focus on basic professional behavior and the underpinnings of advanced manufacturing – math, science, English, etc. – firms demand employees with training in mold and tool making, drafting, CAD design, quality control, testing, materials, and the methods of mechatronics – mechanical, electrical, and computer engineering. One firm suggested that local schools improve their ability to identify students early who possess skills relevant to these areas but may not be suited for college academics, so that targeted students might be urged to consider vocational or technical programs. Demand exists for employees with specialized experience, particularly in cleanrooms, where demand for workers is expected to grow. Beyond curriculum design, students and firms might benefit from additional education about available local jobs. Employers expressed a desire for current students to understand that IT and programming skills can be applicable in advanced manufacturing jobs, and would like to see more programs available in which students are invited to facilities through internships, co-ops, or day visits to experience advanced manufacturing work first-hand. Despite the existence of some grant-assisted incumbent employee training programs, demand still exists for more as firms are very interested in keeping their workers up to speed with the latest technology.

Table 3: List of Interview Informants

Date	Contact	Organization	Location
2/5/13	David Rooney	Center for Economic Growth	Albany, NY
2/6/13	Bill Mulholland	Berkshire Community College	Pittsfield, MA
2/8/13	Carleen Kristensen	Hi Tech Mold & Tool	Pittsfield, MA
2/11/13	Patricia Begrowicz	Onyx Papers	South Lee, MA
2/12/13	Don Rochelo	Apex Resource Technologies	Pittsfield, MA
2/13/13	Ron Griffin	EDM Services	Pittsfield, MA
2/15/13	Carl Olson	China Array Plastics, LLC	Pittsfield, MA
2/28/13	Lisa Chamberlain	The Chamberlain Group	Great Barrington, MA
3/12/13	David Cruise	Regional Employment Board of Hampden County	Springfield, MA
3/13/13	Michael Tamasi	Accurounds	Avon, MA
4/16/13	Patrick Muraca	Nuclea Biotechnologies	Pittsfield, MA
4/29/13	Dirk-Alexander Bruedern and Julian Serda	Global Foundries	Malta, NY
4/30/13	Bronly Boyd	Boyd Technologies	South Lee, MA
5/2/13	Fred Thompson	Attorney for Steinerfilm	Williamstown, MA

Source: UMass Donahue Institute research

Current Manufacturing Initiatives and Best Practices

This section of the report is focused on highlighting and describing a range of advanced manufacturing initiatives at the Federal, state, and regional levels, with emphasis on trying to understand successful strategies and initiatives (best practices) that could be applied or pursued in the Berkshires. This section also covers findings and recommendations from some high-profile, intensive efforts to study today's manufacturing industry in the U.S.

In general, manufacturing growth that has occurred in regions has largely been achieved by firms working together and coordinated public/private efforts to accelerate R&D through educational and research institutions. There are key Federal and state initiatives that provide support to various research, technology and business process support centers. Recent research has revealed specific strategies for success in growing manufacturing in a particular region, and these ideas are included in this section. In particular, one strong approach is the formation of an industrial public-private partnership. A local example of a partnership is examined, along with an exploration with points from the Commonwealth Corporation on what made it work.

Massachusetts and U.S. Advanced Manufacturing Initiatives

Advanced Manufacturing Collaborative

The Advanced Manufacturing Collaborative (AMC) is a group of industry, academic, and government leaders working to strengthen the manufacturing sector in Massachusetts spearheaded by the state starting in late 2011. This AMC is a key priority initiative of the Massachusetts Executive Office of Housing and Economic Development (EOHED).[11] The AMC five-point agenda addresses promotion of manufacturing, workforce development, technical assistance and innovation, costs of doing business in Massachusetts, and access to capital. AMC seeks to elevate the public understanding of advanced manufacturing, support the attraction of talent, and position Massachusetts as an advanced manufacturing hub through implementation of marketing campaigns and grants, including the 'AMP it up!' initiative. Additionally, AMC works to adopt best-practices to align educational institutions with industry needs; addresses issues relative to healthcare costs, regulatory reform, and energy efficiency; and supports investment and growth among small- and medium-sized manufacturers through improved access to financing and grant programs. Recently provided remarks by Secretary Bialecki of EOHED indicate that the state is looking to help facilitate regional efforts to enhance manufacturing by providing some level of seed funding, perhaps modeled after the successful efforts in the Pioneer Valley (see below).

Established prior to the AMC, the Commonwealth does help fund and support a variety of manufacturing initiatives in the state, including:

- The Advanced Technology and Manufacturing Center of the University of Massachusetts at Dartmouth (located in Fall River): http://www.atmc.umassd.edu/about/
- The Massachusetts Manufacturing Extension Partnership (MassMEP), which is funded, in part through the National Institute of Science and Technology (NIST): http://www.massmep.org/about_massmep.html

AMP it up!

The 'AMP it up!' campaign promotes advanced manufacturing to young people in Massachusetts as an attractive career sector. AMP it up! provides education grants and directly informs students about internships, summer programs, and career opportunities available in the advanced manufacturing field through its website, Twitter

[11] http://www.mass.gov/hed/economic/initiatives/manufacturing/advanced-manufacturing-collaborative.html

feed, and media events featuring high-profile government officials. AMP it up! grants, funded by MassDevelopment, are provided to Massachusetts nonprofits, educational organizations, and employment boards for workforce development and training in advanced manufacturing. These grants, which totaled $92,736 to ten organizations in 2012, support career centers, workshops, company tours, and other programs that educate students and adults about career options. Berkshire Community College won an $8,500 matching grant from AMP it up! in this first round, with the Berkshire Applied Technology Council to fund outreach events and a workshop series highlighting manufacturing and high-tech careers in the region. In addition, AMP it up! helped to organize and host a statewide advanced manufacturing summit on June 20, 2013 at Gillette Stadium: http://ampitupma.com/summit2013.

Federal Manufacturing Initiatives

The Federal government has become strongly committed over the last several years to increasing investment in advanced manufacturing research and development. The President's FY13 Budget proposed $2.2 billion in advanced manufacturing R&D, a 19% increase over the current fiscal year, in programs that strengthen the competitiveness of our manufacturing sector, including research on advanced materials and investment, and starting 15 Innovation Institutes in locations across the U.S. specifically focused on manufacturing technology, implementation and commercialization.

Advanced Materials R&D Funding

Funding for R&D on advanced materials is focused on activities such as the Materials Genome Initiative, which aims to reduce the time to discover and develop new materials by 50%, "smart" manufacturing that takes greater advantage of information technology breakthroughs, bio-manufacturing that draws on the nation's historic leadership in the life sciences, and the National Robotics Initiative. To support and coordinate these investments, the Obama Administration has launched an inter-agency Advanced Manufacturing National Program Office hosted by the Department of Commerce.

Manufacturing Innovation Institutes (NNMI)

To help make U.S. manufacturers more competitive and encourage investment in the United States, in March, 2012, President Obama announced his plan to invest $1 billion to catalyze a national network of up to 15 manufacturing innovation institutes around the country. These institutes will serve as regional hubs of manufacturing excellence. The Innovation Institutes will be public-private partnerships to serve as regional hubs of manufacturing excellence, which will help to make our manufacturers more competitive and encourage investment in the United States. The president's fiscal year 2013 budget created the National Network of Manufacturing Innovation (NNMI).

The first institute was started in August 2012 with a $30 million Federal investment in a pilot institute on "Additive Manufacturing," matched by industry and state contributions. The Departments of Defense, Energy, and Commerce; the National Science Foundation; and NASA jointly ran a competitive solicitation for the pilot institute. The new partnership, the National Additive Manufacturing Innovation Institute (NAMII) in Youngstown, Ohio, includes manufacturing firms, universities, community colleges, and nonprofit organizations from the Ohio-Pennsylvania-West Virginia "Tech Belt." The consortium was selected through a competitive process led by the Department of Defense. As required in the funding scheme, the Federal investment will be matched by $40 million in private and state funding from the consortium itself. The University of Massachusetts and other partners did organize a multi-state (including Connecticut) bid for this opportunity that was not selected but the state continues to closely track these opportunities with plans to re-submit in the future for an advanced manufacturing innovation institute.

Findings from Recent Manufacturing Industry Studies

A number of studies have been completed and released in recent years focused on: a) gaining a better understanding today's manufacturing sector in the U.S. (and in MA); and b) generating findings, best practices and strategies to help make manufacturing more competitive at the local, state and national levels. A selection of the key reports reviewed by the research team is profiled below:

Report of the MIT Taskforce on Innovation and Production

In its 2013 *Report of the MIT Taskforce on Innovation and Production*, the MIT Production in the Innovation Economy (PIE) research group set out to analyze how innovation in manufacturing drives economic growth. It found that precursors for innovation supporting advanced manufacturing firms in Germany include legacy resources – established customer relationships, workforce skills, and supplier proximity – and complementary capabilities in the industrial ecosystem, like trade associations, collective research consortia, technical advisory committees, and university-industry collaboratives. The report cites availability of these resources in Germany, paired with the scarcity of similar tools in the United States, as reasons for divergent fates of manufacturing in the two nations.

Taking a closer look at American industry, the study found that manufacturing firms frequently encounter difficulty finding properly trained workers locally, while firms with few connections to other area industry or educational establishments face added difficulty hiring. While the disappearance of vertically-integrated enterprises since the 1980s has perpetuated a sharp decrease in corporate funding of innovation, education, and training programs, the MIT taskforce found that investment in the creation of industry "clusters" has generally failed to fill these gaps, noting that "research suggests that it's the co-located interdependencies among complementary activities, not narrowly specialized clusters, that produce higher rates of growth and job creation." In other words, the finding is that targeting very specific industry sectors as a cluster is less effective than creating a more comprehensive eco-system for a broader set of related activities between industries, infrastructure, workforce training, research facilities, etc.

The report also highlighted successful cooperative initiatives that derived value from face-to-face contact between universities and corporate partners, including promotion of streamlined R&D functions, contact between firms and university graduates, and mutual development of curricula. Likewise, the report showed that trade associations often promote regional economic growth by inducing collaboration and diffusing the risks of innovation to individual firms. This is particularly important for start-ups that benefit from and rely on the risk-reduction and risk-pooling functions performed by trade associations, including standards, testing, expertise, and insurance from hazards associated with product development.

Roadmap for Advanced Manufacturing in Massachusetts

The AMC, in *Building Bridges to Growth: A Roadmap for Advanced Manufacturing in Massachusetts*,[12] defines advanced manufacturing as "a way of producing" and uses National Council for Advanced Manufacturing guidelines describing advanced manufacturing as making "extensive use of computer, high precision, and information technologies integrated with a high performance work force in a production system capable of furnishing a heterogeneous mix of products in small or large volumes with both the efficiency of mass production and the flexibility for custom manufacturing in order to respond rapidly to customer demands." Their report notes a unique opportunity to enhance the Commonwealth's competitive position in advanced manufacturing due to the following:

Strengths

- An existing base of advanced manufacturing companies

[12] http://www.mass.gov/hed/docs/eohed/manufacturing/building-bridges-to-growth-final.pdf

- A vibrant research and innovation infrastructure
- Concentration of world-class advanced manufacturing capabilities

The report singles out small- and medium-sized enterprises (SMEs) as important targets for state support, as these firms typically have strong roots in the Massachusetts economy but can require assistance pursuing new business and financing opportunities. The report additionally notes that larger manufacturers often face similar challenges, and that connections between SMEs and large firms must be facilitated to promote growth and address the following unmet needs:

Unmet Needs

- Relatively high costs of doing business
- A rapidly aging workforce
- Insufficient collaboration among manufacturing firms and other stakeholders

Staying Power II: A Report Card on Manufacturing in Massachusetts

In *Staying Power II: A Report Card on Manufacturing in Massachusetts 2012*,[13] the Boston Foundation published a report assessing secondary data, surveys, and field interviews conducted in early 2012 on the manufacturing industry in Massachusetts. According to the report, advantages enjoyed by manufacturing firms in the Commonwealth identified in *Staying Power II* include the following:

Advantages

- Strong work ethic and appropriate skill sets among available workforce
- Proximity to customers
- Superior quality of life
- Access to efficient transportation and shipping solutions
- High measures of innovation in products and services

Challenges faced by advanced manufacturing firms in Massachusetts include the following:

Challenges

- High health care, energy, worker's compensation, and unemployment insurance costs
- High taxes and fees
- For exporters, continued sluggishness of European markets
- Recruitment of skilled craftsmen and entry-level workers trained in STEM disciplines
- Insufficient alignment of industry needs with vocational school and community college curricula

Reexamining Advanced Manufacturing in a Networked World: Prospects for a Resurgence in New England

In their 2009 report *Reexamining Advanced Manufacturing in a Networked World*,[14] the New England Council and Deloitte Consulting assessed the potential for a resurgence of advanced manufacturing in New England, with a goal to pinpoint subsectors with the potential for economic growth, assess drivers and barriers to growth in New England, and develop recommendations to improve competitiveness among firms. The report identifies subsectors "with the highest potential for growth in New England," including signal-processing, navigational, optic, and measurement tools; aerospace and defense; semiconductors and related complex electrical components/assemblies; medical devices; and materials sciences (e.g., plastics, nanotechnology, plasma tools,

[13] http://www.northeastern.edu/dukakiscenter/wp-content/uploads/Manufacturing-2012_138pp.pdf
[14] http://www.newenglandcouncil.com/assets/rep_2010.01.14_AdvancedManufacturing1.pdf

etc.). While the report notes that clusters of experienced and creative professionals in Massachusetts provide a significant regional competitive advantage, it also acknowledges that advanced manufacturing faces serious branding, education, state policy and industry challenges, including the following:

Advanced Manufacturing Challenges in Massachusetts

- Low public opinion of the industry
- Outdated state incentives
- Insufficient collaboration between manufacturers and industry partners

Application of Industry Cluster-Based Strategies to Rural Economies

A valid question is to wonder how well the findings and strategies from state and U.S.-level studies can be applied in more rural, less populated areas such as the Berkshires. In the 2008 report, *Application of Industry Cluster-Based and Sector-Focused Strategies to Rural Economies*,[15] by Lindsey Woolsey, Woolsey makes several summary recommendations, tailored specifically to rural regions seeking economic development strategies focused on industry sector solutions. He notes that:

> "Because the map of how any region's industries, its sub-sectors, its firms and its workers connect can be complex, public policy must be designed to help industry, businesses and workers help themselves. Public entities can never replace what industry leaders know about their industry, their challenges, and their needs, but in rural regions they can do a lot to facilitate the development and sustainability of industry clusters and sector partnerships."

In other words, this report does see a significant role that public and non-profit entities can play in helping to facilitate industry initiatives and partnerships that have beneficial impacts. Other specific (quoted) suggestions from this report include:

- "Start Talking about 'regionally targeted industry strategies.' and Promote Convening and Networking.[…]
- Build Capacity of Intermediaries: …sector partnerships need to be nurtured and facilitated. This requires time and resources, particularly by the entity acting as convener or intermediary.
- Put Skills and Training at the Center of Economic Development Policy: A responsive and adaptive post-secondary education system is critical to providing the appropriately skilled workforce that industry needs to stay competitive.
- Identify and Name Community Values.[…]
- Connect and Leverage University R&D Efforts: […] Because innovation is also about improvements in products, services and marketing (in addition to science and technology), states and regions will realize greater returns if research aligns with, and connects to, entrepreneurs in their communities.
- Rural regions should consider virtual connections to in-state and national universities, as well as virtual Centers for Excellence directly relevant to their industry clusters.
- Place a Premium on Entrepreneurs: The future of rural economies lies in growing more entrepreneurs, and building their capacity to become high-growth.
- Formalize Pathways into Regional Industries … a skilled workforce is a primary element of regional competitiveness …. The missing connections across industry and training providers, as well as the lack of knowledge about how connections can be made, is where sector strategies offer concrete solutions.

[15] http://www.sectorstrategies.org/sites/all/files/Application%20of%20Sector-focused%20Strategies%20to%20Rural%20Economies.pdf

- The Quality of Cross-Firm Relationships is More Valuable than the Quantity of Firms … the success of industry-focused strategies … will 'depend more on how local businesses relate to one another than on comparative concentrations or scale. In rural areas, clusters may need larger areas, more diverse membership, and more active cooperation to be called a cluster.'
- Banding together for training resources: Community Colleges or other institutions, such as workforce boards, manufacturing associations and economic development corporations, can establish advanced technology centers (ATCs) which train students on state-of-the-art tools. "

It's clear that many of these ideas could relate directly to the Berkshires, including the ideas of: a) establishing virtual connections to state-level and regional initiatives and research institutions; b) forming inclusive industry-led trade associations that seek broad membership even if the firms are not in the same exact industry sector; and c) leveraging the Berkshire Community College as a focal point of workforce training with significant and constantly updated industry input about training needs.

Resources and Programs Supporting Advanced Manufacturing

This section presents a sampling of the some of the resources and programs statewide and regionally that work hand-in-hand with manufacturing companies in Massachusetts related to workforce training, supply chain opportunities, technology deployment, and overall business planning.

Community Colleges and Workforce Training

Community colleges and other higher educational institutions frequently serve as industry resources for workforce training and technology/research facilities, such as the UMass Dartmouth Advanced Technology and Manufacturing Center. Berkshire Community College (BCC) is no exception to this pattern and has been very focused in recent years on attracting resources to support local manufacturing needs.

Workforce Competitiveness Trust Fund

In 2008, Berkshire Community College received a Workforce Competitiveness Trust Fund grant to establish an Applied Manufacturing Technology Training Institute (AMTTI). AMTTI was created to address the short- and long-term workforce development needs of the region's manufacturing industries and related production occupations, by strengthening career and educational pathways for incumbent, unemployed, dislocated and older workers (50+) and high school students. Project activities include the following:

- A college course series leading to a Certificate in Applied Manufacturing Technology
- A skills training program for incumbent workers focused on leadership, management and applied manufacturing skills
- A summer program for high school students to strengthen math, applied manufacturing and workplace leadership skills.

Through this program, incumbent workers will be able to upgrade their skills to improve job retention and career mobility options, and high school students will be exposed to the wide array of jobs available in the manufacturing field. AMTTI's training program has met with such enthusiasm that more than fifty people applied for the grant's limit of twenty available openings in its incumbent worker component.

Community College to Career Fund

Co-administered by the U.S. Department of Labor and the U.S. Department of Education, this Fund will help forge new partnerships between community colleges and businesses to train two million workers nationally for

good-paying jobs in high-growth and high-demand industries, including advanced manufacturing. These investments will give more community colleges the resources they need to become community career centers where people learn crucial skills that local manufacturers are looking for right now, ensuring that employers have the skilled workforce they need and workers are gaining industry-recognized credentials to build strong careers.

BCC, as part of its share of the Massachusetts statewide community college grant award, has focused its attentions on two fields for workforce training: health care and manufacturing. As noted in the summary of interview findings, BCC is actively revamping and updating its training curriculum for manufacturing positions that require a mix of technical know-how (electronics, mechanical) with practical experience in manufacturing settings such as clean rooms. The success of these programs depends on both the scale of the training (how many students are trained) and the continual input and participation of area businesses.

Other Manufacturing Support Programs and Supply Chain Considerations

There are other manufacturing support programs in Massachusetts, some of which focus on helping businesses with a full-range of services (marketing, global reach, business plans), and some that specifically help target supply chain opportunities and improving the ability of Massachusetts companies to purchase services and input goods from other Massachusetts companies. One such program is Mass MEP (mentioned earlier), which is located in Worcester and serves the entire state. Its current case studies mainly feature the more-populated manufacturing in eastern Massachusetts, but it is statewide and the tools it offers include supply chain mapping for advanced manufacturers and business-to-business promotion within and across Massachusetts. There is also a "supplier scouting" tool, through their partner NIST, to be listed for other Original Equipment Manufacturers as an American supplier, if businesses have not yet taken this step.

Another organization that provides significant business support and advocacy is the Associated Industries of Massachusetts (AIM), which maintains a strong Western Mass presence. In particular, they provide a suite of services to manufacturing companies in Massachusetts, and also organize and run the BuyMass program which conducts "matchmaker" events for large MA companies to meet with potential in-state suppliers and vendors, as well as a large business-to-business directory.

Supply Chain Resources

- Supply Chain Mapping on the MassMEP website: http://www.massmep.org/
- NIST supplier sourcing site: http://www.nist.gov/mep/scouting.cfm
- AIM BuyMass program: http://www.aimnet.org/massachusetts-business-center/BuyMass.cfm
- AIM manufacturing services: http://www.aimnet.org/massachusetts-business-center/manufacturing-services.cfm

It is also reiterating the preliminary findings of supply chain vendor opportunities to support the semi-conductor industry, namely in the Hudson River Valley (Global Foundries, IBM, etc.). Based on the research team's online searches[16] and interviews with representatives from Global Foundries, the initial findings seem to indicate that:

- Unlike large auto assembly plants, large semiconductor manufacturing operations do not tend to attract a wide range of parts suppliers (or other) within close proximity. The most essential inputs for semiconductor manufacturing include basic materials (water, energy, gases, chemicals) and capital intensive equipment purchased from large, highly specialized suppliers globally.
- That said, there are some potential benefits or opportunities for the Berkshires in terms of:

[16] Online research found many more documents focused on how the semiconductor is a supplier to finished products but two helpful documents that discuss supply/vendor needs for semiconductor businesses are from McKinsey and Accenture: www.mckinsey.com/client_service/semiconductors/latest_thinking/~/media/mckinsey/dotcom/client_service/semiconductors/pdfs/mosc_1_revised.ashx and http://www.accenture.com/us-en/Pages/insight-semiconductor-supply-chains-urgent-need-change.aspx

- For various replacement parts or other services, being located within a short drive (e.g., 3 hours or less) is an advantage compared to being located in Europe and Asia and needing to fly in various parts overnight.
- Semiconductor manufacturers, as they become more mature in their operations, will have supplier needs and it is incumbent upon businesses hoping to be a supplier to proactively learn how to become on pre-approved vendor lists through the procurement department, and seek out networking opportunities, especially if/when semiconductor businesses hold events that showcase the range of procurement opportunities that they are seeking.

Western Mass Precision Manufacturing Regional Alliance Project (PMRAP)

One relatively successful and nearby model of successful partnerships is the Precision Manufacturing Regional Alliance Project (PMRAP)[17], which has been well-analyzed for critical guidance for other nascent or re-forming partnerships in the region. Neighboring the Berkshires, Western Massachusetts' Precision Manufacturing Regional Alliance Project (PMRAP) tends to be more focused on Hampden County and the Pioneer Valley region, but can offer some lessons learned for other manufacturing collaboratives. The Commonwealth Corporation studied the success of PMRAP in October 2011 and showed that communication, relationships and leadership have been critical for this partnership. This is due, in part, to the following factors:

- A leader who acts as a champion and brings people together for face-to-face contact
- Active participation from members
- The development of a shared vision
- Data driven, frequently updated documentation of the sector in terms of establishments, employees, and recruitment needs (e.g., from impending retirement).
- Full-time staff for coordination, funding, organizing periodic meetings, regular communications and the effective development and management of resources
- Resources to provide meaningful training opportunities, from multiple public and private sources

PMRAP is supported by the Hampden County Regional Employment Board (Hampden REB), and was started with grants from the Massachusetts Technology Collaborative's John Adams Innovation Institute, matched by the REB. Manufacturers organized themselves through the Western Massachusetts Chapter of the National Tooling and Machining Association (WMNTMA). The Western Mass Economic Development Council also joined the group to provide proactive business expansion and location services for this sector. Due to PMRAP, members developed the ability to see possibilities for the entire sector, not just individual firms. Building trust through relationships, members increased their capacity along with their willingness to address conflict and make difficult decisions, and both public and private entities have lent leadership to the collaboration and remained committed. This groundwork allowed for articulation of clear, ambitious, and concrete goals and a renewed focus on results. These goals and a clear understanding of resulting accomplishments in turn enable the future work of the partnership. The current goals of PMRAP 2.0 are:

1. Build a well-educated, technologically skilled and highly adaptable workforce.
2. Strengthen cluster development and increase business competitiveness.
3. Promote industry awareness of the Region as an innovative precision manufacturing hot spot.
4. Transform industry capability to improve manufacturing processes.

PMRAP published a feasibility study for a proposed center called the Massachusetts Center for Advanced Precision Manufacturing Technologies. It would be a shared, nonprofit center coordinating regional manufacturers' needs, including technology development; an educational consortium focused on workforce

[17] See http://www.wmntma.org/about-us/ and http://www.wmntma.org/new-initiatives/pmrap20/

development and the K-12, vocational and community college pipeline; engineering services for developing efficient manufacturing processes; marketing; and enhancing local and state-level relationships. Unfortunately, that proposed center has not yet obtained funding.

Based on information provided during informant interviews, Berkshire manufacturers have participated in PMRAP events independently in the past. Despite previous focus on Hampden County and the Pioneer Valley, the broader Western Massachusetts umbrella which PMRAP sometimes uses to describe itself might be open to further inclusion of businesses in the Berkshires. On the plus side, a broader geographic scope might confer an advantage in securing resources for a shared manufacturing center with engineering services for small manufacturers and cutting-edge equipment, shared and used to foster region-wide innovation. On the other hand, the needs of manufacturers in the Berkshires may be different and there could be value in enhancing the Berkshires capabilities as their own region. The Berkshire Applied Technology Council was established to be an organizing collaborative between regional employers and educators and BCC remains involved in working with this group. Informant interviews suggest that this group is significantly under-utilized and that some form of enhanced industry-led collaborative for manufacturing in the region could lead to benefits.

Key PMRAP Activities and Lessons Learned

- The Precision Manufacturing Regional Alliance Project received $750,000 for workforce training. Funded in part by the John Adams Innovation Institute, with matching funds from the Hampden County Regional Employment Board (REB).
- PMRAP has benefited from committed and consistent leadership from the public and private sector, developed by inviting all interested partners to participate. They spent time pulling together a networked cluster of businesses to see that they faced similar issues and that by working together, they could try to improve opportunities for the region. This included identifying industry leaders who became articulate advocates for this industry. This was done via the Economic Development Council and REB, an independent consultant with a vision, and an active local industrial association, as well as an extremely active leader. David Cruz was referenced multiple times as being critical for this work and being constantly focused on this topic as a committed champion.
- PMRAP built trust through relationships; capacity and willingness to deal with conflict and decision-making, and together developed a shared vision that emphasized growth opportunities for the entire sector not just individual firms.
- PMRAP has garnered significant funding resources for meaningful training opportunities, critical staff support for planning, coordination, project management, problem solving and publicity.
- PMRAP has focused attention to results and data on the manufacturing establishments in the area and their labor demand for machinists, etc. Their demand was compiled based on both expected growth but perhaps more importantly, anticipated turnover through retirement. This data helped to make a strong case for the targeted workforce training grants they have received from the state, and they continue to publish reports that specify the number of businesses and employees in the region.
- The coordination role played by REB staff has been key to holding the partnership together through periodic meetings, regular communications and the effective development and management of resources. This was important because the culture of manufacturing and small business owners both rely heavily on in-person interaction.

Findings and Opportunities

Summary of Findings

The research conducted for this study was focused on understanding advanced manufacturing in Berkshire County in terms of the challenges and opportunities to expand success for the industry in the region. It also included a review of best practices, findings from other studies and documentation of the increasingly focused state and federal initiatives to support advanced manufacturing. As noted at the beginning of this report, we intentionally evaluated data across all manufacturing sectors, explicitly recognizing that advanced manufacturing techniques can and do occur across virtually all sectors. The research findings presented in this section are based on the combination of industry data analysis, informant interviews, and best practices and lessons learned.

Nation's long-term manufacturing trends experienced even more dramatically in the Berkshires

The long-term decline in manufacturing jobs and the share of total economic activity (measured by percent of GDP) is well documented at the U.S. level. From our research, it is clear that the Berkshires has experienced an even steeper decline, stretching back to the 1970s and continuing through the most recent decade. Major declines and outright company losses in Pittsfield, North Adams and other locations have created a void, but various positives remain and continue to evolve in the region's manufacturing sector, namely:

- Manufacturing generates the second largest industry contribution of wages in the Berkshires, a key demonstration of the value of the industry;
- Multiple sub-sectors of manufacturing, led by plastics and paper, continue to generate relatively high concentrations of jobs for the region;
- The region's legacy of manufacturing and related support functions has helped maintain a generally high-quality, well-regarded workforce, with a large number of skilled technical workers;
- Consistent with manufacturing trends noted throughout the state, the Berkshires have shifted towards a greater share of dynamic small-medium sized companies with a diverse portfolio of manufacturing;
- Many of these small-medium sized companies are highly competitive and productive, using a variety of advanced manufacturing techniques;
- Manufacturing is an industry of regional importance with clusters of firms in spread throughout the Berkshires (e.g., North Adams, Adams, Pittsfield, Lee); and
- Although projections are for modest or flat net new job growth in manufacturing in Massachusetts, retiring workers and the evolving skills required for manufacturing are expected to provide substantial job opportunities in manufacturing in the coming decade.[18]

Quality of life seen as a major advantage for business location and employee retention

When asked to describe the biggest opportunities or advantages to working in the Berkshire region, the quality of life was universally described as the main reason for having a business or being able to draw talent to the region. The arts and culture, natural amenities/outdoors, safe communities, and good schools, were all mentioned as attractive for employees. Some companies indicated that once people experienced the Berkshires, they found it a place worth relocating to, and the reason some businesses are located here is because the chief executive loves

[18] http://www.masstech.org/sites/mtc/files/documents/2012%20Manufacturing%20Report%20Card%20Executive%20Summary.pdf

living in the Berkshires. Other advantages include relatively strong market access to multiple markets (Hudson River Valley in New York, and most of Massachusetts and Connecticut), relatively good transportation connections with the I-90 Mass Turnpike and some rail connectivity, and relatively lower real estate costs.

Like most areas, finding skilled workers is a challenge

Across the manufacturers interviewed in the region, all shared feedback on the challenge of finding skilled workers to fill open positions. Many firms feel poised for growth, but are concerned about being limited by not being able to find skilled machinists and engineers to fulfill customer demand. Firms seem to have individual relationships with BCC or local vocational technical schools, but it does not seem that there is a coordinated effort to collaborate with the region's educational assets for manufacturing. Several firms had received workforce training grants and had positive experiences receiving training for their incumbent workers from BCC. Firms had varying experiences recruiting through local vocational technical schools. Some stated that the schools were not training enough students for manufacturing fields, or that the students were going on straight to college, rather than into the workforce, which would be of more help to manufacturers. In many cases, the sought-after workers do not require a bachelor's degree but do require a combination of technical skills (electronic, mechanical), solid math and communication skills, and in some cases, familiarity working in a clean room environment.

Cost of doing business and other factors can also limit success in manufacturing

While access to skilled workers was the most frequently cited challenge, other factors that the region confronts include: a) relatively high energy costs and state-level taxes; b) relatively few sites that are shovel ready or market ready for small to medium sized companies; and c) the sluggish European economy which has led to reduced demand for goods and some reduction in labor hours in the region. In addition, most firms that we spoke with were not aware of state-wide or regional initiatives that they could participate in that would help their business or the industry. Some were members of national trade associations or Associated Industries of Massachusetts (AIM). Given the relatively new statewide Advanced Manufacturing Collaborative initiative and the associated "Amp It Up!" program, it will be interesting to see how these initiatives can benefit the most western part of the Commonwealth effectively. If these programs could be used as catalysts to rally local industry leaders together around shared concerns, they could have a positive impact.

Refined understanding of the opportunity to support broader region's semiconductor industry

One of the reasons to conduct this study was to better understand the potential linkages and opportunities to the semiconductor industry that is present in the Hudson River Valley of New York (and parts of Connecticut and the I-495 corridor in MA). Namely, Global Foundries in Malta, NY is approximately 45-65 miles away from the Berkshires (depending on location) and is a more recent, massive, completely modern semiconductor facility that continues to expand their base of 2,200 jobs. As described more fully in the body of the report, our research and interviews with Global Foundries indicates that opportunities for supply chain vendors in the Berkshires do exist but they are likely much more modest than for other kinds of similarly sized manufacturing (assembly) operations. The key is for Berkshire businesses to proactively seek "pre-approved" status as a vendor and then track the procurement opportunities that are likely forthcoming. On the other hand, there is a very real opportunity for residents in the Berkshires to be trained to work at a place like Global Foundries, especially if they possess a mix of technical skills and clean room environment training. Providing this kind of training to Berkshire residents could not only help them at Global Foundries, but could result in spillover benefits to Berkshire-based firms who seek similar skilled workers.

Advanced Manufacturing Opportunities in the Berkshires

Building from the identified findings, the research conducted for this study also shed light on possible opportunities and strategic directions that could help enhance, retain and grow the manufacturing sector in the

Berkshires. In no particular order, the following five opportunities could form the basis for the development of implementable strategies in advanced manufacturing in Berkshire County.

Prioritize targeted workforce training as a collaborative, high-profile initiative

Berkshire Community College and the area's vocational schools are placing significant emphasis on workforce training to support manufacturing. This effort needs to continue to grow in terms of:

a) Visibility – this should be a high-profile effort, championed by a range of private sector, educational, and development officials, and use of the AMP it Up! program could help;
b) Collaboration – interviews indicate that there is a lack of coordinated input from the area's manufacturer's to the workforce training programs to gain the best range of training, with opportunities for skills learned to be relevant across multiple firms; and
c) Funding – BCC has prioritized training for manufacturing from money secured from a state-level grant to community colleges, but more funding is likely needed to reach a larger scale of training.

Complete and implement master plan for William Stanley Business Park

The region's largest and highest profile site for manufacturing and industrial opportunities is at the William Stanley Business Park in Pittsfield. As indicated on the Pittsfield Economic Development Authority (PEDA) web site, PEDA is in the process of completing a master plan.[19] Based on informant interviews, there is a sense from business leaders that a more dynamic and well-communicated master plan could help to market and provide new tenants to that site. Area stakeholders are familiar with the Devens master planned re-development project, and are interested in applying some of the lessons learned and potentially having greater support from MassDevelopment. In particular, the Devens example suggests providing a wider range of small-medium sites as options which would be consistent with the trends towards more small-medium sized manufacturing companies. Ensuring and promoting pre-permitted sites with environmental issues already identified and cleaned-up is another key aspect of marketing a site like this. Another possibility, especially given the planned life sciences facility, would be to create a more commercial, research lab area of the business park, with other sites reserved for more industrial uses (manufacturing, warehousing distribution, etc.).

Expand the region's emerging assets in life sciences

As noted, Pittsfield has a $6.5 million earmark from the Massachusetts Life Sciences Center (MLSC) to create a new life sciences facility building.[20] Based on informant interviews, implementing this facility is dependent on the region demonstrating its ability to grow and locate life sciences related companies whether in bio-technology, pharmaceuticals, or medical device manufacturing. Homegrown firms like Nuclea Biotechnologies are a great start for this emerging industry, and supporting the BCC's plans to create a clean room training environment is also critical. In essence, the Commonwealth's investment in life sciences under the Patrick Administration is helping to create opportunities in all parts of the state (UMass Amherst recently received $95 million for an R&D facility). What remains to be seen is how this sector can be successful in the Berkshires but there are likely to be manufacturing-related opportunities that need to be tracked and pursued. As an example, the MLSC also awarded $5.5 million for a joint collaboration between Bay State Medical and UMass Amherst in Springfield focused on health monitoring that combines expertise in health informatics with the region's well-established precision manufacturing industry and medical devices industry with the aim of prototyping and commercializing health monitoring devices.

Enhance the region's connections to state-level and regional manufacturing initiatives

Leaders of initiatives such as the PMRAP in the Pioneer Valley and the state-level Advanced Manufacturing Collaborative (AMC) suggested that in order for initiatives around educating and recruiting the workforce and other challenges to be effective, they must be industry-led. Industry leaders must have a stake in the development

[19] http://www.pittsfieldeda.org/
[20] http://williamstanleybp.com/william-stanley/site-5-6/

and execution of any programs for them to be sustainable, even with strong partners in education and government. This can be a challenge, given how stretched business owners can be with their time and resources. The Berkshires may actually have an advantage in being a relatively small community where many industry leaders have known each other for many years and could build from those relationships. In addition, the scale of the manufacturing industry in the Berkshires can be seen as an advantage in terms of conducting outreach to businesses to understand their needs and work towards collaborative initiatives to the benefit of the entire industry's competitiveness.

At the same time, the AMC and the Patrick Administration is working diligently to raise the state's focus on manufacturing and help facilitate initiatives that can boost a region's manufacturing industry. The June 20, 2013 Advanced Manufacturing Summit featured Governor Patrick, who provided new support to AMC's initiatives around the state, including the implementation of a new Advanced Manufacturing Regional Partnership Academy focused on supporting regional manufacturing initiatives. In particular, the state has focused on the PMRAP initiative as a best practice model that they hope to replicate in other parts of the state. The Berkshires have an immediate opportunity to improve their connections to this state-level priority by better positioning itself for funding and support through the AMC, and/or through PMRAP (which has also indicated a willingness to help facilitate other similar initiatives in other regions around the state). In the near-term, the specific opportunity is to engage Berkshire businesses and manufacturing stakeholders in the new regional partnership academy sessions to learn from peers and experts about how best to support regional manufacturing initiatives.

Proactively improve eco-system for manufacturing to help overcome cost disadvantages

It is a well-known fact that energy costs in the Berkshires (and most of New England) are relatively high, especially compared to other parts of the country. Relatively high tax rates can also be a cost factor that firms consider in location decisions. While it is very difficult to change these cost factors (at least in the near term), there are other aspects of the business climate or eco-system for manufacturing that the region can more proactively work to address. Three areas for improvement are:

- **Sites/buildings for manufacturing** – the region does possess a mix of potential locations for manufacturers but this inventory and the marketability of sites would be improved if: a) a more complete inventory of sites was assembled and promoted, with additional sites added to the MassEcon list of Market Ready Sites (only four are listed currently in the Berkshires)[21]; and b) proactive environmental clean-up and expedited permitting were expanded more completely in the region providing faster time to market for prospective business expansions and locations.
- **Improving infrastructure to sites** – though not necessarily a problem, it is important to be aware that the state does have a recently expanded portfolio of public-private funding opportunities to help with infrastructure that support tangible economic development projects and businesses. In recent years, disparate programs were consolidated within the MassWorks Infrastructure Program, which includes access roads, telecommunications, and water/sewer projects.[22] This arsenal of funding now includes an Industrial Rail Access Program (IRAP), led by the Massachusetts Department of Transportation, to help with rail sidings, rail spurs and other rail projects that will enhance specific development opportunities.
- **Financing and incentives** – effective use of locally-driven incentives and well-communicated financing options can be critical to help overcome other cost disadvantages, including consideration of tax increment financing (TIF) policies. PERC is one organization that has made progress in terms of practical, specific funding (loans, grants) for business ventures. Another organization worth collaborating is Common Capital based in Holyoke but serving all of western Massachusetts with a variety of financing options for businesses looking to expand.[23]

[21] http://massecon.com/readymass/
[22] http://www.mass.gov/hed/economic/eohed/pro/infrastructure/massworks/
[23] http://www.common-capital.org/wp-content/uploads/2013/05/Common-Capital-Businesses-Financed-1990-2012.pdf