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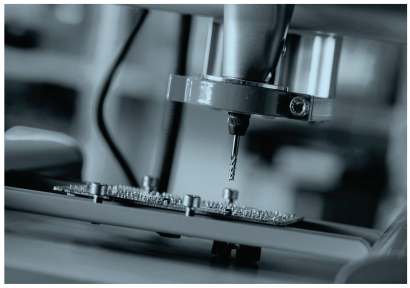

CENTERS OF EXCELLENCE ACTION STRATEGY

EAST MICHIGAN COUNCIL OF GOVERNMENTS

TIP strategies
AUSTIN • SEATTLE

ACKNOWLEDGEMENTS

TIP Strategies would like to thank all of the individuals and organizations who contributed to the creation of this Centers of Excellence Action Strategy. We want to thank the Center of Excellence Task Force members whose expertise and feedback was critical for the success of this planning process. We also extend our gratitude to the many other leaders from the region and state who shared their insights and support for this project and its potential to positively impact the East Central Michigan economy. We are also especially grateful for the guidance and support we received from the leadership and staff of the East Michigan Council of Governments (EMCOG).

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INTRODUCTION

During the planning process for the Regional Prosperity Strategy completed in December 2014, **a group of leaders in the 8-county East Central Michigan Prosperity Region** (PR-5) galvanized support for the concept of creating a new regional asset to stimulate additional job growth and investment and to support the growth of existing companies. The East Michigan Council of Governments (EMCOG), the lead organization representing PR-5, re-engaged TIP Strategies, an economic development consulting firm based in Austin, Texas and Seattle, Washington, to assist with the development of this Centers of Excellence Action Strategy. With TIP's assistance and the guidance of a Task Force made up of more than a dozen of the region's academic and business leaders, EMCOG has developed this strategy document with immediate, short-term, and long-term **actions to create Centers of Excellence that will move the region's economy forward along a path of sustained growth.**

Centers of Excellence are typically **a collaboration between higher education institutions and businesses**, leveraging the unique assets found within a region to support the advancement of research or training within a specific industry or focus area. They often serve as **a magnet for industry expertise** and are **dedicated to the success of companies within a region.** They also provide leadership, recognition, best practices, research, support and/or training for entrepreneurs, as well as current and future employees within one or more industries.

Three ingredients of successful Centers of Excellence are:

1. They are defined by a consortium or collaboration led by multiple colleges and universities.
2. They bring together higher education and industry, and often other groups (e.g., government and nonprofits).
3. They are focused on a specific area of research, a particular industry segment, or a solution to a narrowly defined problem.

A successful Center of Excellence will build on the region's higher education and industry strengths to develop and attract new waves of investment, talent, and business creation. **Expected outcomes** of a Center of Excellence include:

1. Generating state-wide and national recognition for East Central Michigan;
2. Supporting regional economic growth; and
3. Leveraging the unique assets of the region's higher education institutions.

This document describes **four potential concepts** for a Center of Excellence in East Central Michigan as identified by the Task Force:

1. **Advanced Materials/Plastics:** Explore waste heat to energy conversion and other products, processes, and technologies for the plastics manufacturing industry to spark innovation, cost savings, and the growth of a new industry cluster to support the region's manufacturing sector.

2. **Agriculture/Craft Breweries:** Pursue agri-tech entrepreneurship and innovation to support the growing craft breweries industry, potentially including shared processing facilities to serve multiple businesses across the region.
3. **Health Sciences:** Align the region's health care industry, workforce training efforts, and health sciences innovation programs to improve urban and rural community health.
4. **International Workforce:** Enhance the experience for international students through better connections to the region and its businesses, efforts to align workforce training programs, and marketing to international communities.

For each of the four concepts, we have included a one-page summary and a more detailed description.

Each concept for a Center of Excellence has a unique path for implementation and a distinct proposed structure. All four concepts have been designed to address specific problems or to respond to a specific set of opportunities. **Yet, despite their differences, each concept shares three key elements:**

1. **The steps for implementation are focused on efficiency and quick results.** The actions recommended in this document are designed to move each concept ahead with as few resources as possible. The steps required for implementation are structured to maintain positive momentum through immediate and short-term actions that yield results with minimal time and effort. Many of the initial steps required for each concept are as simple as bringing together different groups of academic institutions, businesses, and other organizations to identify shared goals and objectives as they relate to each specific opportunity. These initial conversations are critical to the long-term success of this project, because they will bring together people and organizations that can generate positive outcomes by working together.
2. **Collaboration is the driving philosophy behind each concept.** The steps for implementing each concept are intended to bring organizations together to realize greater outcomes with fewer resources by collaborating to scale up. The implementation of each concept will be guided by a coalition of leaders that meet regularly to discuss potential areas of collaboration and opportunities to create initiatives that enhance the economic competitiveness of the entire region. Voluntary collaboration and partnerships will be required for successful outcomes.
3. **EMCOG will assist ongoing implementation efforts** as a convener and support organization to help move each concept forward. EMCOG has successfully served as the regional convener for the Regional Prosperity Strategy and many other programs and initiatives that have supported economic development in East Central Michigan. Their continued involvement in the Centers of Excellence Action Strategy will be crucial for the project's success. EMCOG's staff resources, connections to local governments, and ability to access state and federal grant funding will be important to assist implementation efforts. They can also act as a resource to report regularly on outcomes associated with this project, to keep stakeholders aware of progress and results.

CENTER OF EXCELLENCE CONCEPT SUMMARIES

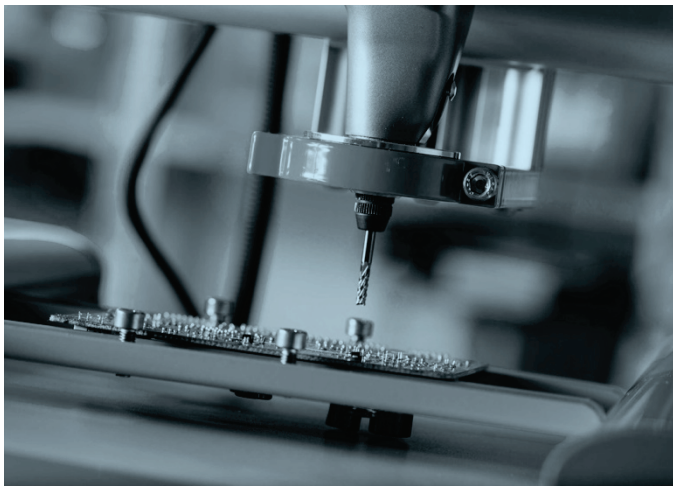
ADVANCED MATERIALS/PLASTICS

CONCEPT

Explore waste heat to energy conversion and other products, processes, and technologies for the plastics manufacturing industry to spark innovation, cost savings, and the growth of a new industry cluster to support the region's manufacturing sector.

DESCRIPTION

The plastics manufacturing industry in East Central Michigan is a strong, diverse cluster of businesses. The PR-5 region, primarily in the northern counties of Gladwin and Arenac, is home to dozens of businesses in the plastics manufacturing and thermoforming industry. Waste heat, resulting from manufacturing processes, is a large untapped resource for many industries and companies. This is especially true for the plastics manufacturing firms in East Central Michigan, which incur substantial monthly costs from electric utility services needed to run their facilities. The conversion of waste heat to electricity is an exciting innovation currently being tested. A leading firm in this space is Alphabet Energy, a Silicon Valley startup with over $30 million in venture funding that is utilizing technologies developed by nanotechnology researchers at Michigan State University. While there are similar innovative firms located in other parts of the US, there are significant advantages to developing these technologies where a concentration of manufacturing firms exists. East Central Michigan's manufacturing firms (especially plastics) and its colleges/universities are well-positioned to develop innovative technologies in this space.



ADVANCED MATERIALS INDUSTRY SNAPSHOT

Area	2015 Jobs	2010-2015 % Change	Earnings Per Worker (2015)
PR-5	25,029	21%	$84,485
Michigan	348,291	32%	$76,725
US	4,790,134	12%	$72,406

Source: EMSI, 2015.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed

REGIONAL ASSETS:

- Regional cluster of plastics manufacturing firms with high levels of waste heat
- Numerous machine & equipment providers to plastics industry
- Major corporations involved in advanced materials
- SVSU Independent Testing Lab
- MMCC Plastics Technology

POTENTIAL PARTNERS:

- SVSU (Independent Testing Lab), CMU, MMCC, Delta College
- MSU (nanotechnology R&D)
- Vantage Plastics, Midland Compounding & Consulting, J. Ranck Electric, Alphabet Energy, Consumers Energy, NextEnergy
- Manufacturers associations, SBDCs
- Society of Plastics Engineers

BEST PRACTICES:

- BETI (Building Energy-Efficiency Testing and Integration) project, Puget Sound Regional Council
- The Water Council (Milwaukee, WI)
- SEMATECH & MCC (Austin, TX)
- Pecan Street (Austin, TX)

AGRICULTURE/CRAFT BREWERIES

CONCEPT

Pursue agri-tech entrepreneurship and innovation to support the growing craft breweries industry, potentially including shared processing facilities to serve multiple businesses across the region.

DESCRIPTION

Agriculture is a major economic driver for East Central Michigan. The region is home to nearly 6,000 farms that produce more than $1 billion of products annually and employ more than 14,000 people. The region's agricultural strengths can be leveraged for broader economic growth. Agri-tech entrepreneurship and innovation, through greater connectivity between the region's higher education institutions and area ag businesses, could lead to new economic opportunities. Ag-related innovation could be accelerated through partnerships with Michigan State University, a top-10 ag science R&D institution nationally. The breweries and hops sector represents a unique agriculture opportunity for the region. Michigan's growing status as a top-5 state nationally for breweries, combined with the region's agriculture and manufacturing strengths, make the development of an industry centered on craft brewing a viable option for economic development.

EVERY STATE IN THE US, RANKED BY ITS BEER

Rank	State
1	Oregon
2	California
3	Colorado
4	**Michigan**
5	Washington
6	Wisconsin
7	Vermont
8	Pennsylvania
9	New York
10	Massachusetts

Source: Thrillist, 2014

In 2014, the digital lifestyle publication Thrillist created a ranking of all 50 states based on their beer. Thrillist describes their rating criteria accordingly: "Quantity and quality are both important, but quality's a bit MORE important. We also gave a boost to states who played a historical role in American beer as we know it today."

REGIONAL ASSETS:

- Michigan is a top brewery state in craft brewery production & quality
- Growing breweries and hops sector in region and across state
- Nearly 6,000 farms with over $1 billion in ag products each year from 14,000+ farm workers
- Several large food processing companies
- MSU Extension & potential connections to MSU's top-10 ag sciences R&D program

POTENTIAL PARTNERS:

- CMU Fermentation Science & other regional higher education
- Regional ag businesses, manufacturers, and breweries
- MSU Extension
- State organizations (MEDC, MI Farm Bureau, MI Brewers Guild)
- Regional organizations (economic development corporations, Blue Water Angels)
- USDA Rural Development
- Saginaw Chippewa Indian Tribe

BEST PRACTICES:

- Tennessee AgLaunch
- NBAF (National Bio and Agro Defense Facility) (Manhattan, KS)
- Animal Health Corridor (Greater Kansas City Area)
- Asheville Brewers Alliance (Asheville, NC)

HEALTH SCIENCES

CONCEPT

Align the region's health care industry, workforce training efforts, and health sciences innovation programs to improve urban and rural community health.

DESCRIPTION

East Central Michigan has an abundance of health care assets. The region has several major hospital systems that serve a much larger geographic area than just the 8-county Prosperity Region. Each of the region's higher education institutions has its own specialization in health care training. And the new CMU College of Medicine is a valuable asset that can help the region take its health care sector to the next level. An immediate opportunity exists to align training programs across the region's health care institutions and medical training providers, potentially including tele-health, shared training facilities, and addressing social service needs. Aligning the community benefit spending (non-profit hospitals are required to provide benefits in the communities they serve each year to retain their tax-exempt status) taking place through the region's hospital systems is another immediate opportunity—encouraging the hospitals to reach a wider audience and make investments in a more coordinated manner. A longer-term opportunity could be a collaborative R&D effort led by the CMU College of Medicine, in partnership with the region's hospitals and higher education institutions. The majority of academic R&D investments in the State of Michigan are within the life sciences field, mostly at the University of Michigan-Ann Arbor. East Central Michigan could, and should, garner a larger share of R&D investments.

HEALTH CARE INDUSTRY SNAPSHOT

Area	2015 Jobs	2010-2015 % Change	Earnings Per Worker (2015)
PR-5	31,914	4%	$53,519
Michigan	512,412	5%	$60,387
US	15,357,487	8%	$61,956

Source: EMSI, 2015.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed

REGIONAL ASSETS:

- Regional health care industry serves a market area that extends far beyond the 8-county region, including several surrounding counties
- Several major hospital systems
- New CMU College of Medicine
- Each of the region's colleges & universities offers medical training

POTENTIAL PARTNERS:

- CMU College of Medicine
- Regional higher education: (CMU, SVSU, Alma College, Mid Michigan Community College, and Delta College)
- Regional hospital systems (Covenant, McLaren, St. Mary's, MidMichigan Health)
- University of Michigan
- MEDC
- Other health-related organizations

BEST PRACTICES:

- Global Center for Health Innovation (Cleveland, OH)
- Healthy Chicago 2.0
- Med-tech innovation district (Austin, TX)
- Round Rock Higher Education Center (Round Rock, TX)

INTERNATIONAL WORKFORCE

CONCEPT

Enhance the experience for international students through better connections to the region and its businesses, efforts to align workforce training programs, and marketing to international communities.

DESCRIPTION

Collectively, the colleges and universities in East Central Michigan are the region's strongest asset for economic development. With well over 55,000 students each year, including a large and growing number of international students, higher education represents a large part of the region's economy. There is a unique opportunity to leverage international students for economic development. The goal is not to simply increase the number of foreign students in the region by doing joint marketing, but rather, to enhance the experience for international students living in the region to establish long-term relationships. This concept is intended to build the region's reputation as a great destination for international students and to cultivate connections between the region and other countries that can lead to future economic development opportunities. Partnerships with regional businesses that are seeking international talent could be leveraged to help implement this initiative. A consortium of the region's colleges and universities, with the goal of exploring ways to better connect foreign students to the region's businesses and communities, could yield a wide range of economic benefits.

HIGHER ED. ENROLLMENT & COMPLETIONS

School	Enrollment (Fall 2014)	International Students
Alma College	1,396	23
Northwood University	3,131	161
Mid-Michigan Comm. College	4,422	133
Saginaw Valley State Univ.	9,829	700
Delta College	9,842	30
Central Michigan University	26,879	1,175
TOTAL	**55,499**	**2,222**

Source: NCES

REGIONAL ASSETS:

- Large and growing number of international students in the region & state
- Several colleges/universities, each with its own academic & workforce training specialties
- Large corporations with global business ties
- Available jobs for international talent

POTENTIAL PARTNERS:

- Regional higher education: (CMU, SVSU, Alma College, Mid Michigan Community College, and Delta College)
- Large corporations seeking global talent (Dow Chemical, Dow Corning, Hemlock Semiconductor, Nexteer)
- MEDC
- National associations of community colleges & universities
- Great Lakes Bay Convention & Visitors Bureau and other CVBs

BEST PRACTICES:

- Universities at Shady Grove (Montgomery County, MD)
- Delta Research Consortium (Mississippi River Delta region)
- South Texas/Border Initiative

ADVANCED MATERIALS/PLASTICS
WASTE HEAT TO ENERGY CONVERSION

CONCEPT DESCRIPTION

Explore waste heat to energy conversion and other products, processes, and technologies for the plastics manufacturing industry to spark innovation, cost savings, and the growth of a new industry cluster to support the region's manufacturing sector.

STRUCTURE

This Center of Excellence concept will be a partnership between the region's plastics manufacturing firms and regional higher education institutions. Initially, this effort will be led by and housed within the Mid Michigan Community College (MMCC) Plastics Technology program. The Saginaw Valley State University Independent Testing Lab and Vantage Plastics will serve as initial key partners. The partnership will serve the region's manufacturers to make them more competitive and innovative. This partnership will test technologies that convert waste heat to electricity, along with other energy efficiency opportunities specific to the plastics industry. Other innovations that leverage waste heat for productive use (e.g., greenhouses, drying processes, heating of buildings) will also be explored as part of this effort. Testing of technologies will begin in MMCC's facilities. Once technologies have been proven in a laboratory setting, industry partners (beginning with Vantage Plastics) will implement these technologies in their manufacturing plants. Successful technologies will be used as models to be translated for broader application across the region's plastics manufacturing firms, and ultimately, to the larger manufacturing industry. This Center of Excellence has the potential to not only strengthen the region's existing plastics manufacturing cluster, but to leverage this unique set of businesses to create a new industry that fuels innovation, new job growth, and capital investment for the region.

POTENTIAL PARTNERS:

- Higher education (MMCC Plastics Technology program, SVSU Independent Testing Lab, CMU, Delta College, MSU nanotechnology R&D program, Ferris State University Plastics Engineering Technology program)
- MMCC Plastics Manufacturers Advisory Board (including Vantage Plastics, Midland Compounding & Consulting, Brown Machine, and other firms)
- Manufacturers associations (Great Lakes Bay Manufacturers Association, Central Michigan Manufacturers Association, Michigan Manufacturers Association, National Association of Manufacturers)
- Waste heat innovation and related firms in Michigan and across the US (Alphabet Energy, Tellurex, J. Ranck Electric, Weco International)
- National industry associations (Society of Plastics Engineers, Plastics Institute of America)
- MEDC and regional economic development corporations, SBDCs (small business development centers)
- Other organizations (Michigan Manufacturing Technology Center, Consumers Energy, NextEnergy)

RATIONALE & REGIONAL ASSETS

The plastics manufacturing industry in East Central Michigan is a strong, diverse cluster of businesses. The PR-5 region, primarily in the counties of Arenac, Gladwin, and Midland, is home to dozens of businesses in the plastics manufacturing and thermoforming industry. In fact, the City of Beaverton (in Gladwin County) is the epicenter of the region's plastics industry. Beaverton has branded itself as the "Thermoforming Capital of the World" thanks to the large number of plastics and manufacturers that are concentrated in this small community. Dow Chemical was an early innovator of modern plastics materials, and in the 1940s, the region spawned several pioneering companies that have become industry leaders today, including Brown Machine and Robinson Industries. Between the thermoforming firms, the machinery and equipment providers, and related manufacturing and service businesses, this region plays a unique role in the plastics industry. The plastics industry as a whole accounts for about 65,000 jobs in Michigan and 900,000 jobs in the US. And the broader advanced materials industry in the region and state is more concentrated, growing faster, and has higher wages than the US as a whole.

Waste heat is a large untapped resource for many industries and companies. This is especially true for the plastics manufacturing firms in East Central Michigan. Some of the region's mid-sized plastics manufacturing and thermoforming companies spend upwards of $100,000 per month on electricity. This is a substantial cost that affects the business operations of local firms. The potential cost savings and efficiencies from leveraging waste heat for productive use could significantly improve the competitiveness of the region's manufacturers.

The conversion of waste heat to electricity is an exciting innovation currently being tested. A leading firm in this space is Alphabet Energy, a Silicon Valley startup with over $30 million in venture funding, utilizing technologies developed by nanotechnology researchers at Michigan State University. While there are similar innovative firms located in other parts of the US, there are significant advantages to developing these technologies where the concentration of manufacturing firms exists. East Central Michigan's manufacturing firms (especially plastics) and its colleges/universities are well-positioned to test and implement innovative technologies for capturing waste heat for generating electricity or leveraging it for other productive uses.

The testing and product development associated with waste heat could lead to a new industry. Energy efficiency practices have proven to yield significant cost savings for businesses, and many opportunities remain for the region's businesses to become more competitive through traditional energy efficiency efforts. However, this concept has the potential to transform an existing liability into an asset. Even more exciting, this could lead to the creation of a new industry cluster in East Central Michigan to fuel the growth of the region's economy. A new group of businesses focused on energy efficiency technologies for manufacturing can be developed in the region. This would strengthen existing firms, but would also help the region expand beyond plastics and thermoforming. Ultimately, East Central Michigan could serve as a hub for innovative technologies and products that are adopted by plastics, thermoforming, petrochemical, and related firms across the global marketplace.

Regional assets and advantages include:

- One of the largest plastics manufacturing clusters in North America, centered on Arenac, Gladwin, and Midland Counties with more than 5,000 jobs specifically in plastics manufacturing and more than 25,000 jobs in the broader advanced materials industry

- Large corporations involved in advanced materials (Dow Chemical, Dow Corning, and Hemlock Semiconductor)
- Numerous machine and equipment providers that supply and serve the plastics industry
- MMCC Plastics Technology program
- SVSU Independent Testing Lab
- Ferris State University plastics engineering program
- MSU nanotechnology R&D

STEPS FOR IMPLEMENTATION

IMMEDIATE (NEXT 100 DAYS)

I-1. Host a summit at MMCC with regional plastics manufacturing firms to discuss the problems and opportunities associated with waste heat.

- Include regional higher education, businesses, and entrepreneurs interested in this concept.
- Invite business leaders, researchers, and other innovators in this field from around the US that are developing innovations and technologies to capture waste heat for productive use.

I-2. Identify programs, partners, and funding sources to support this concept.

I-3. Establish a committee, spearheaded by members of the Center of Excellence Task Force, to meet regularly to move this concept forward.

I-4. Designate a space at MMCC to test waste heat to electricity conversion technologies and related innovations.

I-5. Catalogue additional waste heat applications beyond potential conversion to electricity.

- These could include greenhouses, drying of agricultural products, heating of buildings during cold weather, or other possible uses.

SHORT-TERM (THROUGH 2016)

S-1. Begin testing of waste heat to electricity conversion technologies in the MMCC laboratory setting.

- Document results of lab testing to expand knowledge base.

S-2. Expand testing from the lab to the market, utilizing Vantage Plastics and other regional plastics manufacturing firms.

S-3. Engage other partners across the state to support this effort.

- Work with the University of Michigan to become an "affiliate partner" of the MForesight program that is a national research consortium, housed at the University of Michigan-Ann Arbor, to identify the cutting-edge manufacturing innovations that will drive US economic competitiveness over the next 10-20 years.

S-4. Work with regional entrepreneurship and small business support organizations (e.g., Mid Michigan Innovation Center, Blue Water Angels, CMU Research Corporation) to pull together a commercialization strategy.

- Spend time exploring how to turn innovations from this concept into business opportunities.

LONG-TERM (2017 & BEYOND)

L-1. Work with the region's higher education institutions to develop talent specific to the new technologies.

L-2. Work with existing firms to encourage adoption of new technologies.

L-3. Recruit innovative plastics manufacturing and related advanced manufacturing firms from other parts of the state and country to the region.

L-4. Pursue federal grant opportunities to build on this center of excellence by concentrating more R&D, talent, and innovation related to waste heat capture technologies.

L-5. Initiate an effort to recruit national researchers to participate in this Center of Excellence, through a virtual collaboration of national advisory experts.

- Recruit top researchers to join the center to conduct applied research, potentially including an endowed chair for a "Researcher-in-Residence" at one or more of the region's higher education institutions.

AGRICULTURE/CRAFT BREWERIES
CRAFT BREWING SCIENCE

CONCEPT DESCRIPTION

Pursue agri-tech entrepreneurship and innovation to support the growing craft breweries industry, potentially including shared processing facilities to serve multiple businesses across the region.

STRUCTURE

This concept will be a virtual partnership that connects the region's economic development organizations, higher education institutions, brewery & hops industry, and related businesses. It will be led by the Mid Michigan Development Corporation, Greater Gratiot Development Inc., CMU's Fermentation Science program, and MMCC, and will also include brewery industry representatives as key partners. Initially, this concept will have a broad scope of supporting the craft brewing industry in East Central Michigan through collaboration among craft brewers and related businesses, higher education institutions, and the economic development community. As this Center of Excellence becomes formalized and gains traction, it may hone in on specific niches, such as brewing equipment and machinery, hops production, malting barley production, or other aspects that support craft brewing in the region and state.

POTENTIAL PARTNERS:

- Mid Michigan Development Corporation, Greater Gratiot Development Inc. and other regional economic development organizations
- CMU Fermentation Science program, MMCC, and other regional higher education institutions
- State level agriculture and industry organizations (Michigan Brewers Guild, MSU Extension, Michigan Farm Bureau)
- Industry associations (Brewers Association, American Society of Brewing Chemists, Hop Growers of America, Master Brewers Association of the Americas, Midwest Organic Hops)
- Regional and statewide craft breweries, hops producers, and malting barley producers

RATIONALE & REGIONAL ASSETS

Craft brewing is a growth industry nationally. According to statistics published by the Brewers Association (BA), there were nearly 3,500 breweries in the US in 2014, an increase of roughly 2,000 breweries from just 10 years earlier. Of these, 99 percent were craft-brewing operations. However, these small, independent producers accounted for just 11 percent of total market share, producing 21.8 million of the 197.1 million barrels produced in 2014. In dollar terms, the craft brewing industry accounted for 22 percent of the roughly $101 billion beer market in the US. Within the US craft brewing industry, microbreweries represent the largest market segment, with approximately 1,870 establishments nationwide (roughly one-half of the country's total breweries). Microbreweries are also the fastest-growing segment of the industry, increasing by more than 400 percent between 2004 and 2014. During the

same period, the number of large, non-craft brewers declined from 55 in 2004 to just 46 by 2014, a decrease of 16 percent. In terms of volume, total beer production rose by less than 1 percent in 2014, compared with the prior year. At the same time, the volume of craft beer produced in the US increased by 18 percent.

Breweries are a major economic driver and growth opportunity for Michigan. According to a 2014 analysis from the Brewers Association, Michigan's brewing industry contributed $1.85 billion in economic impact, up 84 percent from about $1.0 billion two years earlier. The sector is also responsible for 14,773 full-time jobs and $571.6 million in annual wages. A promising trend is the expansion of large craft brewers based in the Western US that are seeking a second location in the Eastern US to access a larger market area through proximity to distribution channels and proximity to a much larger customer base. Recent examples are the New Belgium Brewing Company (based in Fort Collins, Colorado), which opened its second location in Asheville, North Carolina, and the Sierra Nevada Brewing Company (California), which opened an East Coast location near Asheville. Deschutes Brewery (Bend, Oregon), the largest craft brewer in the US, is also currently scouting for an East Coast location; Asheville, North Carolina; Roanoke, Virginia; Greenville, South Carolina; and Charlotte, South Carolina are all on the short list. East Central Michigan's strengths in agriculture and manufacturing, along with the state's strong brewing industry, make the region a good location for craft brewery expansions and related supply chain development.

Craft breweries play an important role in talent attraction. Cities across the US have successfully leveraged craft breweries to generate a buzz that attracts talented workers, especially young adults. Grand Rapids, Michigan has parlayed its status as "Beer City USA" and "Best Beer Town" by USA Today into a key selling point that has made the city a top destination in the Midwestern US for skilled workers. Asheville, North Carolina, another recent "Beer City USA" winner, has also used its status as a major craft brewing center to attract talent. Asheville, a small city in the mountains of Western North Carolina gains more residents each year from major East Coast metro areas (New York, DC, and Chicago) than it loses to those areas, thanks in large part to the widespread "buzz" that is created by the region's breweries and other amenities (arts/culture, music, and outdoor recreation). East Central Michigan can take advantage of these trends and use craft breweries not only as a business recruitment/expansion opportunity, but also to attract talent and retain young people in the region.

Regional assets and advantages include:

- CMU's Fermentation Science program, one of only five similar programs in the US
- Regional enthusiasm and positive momentum from the recent Hops Summit in Mount Pleasant in November 2015
- Climate and agricultural soils favorable for growing aromatic hops
- Michigan is a top-ranked state for breweries, including a higher-than-average preference among consumers for in-state beer
- A diverse set of advanced manufacturers that provide equipment and machinery for the agricultural sector, some of which are seeking product opportunities to supply breweries

STEPS FOR IMPLEMENTATION

IMMEDIATE (NEXT 100 DAYS)

I-1. Convene a regional craft brewing science summit, building on the momentum of the recent (Nov. 2015) hops summit.

- Include brewers, hops and barley providers, suppliers, and educational providers.

I-2. Establish a committee, spearheaded by members of the Center of Excellence Task Force, to meet regularly to move this concept forward.

I-3. Leverage the region's higher education institutions to identify opportunities to create training programs that benefit the region's and state's craft brewing sector.

- Learn about other models of successful brewery industry and training provider collaborations that led to positive economic development outcomes in other parts of the US.

I-4. Work with the region's economic development corporations to evaluate opportunities to establish craft breweries as a legitimate target industry for business recruitment and expansion.

- Analyze the region's and the state's competitive advantages nationally within this sector.
- Look at Asheville's recent success in recruiting Sierra Nevada and New Belgium as a model to learn from.
- Richmond, Virginia's recent successful recruitment of Stone Brewing Company is another good example to learn from.

I-5. Pursue grant funding through USDA Rural Development and other organizations to develop a better understanding of the business opportunities associated with craft brewing in East Central Michigan.

SHORT-TERM (THROUGH 2016)

S-1. Establish a formal partnership (housed jointly at CMU and MMCC) to create a Center of Excellence for Craft Brewing Science.

- Include business leaders in the brewing industry, educators, and researchers in this committee.

S-2. Explore the potential for shared space for testing and product development associated with brewing, hops, and malting barley.

- Work with craft brewers, hops producers, and malting barley producers to pursue the creation of a co-op business model to grow larger quantities and varieties of hops and/or malting barley in a single facility.

S-3. Work with the region's economic development corporations, manufacturing associations, and manufacturing and agriculture businesses to explore the potential to grow the region's manufacturing sector by creating machinery and equipment that serve craft breweries.

- Compile a listing of all the brewery equipment, machinery, and supplier companies existing in Michigan, the Midwest, and the US as a whole.
- Use this list to identify gaps and opportunities for viable businesses that could support the region and state's craft brewing sector.
- Also consider opportunities for existing manufacturing firms in the region to add products that supply craft breweries.

LONG-TERM (2017 & BEYOND)

L-1. Launch a regional craft brewery and supply chain recruitment effort in collaboration with the region's economic development organizations, MEDC, and other economic development groups from across the state.

- Target expansions of large craft brewers located in other parts of the country, especially from the West Coast and states in the Mountain Time Zone.
- Pursue supply chain and diversification opportunities related to breweries (e.g., yeast producers, equipment providers).
- Work with the region's economic development organizations to have shared representation at national and international trade shows related to the craft brewing industry to collectively promote the region as a great location for new craft breweries and related business investments/expansions.

L-2. Establish related training programs across the region's higher education institutions (e.g., biochemistry, microbiology) to support this sector.

- Work closely with the brewing industry to identify the most valuable and in-demand skill sets.

HEALTH SCIENCES
URBAN & RURAL COMMUNITY HEALTH

CONCEPT DESCRIPTION

Align the region's health care industry, workforce training efforts, and health sciences innovation programs to improve urban and rural community health.

STRUCTURE

This concept will be structured as a consortium focused on improving community health outcomes in underserved areas of the 8-county East Central Michigan region and beyond, both rural and urban. The consortium will include the region's colleges and universities as well as the major hospital systems and could be housed physically at the new CMU College of Medicine facilities in Saginaw. This collaborative effort will pursue several objectives to improve community health in the region, including:

- Identifying select indicators to measure community health (e.g., rates of infant mortality, childhood obesity, smoking cessation, diabetes);
- Working with the health care industry and training providers to ensure that training programs are responsive to current and future workforce needs, ensuring to prevent overlap and duplication with other programs in the region;
- Working with the region's hospitals to align community benefit spending (non-profit hospitals are required to provide benefits in the communities they serve each year to retain their tax-exempt status) across the region to address community health in a more holistic manner; and
- Pursuing R&D efforts in the health sciences field to fuel med-tech innovation and economic development, including the possibility of promoting the region as a location for clinical trials of new medical products and technologies.

This Center of Excellence will begin as a regional summit that invites all relevant parties (hospitals, colleges and universities, and other health care organizations) to an event to discuss collaboration opportunities to improve community health outcomes across East Central Michigan and the surrounding region. The summit event will be used to identify areas of collaboration to be pursued. The same group of leaders should convene again regularly (quarterly or twice/year) to share best practices and discuss barriers and opportunities for improving community health in the region.

POTENTIAL PARTNERS:

- CMU College of Medicine
- Hospital Council of East Central Michigan

- Regional higher education institutions (CMU, SVSU, Delta College, MMCC, Alma College, Northwood University, Davenport University)
- Regional hospital systems (Covenant, McLaren, St. Marys, MidMichigan Health)
- Michigan Center for Rural Health (part of MSU)
- Michigan Health Improvement Alliance
- Companies and organizations involved in med-tech innovation (Dow Corning health care division, MidMichigan Innovation Center, Blue Water Angels, MEDC)
- National organizations (National Institute of Health, National Association of Community Health Centers)
- University of Michigan School of Public Health
- Mid-Central Regional Center of Michigan Area Health Education Center
- Regional district health departments (Central Michigan District Health Department, Mid-Michigan District Health Department, Saginaw County Health Department, Bay County Health Department)
- Michigan Department of Health & Human Services
- Other relevant organizations in surrounding counties beyond PR-5 including hospitals, higher education institutions, and other health care organizations

RATIONALE & REGIONAL ASSETS

Healthy communities are essential for healthy economies. Health performance and economic performance are closely linked. A healthy community not only yields a high quality of life, it also supports employers and a robust regional economy. Immediate and short-term benefits from health improvements can lead to enhanced worker productivity, reduced business costs, and other benefits to the regional economy. Over the long-term, a healthier population will translate into a stronger, more competitive regional economy.

Medical talent shortages exist across Michigan. Most of the state's counties (72 of 83) are classified as medically underserved by the US Department of Health and Human Services, Health Resources and Services Administration (HRSA), including the overwhelming majority of rural counties. Many communities in East Central Michigan suffer from higher rates of health problems (e.g., diabetes, heart disease) than the US average. Collaborative efforts to address these challenges could yield significant positive results.

Immediate opportunities exist to align health training programs and community health efforts in the region. Each of the region's colleges and universities offers numerous certificate and degree programs in the health care field. There is some overlap in the program offerings, but each institution has its own specializations in health training. A formal consortium with each school at the table could address gaps and leverage resources to

improve the efficiency and accessibility of medical training for the region's workforce and health care industry. It will be important to catalogue all of the health training programs that exist in the region.

Life sciences account for the majority of Michigan's academic R&D investments. About $1.2 billion of the state's $2.25 billion of academic R&D investments in 2014 were in the life sciences field. Most of this takes place at the University of Michigan-Ann Arbor ($760 million of life sciences R&D expenditures in 2014). East Central Michigan could, and should, garner a larger share of R&D investments. The new CMU School of Medicine is a key asset for the region, which could help boost the amount of life sciences R&D investments in East Central Michigan over the long-term. Central Michigan University's successful progress toward becoming a more significant research university is also a positive trend. In fact, from 2010 to 2014, Central Michigan doubled its annual academic R&D investments from $7.5 million to $15 million, a higher growth rate than any other university in the state. A related opportunity, especially as the CMU College of Medicine ramps up its programs, is to pursue opportunities to bring in clinical trials of new medical products and technologies to partner with the region's hospital systems.

Regional assets and advantages include:

- Regional health care industry serves a market area that extends far beyond the 8-county region
- Several major hospital systems
- New CMU College of Medicine
- Each of the region's colleges & universities offers medical training
- CMU's progress toward expanding its role as a research university

STEPS FOR IMPLEMENTATION

IMMEDIATE (NEXT 100 DAYS)

I-1. Convene a community health innovation summit at the CMU College of Medicine to bring regional health training providers, medical industry leaders, and med-tech innovation firms together to discuss challenges and opportunities associated with the region's health care sector.

- This event should be co-sponsored with the Hospital Council of East Central Michigan.
- Use this meeting as a launch pad to establish a formal consortium, made up of the region's higher education institutions and hospital systems, to advance programs and innovations in community health, focusing on underserved areas and populations.
- Identify areas of potential collaboration for this group to pursue that would positively impact community health outcomes across the 8-county region and beyond.

I-2. Establish a committee, spearheaded by members of the Center of Excellence Task Force, to meet regularly to move this concept forward.

I-3. Initiate conversations with the region's hospital systems to align their annual community benefit spending (required to maintain their federal non-profit status) in a coordinated manner across the region to address community health outcomes more holistically.

SHORT-TERM (THROUGH 2016)

S-1. Identify and agree upon a set of community health indicators to track and measure as outcomes of this program.

S-2. Establish and cultivate relationships with regional grantmaking foundations, especially those that focus on improving health outcomes.

- Begin conversations with regional foundations that list health outcomes among their priority investment areas.
- Also seek relationships with large foundations in other parts of the state that might play a role as a funding source for this concept (such as the Kellogg Foundation, which is the 7th largest foundation in the US).

S-3. Continue working with the region's hospitals and other partners to align community benefit spending across the region, to reach broader audiences and make strategic investments that lead to healthier communities.

S-4. Build an inventory of each medical training program in the region to identify gaps and potential collaboration opportunities among training providers.

- Ensure that this builds upon (and does not duplicate) the foundation of work taking place through other efforts in the region, such as the STEM networks across the region's higher education institutions.

LONG-TERM (2017 & BEYOND)

L-1. Pursue R&D opportunities through the CMU College of Medicine, in partnership with the region's hospitals and other higher education institutions.

L-2. Work with the region's hospital systems and the CMU College of Medicine to pursue the development of clinical trials and recruitment of med-tech firms with existing products and technologies to be tested along with a hospital partner.

L-3. Explore the potential to develop a med-tech innovation district in Saginaw, centered on the CMU College of Medicine.

- Take a group of regional health sciences leaders on a study tour of successful and emerging med-tech innovation districts in other US cities (e.g., Charleston, South Carolina; Austin, Texas; Cleveland, Ohio).

L-4. Track the selected community health metrics and report on them annually to the region's stakeholders.

INTERNATIONAL WORKFORCE
ENHANCE & MARKET THE EXPERIENCE

CONCEPT DESCRIPTION

Enhance the experience for international students through better connections to the region and its businesses, efforts to align workforce training programs, and marketing to international communities.

STRUCTURE

This will be a virtual collaboration among the region's colleges and universities to enhance the experience for foreign students in East Central Michigan, led by CMU and SVSU. The region's convention and visitors bureaus are a key group of potential partners. The goal is not to simply increase the number of foreign students in the region, but rather, to enhance the experience for international students living in the area. In fact, if the region is successful in better integrating and connecting its existing foreign students into the community, it is likely to gain a larger number of international students over the long-term. The ultimate goal of this Center of Excellence is to create a partnership among the region's colleges and universities to make East Central Michigan a more desirable destination for international students. This will lead to better rates of student retention at higher education institutions, a better experience for the region's international students (leading to more of them staying in the region to work or start businesses), and a higher likelihood that the families of foreign students attending regional colleges/universities will bring business expansions, investments, and tourism spending into the region. An equally important outcome of this concept is to build relationships and connections between East Central Michigan and other parts of the world, leading to greater opportunities for foreign direct investment, international business development, and attraction of international talent.

POTENTIAL PARTNERS:

- CMU, SVSU, and other regional higher education institutions
- Great Lakes Bay Convention and Visitors Bureau and other regional convention and visitors bureaus
- Regional economic development corporations
- State organizations (MEDC, Pure Michigan)
- Regional businesses, especially large employers with significant numbers of foreign-born workers
- National organizations (Community Colleges for International Development, Institute of International Education)

RATIONALE & REGIONAL ASSETS

Improving the region's connections to the global economy is crucial for long-term success. East Central Michigan is home to many companies with global relationships and global customers, including large corporations owned by foreign investors. Providing an environment that is favorable for international students is an important strategy for retaining existing businesses and recruiting new companies.

The region and state have a large and growing population of international students. Each of the region's higher education institutions has a significant pool of international students, especially at the larger universities (primarily Saginaw Valley State University and Central Michigan University) which have seen a large increase in foreign students in just the last few years. Collectively, the region's colleges and universities have a current enrollment of more than 2,200 international students. While many colleges and universities across the US are placing a greater emphasis on recruiting students from foreign countries, the more significant opportunity for East Central Michigan is to enhance the experience of existing international students.

International students are a gateway for future economic development opportunities. The early connections made between foreign students and East Central Michigan are seeds that, if properly cultivated, can lead to business investments, expansions, and relocation decisions in future years. Many international students come from families that own large foreign-based firms or serve as executives in multinational corporations. By providing a better experience for the college and university students from the elite families in foreign countries, East Central Michigan is more likely to attract foreign direct investment. Better connecting with international students can also lead to an additional opportunity in expanded tourism spending associated with foreign students and their families visiting the region. Because of this, the region's convention and visitors bureaus and Pure Michigan (the state tourism promotion effort) should become partners in this concept.

International students are an under-utilized economic asset. Because of difficulties associated with hiring non-US residents, it is challenging for international students to remain in the US after graduating from college, even if they desire to remain in the country. Other challenges arise from language barriers, cultural differences, and practical barriers (housing, transportation, and employment opportunities). A collaborative effort led by the region's colleges and universities to better understand and address the barriers to connect international students to the community could yield a wide range of positive outcomes. Cooperative approaches pursued by the region's higher education institutions, such as establishing a single on-campus employment center for international students, could help to create stronger ties between foreign students and the East Central Michigan community.

Regional assets and advantages include:

- Large and growing number of international students in the region
- Several colleges and universities, each with its own academic and workforce training specialties, that attract foreign students on a yearly basis
- Several large corporations with global business ties
- Dozens of mid-size businesses that sell their products and services globally
- A diverse region with many assets that, collectively, could be leveraged more effectively for the purposes of recruiting and retaining international students

STEPS FOR IMPLEMENTATION

IMMEDIATE (NEXT 100 DAYS)

I-1. Convene a group of higher education and business leaders to identify the challenges and opportunities associated with connecting international students to the region.

I-2. Establish a committee, spearheaded by members of the Center of Excellence Task Force, to meet regularly to move this concept forward.

I-3. Work with the region's higher education institutions to catalogue relevant data and enrollment trends of foreign students.

I-4. Develop an inventory of the existing resources available at area colleges/universities for improving shared cultural understanding (e.g., cultural norms, customs, values) among international students.

- It is important to understand the cultural differences between the US and the origin countries of international students in East Central Michigan.

I-5. Continue conversations with regional convention and visitors bureaus to explore options to connect international students to the region.

SHORT-TERM (THROUGH 2016)

S-1. Establish one or more central locations at SVSU or CMU to provide on-campus employment opportunities for international students.

- This could be branded as a "foreign talent zone" (instead of a foreign trade zone) where regional businesses could gain access to skilled workers.
- This could also serve as a collaborative solution to the problem of retaining international students due to a shortage of available employment opportunities existing on campuses.

S-2. Hold one or more regional welcoming events for all international students across East Central Michigan.

- This will help international students to make connections with each other.
- Survey this group on a regular basis about things that they need, would like to see, or that would enhance their experience in the region.

S-3. Engage the region's businesses in efforts to enhance the environment of East Central Michigan for international students.

- Work with large employers in the region to identify executives and professionals from foreign countries and connect these individuals to international students from the same origin country.

- Convene meetings with business leaders to identify solutions to challenges impacting the region's ability to retain and recruit international talent.

S-4. Put together a joint marketing plan to sell the region to international students.

- This should be a collaborative effort led by the region's higher education institutions and convention and visitors bureaus.
- This should also engage foreign students from each of the region's colleges and universities to understand their unique needs and desires (i.e., what it would take to improve their experience of living, studying, and working in East Central Michigan) and to incorporate their insights into the marketing plan.

LONG-TERM (2017 & BEYOND)

L-1. Work with the region's economic development organizations to explore business expansion opportunities in connection with families of foreign students.

- Take a group of regional higher education leaders, along with other business and community leaders, on an international joint marketing trip for business and talent recruitment.
- Leverage the on-campus employment center/"foreign talent zone" at SVSU or CMU as an incentive to recruit businesses from other regions seeking access to international talent.

L-2. Take a group of regional higher education leaders on a study tour of other collaborative efforts across the US that have proven successful in leveraging international talent.

- Study tours could be conducted to learn from successful efforts of individual institutions and from collaborative efforts that have utilized a consortium approach to recruitment/retention of foreign students.
- Two of the top public universities in the US that have achieved success in recruiting and retaining international students include Purdue University and the University of Illinois at Urbana-Champaign.

L-3. Work with the state's federal delegation on issues impacting international students.

APPENDIX A. ADDITIONAL RESOURCES & ANALYSIS

POTENTIAL FUNDING SOURCES

Michigan is fortunate to have several of the country's largest grantmaking foundations. While most of the state's foundations are primarily or entirely focused on the communities in which they are based, some invest their resources nationally and even globally. The Kellogg Foundation has more than $8.6 billion in total assets (ranked number seven in the US) and nearly $300 million in total giving in 2014. The Kellogg Foundation, which focuses its giving on improving health and education outcomes for disadvantaged children, operates globally but allocates more than 90 percent of its annual funding in the US, with more than 50 percent of that targeted for Michigan, Mississippi, New Mexico, and New Orleans.

FIGURE 1. LARGEST GRANTMAKING FOUNDATIONS IN MICHIGAN

TOP 10 LARGEST GRANTMAKING FOUNDATIONS IN MICHIGAN, RANKED BY TOTAL ASSETS, 2014

Foundation	Location	Total Assets	Total Giving	Financial Data Year Ended	State Rank	US Rank	Relevant Focus Areas
W.K. Kellogg Foundation	Battle Creek	$8,621,183,526	$294,891,874	8/31/2014	1	7	Health & education for disadvantaged children
The Kresge Foundation	Troy	$3,543,405,167	$130,183,827	12/31/2013	2	18	Arts & culture, community development, Detroit, education
Charles Stewart Mott Foundation	Flint	$2,587,788,238	$114,442,289	12/31/2013	3	28	Civic engagement, environment, Flint, pathways out of poverty
Community Foundation for Southeast Michigan	Detroit	$765,265,744	$98,825,307	12/31/2014	4	122	Enhancing quality of life in 7-county Southeast Michigan region
John E. Fetzer Institute, Inc.	Kalamazoo	$532,800,038	$1,062,774	6/30/2014	5	187	Child welfare, education, health, law, philanthropy, social sciences
William Davidson Foundation	Southfield	$506,222,451	$47,121,928	12/31/2013	6	203	Education, health, Judaism, nonprofits, religion
The Herbert H. and Grace A. Dow Foundation	Midland	$499,871,349	$20,026,290	12/31/2013	7	206	Arts & culture, quality of life for Midland and Michigan, education, science
The Skillman Foundation	Detroit	$470,151,665	$16,880,159	12/31/2013	8	213	Improving the lives of children in Metro Detroit
Kalamazoo Community Foundation	Kalamazoo	$434,375,359	$15,191,135	12/31/2013	9	236	Enhancing the community and quality of life in the greater Kalamazoo area
Grand Rapids Community Foundation	Grand Rapids	$322,783,752	$10,673,454	6/30/2014	10	308	Strengthen the lives of people in Grand Rapids and surrounding communities

Source: Foundation Center

East Central Michigan has many foundations that could be partners in the creation of a Center of Excellence for the region. The 30 largest foundations control a combined $1.35 billion in total assets and were responsible for nearly $75 million in total giving in the most recent year for which data is available. The most common focus areas of regional foundations are community development, health, and education. Led by the Herbert H. and Grace A. Dow Foundation (ranked seventh in Michigan), the region contains 11 of the state's 100 largest foundations.

FIGURE 2. LARGEST GRANTMAKING FOUNDATIONS IN EAST CENTRAL MICHIGAN (PR-5)

TOP 30 LARGEST GRANTMAKING FOUNDATIONS IN PR-5, RANKED BY TOTAL ASSETS, 2014

Foundation	Location	Total Assets	Total Giving	Financial Data Year Ended	PR-5 Rank	State Rank	Relevant Focus Areas
The Herbert H. and Grace A. Dow Foundation	Midland	$499,871,349	$20,026,290	12/31/2013	1	7	Arts & culture, quality of life for Midland and Michigan, education, science
The Rollin M. Gerstacker Foundation	Midland	$182,071,097	$5,787,805	12/31/2014	2	20	Community projects, higher education, health care, medical research, hospitals
Elsa U. Pardee Foundation	Midland	$90,109,613	$4,970,989	12/31/2013	3	41	Research programs and financial support for cancer treatment and cure
Midland Area Community Foundation	Midland	$85,584,180	$3,894,828	12/31/2013	4	42	Strengthen the Midland community
The Charles J. Strosacker Foundation	Midland	$65,328,800	$2,509,556	12/31/2013	5	52	Communities in Michigan, educational organizations, and social services
The Harry A. and Margaret D. Towsley Foundation	Midland	$58,504,091	$1,456,200	12/31/2013	6	56	Higher education, medical education, Planned Parenthood, law, and social work
Saginaw Community Foundation	Saginaw	$48,410,402	$1,706,247	12/31/2013	7	66	Strengthen the Saginaw community
Bay Area Community Foundation	Bay City	$45,035,286	$1,717,806	12/31/2013	8	69	Charitable, cultural, educational, and environmental projects for Bay and Arenac Counties
Harvey Randall Wickes Foundation	Saginaw	$44,124,116	$1,779,264	12/31/2013	9	70	Civic affairs, parks & recreation, library, youth & social services, hospitals, and cultural programs in Saginaw County
Dow Corning Foundation	Midland	$30,996,571	$1,262,275	12/31/2013	10	95	STEM, community vitality, innovative and sustainable technology
Allen Foundation, Inc.	Midland	$29,466,076	$486,348	12/31/2013	11	97	Projects that benefit nutritional programs in education, training, and research
Wolohan Family Foundation	Saginaw	$26,849,427	$1,025,200	12/31/2013	12	104	Catholicism, child welfare, higher education, human services
The Dow Chemical Company Foundation	Midland	$22,714,039	$21,503,896	12/31/2013	13	118	Community success, science education, and environmental stewardship

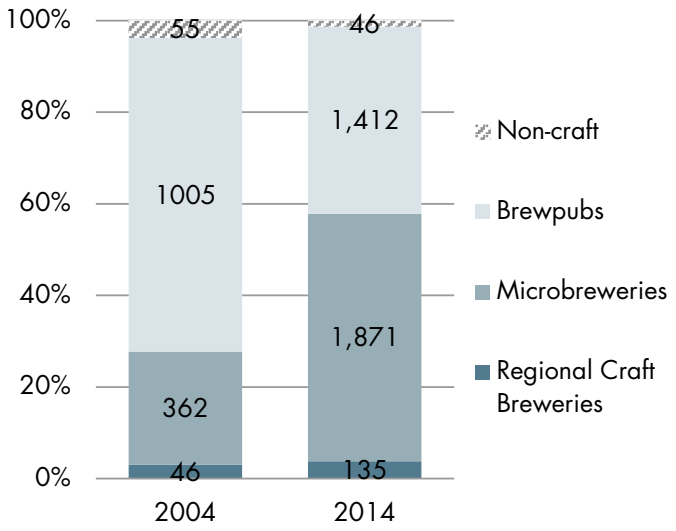
Foundation	Location	Total Assets	Total Giving	Financial Data Year Ended	PR-5 Rank	State Rank	Relevant Focus Areas
Temple Theater Foundation	Saginaw	$13,670,384	$0	12/31/2012	14	168	Temple Theatre in downtown Saginaw
Alden & Vada Dow Fund	Midland	$12,676,004	$525,300	12/31/2013	15	179	Various
Gratiot County Community Foundation	Ithaca	$10,705,543	$334,866	9/30/2013	16	201	Enhance the lives of Gratiot County citizens
William F. McNally Family Foundation	Saginaw	$9,746,581	$273,590	12/31/2013	17	216	Art, higher education, hospitals, Protestantism, theology
John W. and Rose E. Watson Foundation	Saginaw	$8,453,847	$319,550	12/31/2013	18	242	Roman Catholic organizations
Frankenmuth Community Foundation	Frankenmuth	$8,187,654	$204,454	12/31/2013	19	247	Public, educational, recreational, and charitable organizations in Frankenmuth
Barstow Foundation	Midland	$7,795,261	$294,244	12/31/2013	20	257	Various
Allen E. & Marie A. Nickless Memorial Foundation	Saginaw	$6,012,871	$239,299	12/31/2013	21	308	Arts & culture, Christianity, Education, Foundations
The Kantzler Foundation	Bay City	$5,975,076	$160,000	12/31/2013	22	309	Charitable, artistic, educational, and cultural organizations in Bay County
Wallace and Irene Bronner Family Charitable Foundation	Frankenmuth	$5,971,837	$152,497	12/31/2013	23	311	Christian organizations, education, health, and human services
Wickson-Link Memorial Foundation	Saginaw	$5,662,831	$245,530	12/31/2013	24	321	Disadvantaged youth, cultural organizations, health, education, libraries
Nartel Family Foundation	Saginaw	$4,734,849	$227,017	6/30/2013	25	368	Health
Morley Foundation	Saginaw	$4,695,891	$213,455	12/31/2013	26	372	Welfare, health, education, civic improvement, humanities, Saginaw County
The Leppien Foundation	Alma	$4,055,231	$2,705,000	12/31/2013	27	393	Christian organizations and impoverished children
Jury Foundation	Saginaw	$3,092,946	$135,800	12/31/2013	28	458	Support charitable organizations, primarily in Saginaw County
Paul F. and Franca G. Oreffice Foundation	Midland	$2,842,832	$190,420	12/31/2013	29	491	Health
The W.E. Martin Foundation	Mount Pleasant	$2,697,599	$118,100	12/31/2012	30	511	Community & economic development, sports & recreation, youth development

Source: Foundation Center

INDUSTRY STATISTICS

According to statistics published by the Brewers Association (BA), there were nearly 3,500 breweries in the US in 2014, an increase of roughly 2,000 breweries from just 10 years earlier. Of these, 99 percent were craft-brewing operations. These small independent producers accounted for just 11 percent of total US production (21.8 million of the 197.1 million barrels produced in 2014), but in dollar terms, accounted for 22 percent of the roughly $101 billion beer market in the US. Within the US craft brewing industry, microbreweries represent the largest market segment, with approximately 1,870 establishments nationwide (roughly one-half of the country's total breweries). Microbreweries are also the fastest-growing segment of the industry, increasing by more than 400 percent between 2004 and 2014. During the same period, the number of large, non-craft brewers declined from 55 in 2004 to just 46 by 2014, a decrease of 16 percent. In terms of volume, total beer production rose by less than 1 percent in 2014 compared with the prior year, while at the same time, the volume of craft beer produced in the US increased by 18 percent.

FIGURE 3. US BREWERY STATISTICS
NUMBER OF BREWERIES BY SEGMENT



Source: Brewers Association data compiled by TIP Strategies

CRAFT BREWING MARKET SEGMENTS

- **Microbrewery.** A brewery that produces less than 15,000 barrels (17,600 hectoliters) of beer per year with 75 percent or more of its beer sold off-site. Microbreweries sell to the public by one or more of the following methods: the traditional three-tier system (brewer to wholesaler to retailer to consumer); the two-tier system (brewer acting as wholesaler to retailer to consumer); and directly to the consumer through carry-outs and/or on-site tap-room or restaurant sales.
- **Brewpub.** A restaurant-brewery that sells 25 percent or more of its beer on site. The beer is brewed primarily for sale in the restaurant and bar. The beer is often dispensed directly from the brewery's storage tanks. Where allowed by law, brewpubs often sell beer "to go" and/or distribute to off-site accounts. Note: BA re-categorizes a company as a microbrewery if its off-site (distributed) beer sales exceed 75 percent.
- **Contract Brewing Company.** A business that hires another brewery to produce its beer. It can also be a brewery that hires another brewery to produce additional beer. The contract brewing company handles marketing, sales and distribution of its beer, while generally leaving the brewing and packaging to its producer-brewery (which, confusingly, is also sometimes referred to as a contract brewery).
- **Regional Craft Brewery.** An independent regional brewery with an annual beer production of between 15,000 and 6,000,000 barrels and having a majority of volume in "traditional" or "innovative" beer(s).

Source: Brewers Association website (www.brewersassociation.org)

In 2014, the digital lifestyle publication Thrillist created a ranking of all 50 states based on their beer, in which Michigan was rated fourth best. Thrillist describes their rating criteria accordingly: "Quantity and quality are both important, but quality's a bit MORE important. If you're a small state turning out a disproportionate amount of great beer, it did not go unrecognized. We also gave a boost to states who played a historical role in American beer as we know it today."

FIGURE 4. EVERY STATE IN THE US, RANKED BY ITS BEER

Rank & State	Rank & State	Rank & State
1. Oregon	18. Indiana	35. Arizona
2. California	19. Delaware	36. Kansas
3. Colorado	20. Texas	37. South Carolina
4. Michigan	21. Utah	38. Arkansas
5. Washington	22. Alabama	39. Connecticut
6. Wisconsin	23. Montana	40. Wyoming
7. Vermont	24. Maryland	41. New Hampshire
8. Pennsylvania	25. Alaska	42. New Jersey
9. New York	26. Oklahoma	43. Hawaii
10. Massachusetts	27. Louisiana	44. Nebraska
11. Missouri	28. Virginia	45. South Dakota
12. Ohio	29. Idaho	46. Nevada
13. Illinois	30. Georgia	47. North Dakota
14. Maine	31. New Mexico	48. Rhode Island
15. North Carolina	32. Kentucky	49. West Virginia
16. Minnesota	33. Tennessee	50. Mississippi
17. Florida	34. Iowa	

Source: Thrillist.com

The advanced materials industry, as defined by the NAICS codes in the table below, accounts for nearly 25,000 jobs in PR-5 and nearly 350,000 jobs in Michigan as a whole. The industry has grown rapidly from 2010 to 2015 in the region (19 percent growth) and the state (32 percent growth), compared to a US growth rate of 12 percent.

FIGURE 5. ADVANCED MATERIALS EMPLOYMENT TRENDS

EMPLOYMENT, PERCENT CHANGE, AND LOCATION QUOTIENT (LQ) ANALYSIS, 2010-2015

		US		Michigan			East Central Michigan		
NAICS	Sector	Jobs (2015)	% Chg. (2010-15)	Jobs (2015)	% Chg. (2010-15)	LQ (2015)	Jobs (2015)	% Chg. (2010-15)	LQ (2015)
3252	Resin, Synthetic Rubber, & Artificial Synthetic Fibers & Filaments Mfg.	93,316	4%	7,095	7%	2.58	4,288	6%	30.55
3259	Other Chemical Product & Preparation Mfg.	82,537	-3%	3,431	14%	1.41	455	41%	3.66
3261	Plastics Product Mfg.	556,640	10%	34,393	32%	2.09	1,417	8%	1.69
3262	Rubber Product Mfg.	133,816	10%	5,209	28%	1.32	261	-35%	1.30
3279	Other Nonmetallic Mineral Product Mfg.	78,895	17%	2,845	11%	1.22	958	9%	8.07
3315	Foundries	125,047	13%	10,687	24%	2.90	873	-7%	4.64
3321	Forging & Stamping	100,734	14%	7,688	34%	2.59	183	73%	1.21
3323	Architectural & Structural Metals Mfg.	368,036	14%	11,198	14%	1.03	1,130	34%	2.04
3327	Machine Shops; Turned Product; & Screw, Nut, & Bolt Mfg.	386,695	20%	30,274	33%	2.65	1,028	76%	1.77
3331	Agriculture, Construction, & Mining Machinery Mfg.	247,850	21%	2,673	22%	0.37	569	-13%	1.53
3332	Industrial Machinery Mfg.	110,650	11%	5,811	29%	1.78	615	-10%	3.70
3334	HVAC & Commercial Refrigeration Equipment Mfg.	127,106	0%	3,792	28%	1.01	950	25%	4.97
3335	Metalworking Machinery Mfg.	187,176	19%	39,128	35%	7.09	2,092	49%	7.43
3339	Other General Purpose Machinery Mfg.	269,026	18%	15,285	34%	1.93	713	107%	1.76
3359	Other Electrical Equip. & Component Mfg.	128,488	8%	2,689	68%	0.71	294	13%	1.52
3363	Motor Vehicle Parts Mfg.	565,524	34%	123,625	45%	7.41	6,223	31%	7.32
3391	Medical Equip. & Supplies Mfg.	327,527	4%	12,730	17%	1.32	863	-2%	1.75
4238	Machinery, Equipment, & Supplies Merchant Wholesalers	692,074	11%	23,123	11%	1.13	1,312	12%	1.26
4245	Farm Product Raw Material Merchant Wholesalers	75,850	-2%	1,309	18%	0.58	181	25%	1.59
4246	Chemical & Allied Products Merchant Wholesalers	133,204	8%	4,073	10%	1.04	339	31%	1.69
TOTAL		**4,790,193**	**12%**	**347,058**	**32%**	**2.46**	**24,406**	**19%**	**3.39**

Source: EMSI Complete Employment 2015.3 Location Quotients (LQs) are calculated by comparing a sector's share of total local employment to the sector's national share. An LQ of 1.00 indicates that the sector commands an average (expected) share of the local economy. LQs above 1.20 indicate a strong local sector, while those less than 0.80 indicate a weak local sector.

The health care industry accounts for more than 31,000 jobs in PR-5 and over 516,000 jobs in Michigan as a whole. The industry grew by 4 percent from 2010 to 2015 in the region and 6 percent in Michigan, compared to a US growth rate of 9 percent. However, East Central Michigan has a higher concentration (LQ of 1.34) of health care jobs than Michigan (LQ of 1.13) and the US.

FIGURE 6. HEALTH CARE EMPLOYMENT TRENDS

EMPLOYMENT, PERCENT CHANGE, AND LOCATION QUOTIENT (LQ) ANALYSIS, 2010-2015

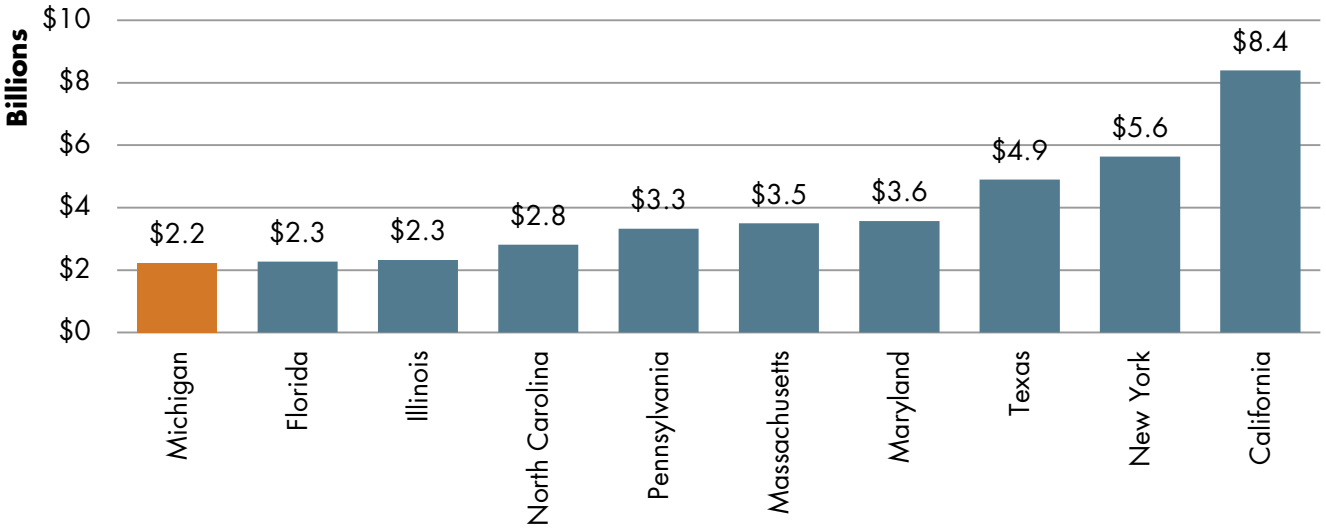
		US		Michigan			East Central Michigan		
NAICS	Sector	Jobs (2015)	% Chg. (2010-15)	Jobs (2015)	% Chg. (2010-15)	LQ (2015)	Jobs (2015)	% Chg. (2010-15)	LQ (2015)
6211	Offices of Physicians	2,618,778	10%	73,673	3%	0.95	3,599	6%	0.91
6212	Offices of Dentists	956,674	9%	32,596	2%	1.15	1,575	-6%	1.09
6213	Offices of Other Health Practitioners	944,647	21%	27,916	15%	1.00	1,915	23%	1.35
6214	Outpatient Care Centers	775,525	24%	19,853	11%	0.87	507	15%	0.43
6215	Medical & Diagnostic Laboratories	275,739	14%	3,975	-12%	0.49	210	141%	0.51
6216	Home Health Care Services	1,399,153	21%	43,926	17%	1.06	3,641	32%	1.73
6219	Other Ambulatory Health Care Services	326,999	14%	9,557	15%	0.99	828	17%	1.68
6221	General Medical & Surgical Hospitals	4,532,249	5%	193,269	5%	1.45	12,221	-4%	1.79
6222	Psychiatric & Substance Abuse Hospitals	108,525	8%	2,964	1%	0.93	34	581%	0.21
6223	Specialty (except Psychiatric & Substance Abuse) Hospitals	221,690	9%	4,226	23%	0.65	5	-95%	0.02
6231	Nursing Care Facilities (Skilled Nursing Facilities)	1,653,487	0%	44,430	2%	0.91	3,657	-6%	1.47
6232	Residential Intellectual & Developmental Disability, Mental Health, & Substance Abuse Facilities	625,353	10%	19,131	1%	1.04	896	-18%	0.95
6233	Continuing Care Retirement Communities & Assisted Living Facilities for the Elderly	875,727	17%	32,448	13%	1.26	2,125	25%	1.61
6239	Other Residential Care Facilities	159,406	-2%	8,634	15%	1.84	548	22%	2.29
TOTAL		**15,473,953**	**9%**	**516,597**	**6%**	**1.13**	**31,211**	**4%**	**1.34**

Source: EMSI Complete Employment 2015.3 Location Quotients (LQs) are calculated by comparing a sector's share of total local employment to the sector's national share. An LQ of 1.00 indicates that the sector commands an average (expected) share of the local economy. LQs above 1.20 indicate a strong local sector, while those less than 0.80 indicate a weak local sector.

HIGHER EDUCATION STATISTICS

Michigan universities received more than $2.2 billion in academic R&D investments in 2014, making it the 10th ranked state in the US for R&D expenditures. Michigan is also the 10th most populated state, so these figures are in line with expectations.

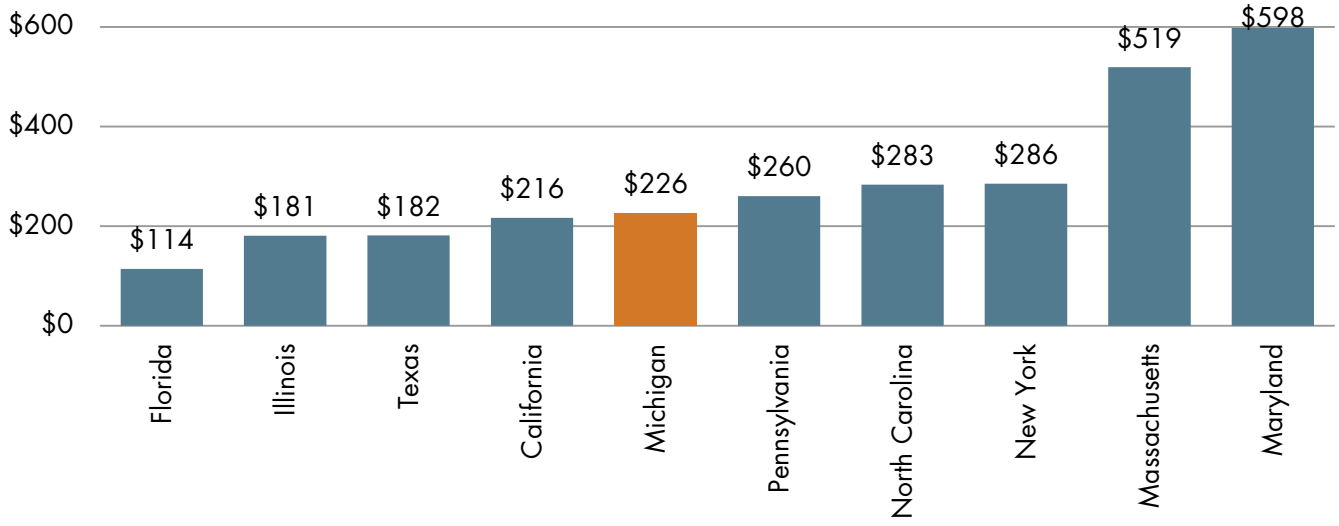
FIGURE 7. ACADEMIC R&D INVESTMENTS IN TOP 10 STATES, 2014



Source: National Science Foundation

On a per capita basis, Michigan universities received more R&D investments in 2014 than California, Texas, Illinois, and Florida.

FIGURE 8. FALL ENROLLMENT TRENDS AT PR-5 COLLEGES & UNIVERSITIES, 2010-2014



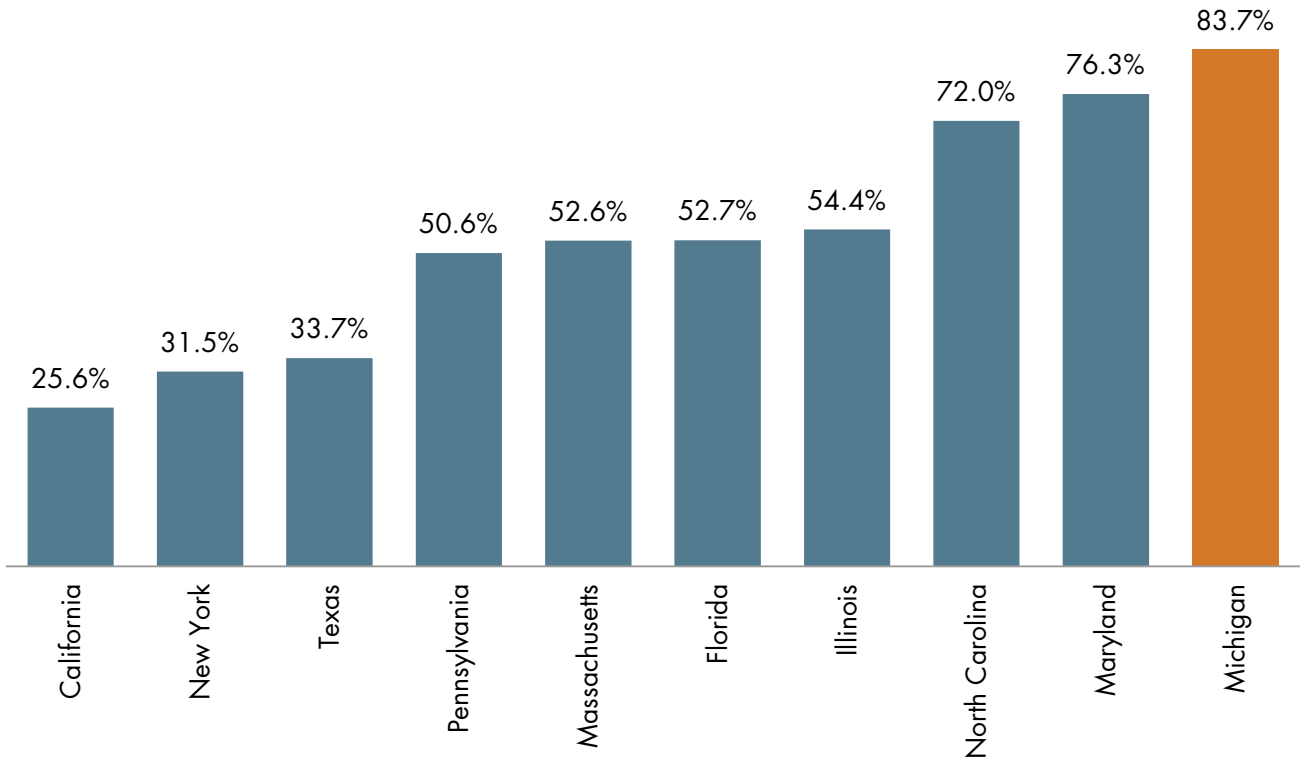
Source: National Science Foundation

The University of Michigan-Ann Arbor and Michigan State University account for the vast majority of academic R&D investments in the state of Michigan, receiving nearly $1.9 billion combined in 2014. These two institutions account for 83.7 percent of Michigan's academic R&D investments. This makes the state of Michigan unique among the 10 states with the highest amount of R&D investments.

No other state has a similar concentration of R&D spending in its top two higher education institutions. Every other state in the top 10 does a better job of "spreading the wealth" of R&D investments to a larger number of higher education institutions. These findings speak highly of the University of Michigan and Michigan State University. Both of these schools are world-class research universities. In fact, the University of Michigan ranks #2 among all US universities, public and private, in total R&D spending with $1.35 billion in 2014. Michigan State University ranks #37 nationally with $527 million in 2014.

But more importantly, this represents a huge untapped opportunity for the many other universities in Michigan, including those in East Central Michigan (especially Central Michigan University). Another big opportunity for East Central Michigan is the attraction of R&D investments from the University of Michigan and Michigan State University into the region, tied perhaps to some of the region's major industries (e.g., advanced materials/plastics and health sciences).

FIGURE 9. ACADEMIC R&D INVESTMENTS AT MICHIGAN UNIVERSITIES, 2010-2014



Source: National Science Foundation

The University of Michigan-Ann Arbor and Michigan State University will continue to serve as the state's primary research institutions. However, universities in other parts of the state are well-positioned to grow their R&D

programs. East Central Michigan is well-positioned to capture a larger share of the academic R&D investments in Michigan. A positive recent trend is the growth in R&D investments at Central Michigan University, which has expanded its academic R&D spending at a faster pace than any other university in the state from 2010 to 2014, doubling its R&D expenditures from $7.5 million in 2010 to $15 million in 2014. This indicates the potential for East Central Michigan to capture a larger share of R&D spending, fueling additional innovation and investment.

FIGURE 10. ACADEMIC R&D INVESTMENTS AT MICHIGAN UNIVERSITIES, 2010-2014

	Academic R&D Investments		2010 to 2014	
University	**2010**	**2014**	**Net Chg.**	**% Chg.**
Central Michigan U.	**$7,483,000**	**$15,015,000**	**$7,532,000**	**+100.7%**
Grand Valley State U.	$5,044,000	$8,198,000	$3,154,000	+62.5%
Michigan State U.	$431,373,000	$526,906,000	$95,533,000	+22.1%
U. Michigan, Dearborn	$6,779,000	$8,176,000	$1,397,000	+20.6%
Oakland U.	$12,856,000	$15,196,000	$2,340,000	+18.2%
U. Detroit Mercy	$1,148,000	$1,320,000	$172,000	+15.0%
U. Michigan, Ann Arbor	$1,184,445,000	$1,349,262,000	$164,817,000	+13.9%
Michigan Technological U.	$63,471,000	$68,526,000	$5,055,000	+8.0%
Wayne State U.	$254,492,000	$218,435,000	($36,057,000)	-14.2%
Hope C.	$3,596,000	$3,016,000	($580,000)	-16.1%
Western Michigan U. and School of Medicine	$26,391,000	$18,942,000	($7,449,000)	-28.2%
Calvin C.	$5,010,000	$3,051,000	($1,959,000)	-39.1%
Kettering U.	$6,880,000	$3,517,000	($3,363,000)	-48.9%
Lawrence Technological U.	$3,952,000	$1,876,000	($2,076,000)	-52.5%
Eastern Michigan U.	$14,133,000	$1,428,000	($12,705,000)	-89.9%
STATE OF MICHIGAN TOTAL	**$2,027,053,000**	**$2,242,864,000**	**+215,811,000**	**+2.2%**

Source: National Science Foundation

The region has more than 55,000 enrolled students as of fall 2014, but this is down from nearly 61,000 in 2010.

FIGURE 11. FALL ENROLLMENT TRENDS AT PR-5 COLLEGES & UNIVERSITIES, 2010-2014

	Fall Enrollment		2010 to 2014	
University	**2010**	**2014**	**Net Chg.**	**% Chg.**
Alma College	1,422	1,396	(26)	-1.8%
Central Michigan University	28,292	26,879	(1,413)	-5.0%
Saginaw Valley State University	10,656	9,829	(827)	-7.8%
Northwood University	3,651	3,131	(520)	-14.2%
Mid Michigan Community College	5,177	4,422	(755)	-14.6%
Delta College	11,572	9,842	(1,730)	-14.9%
PR-5 TOTAL	**60,770**	**55,499**	**(5,271)**	**-8.7%**

Source: National Center for Education Statistics

The 8-county region had nearly 13,400 degree completions at area colleges and universities in 2014, down by about 5 percent from 2010. The largest program categories that saw a decrease in completions are: business, management, & marketing (a decline of 1,074 completions or 22.6 percent from 2010 to 2014) and education (a

decline of 545 completions or 29.3 percent from 2010 to 2014). Health professions, the second largest program category, had a roughly unchanged number of completions (about 1,900). Liberal arts & humanities experienced the largest increase in completions (373 or 37.8 percent). Other program categories that increased their completions significantly include: biological & biomedical sciences (increase of 136 or 58.4 percent); psychology (increase of 160 or 54.8 percent); and computers & information science (increase of 91 or 46.2 percent).

FIGURE 12. DEGREE COMPLETION TRENDS AT PR-5 COLLEGES & UNIVERSITIES, 2010-2014

CIP Code	Program Category	Program Completions		2010 to 2014	
		2010	2014	Net Chg.	% Chg.
3	Natural Resources & Conservation	39	69	+30	+76.9%
26	Biological & Biomedical Sciences	233	369	+136	+58.4%
42	Psychology	292	452	+160	+54.8%
27	Mathematics & Statistics	53	79	+26	+49.1%
11	Computers & Information Science	197	288	+91	+46.2%
24	Liberal Arts & Humanities	986	1,359	+373	+37.8%
48	Precision Production	56	75	+19	+33.9%
40	Physical Sciences	81	102	+21	+25.9%
23	English Language	147	184	+37	+25.2%
45	Social Sciences	337	406	+69	+20.5%
44	Public Administration	444	505	+61	+13.7%
50	Visual & Performing Arts	242	268	+26	+10.7%
43	Law Enforcement, Firefighting, & Protective Services	227	245	+18	+7.9%
15	Engineering Technologies	156	166	+10	+6.4%
19	Family & Consumer Sciences	230	244	+14	+6.1%
31	Parks, Recreation, Leisure, & Fitness	592	617	+25	+4.2%
9	Communications & Journalism	433	450	+17	+3.9%
51	Health Professions	1,904	1,891	(13)	-0.7%
14	Engineering	74	72	(2)	-2.7%
54	History	154	128	(26)	-16.9%
16	Foreign Languages	67	52	(15)	-22.4%
12	Personal & Culinary Services	142	110	(32)	-22.5%
52	Business, Management, & Marketing	4,753	3,679	(1,074)	-22.6%
13	Education	1,862	1,317	(545)	-29.3%
N/A	Other Programs	248	163	(85)	-34.3%
47	Mechanic & Repair Technologies	169	88	(81)	-47.9%
	PR-5 TOTAL	**14,118**	**13,378**	**(740)**	-5.2%

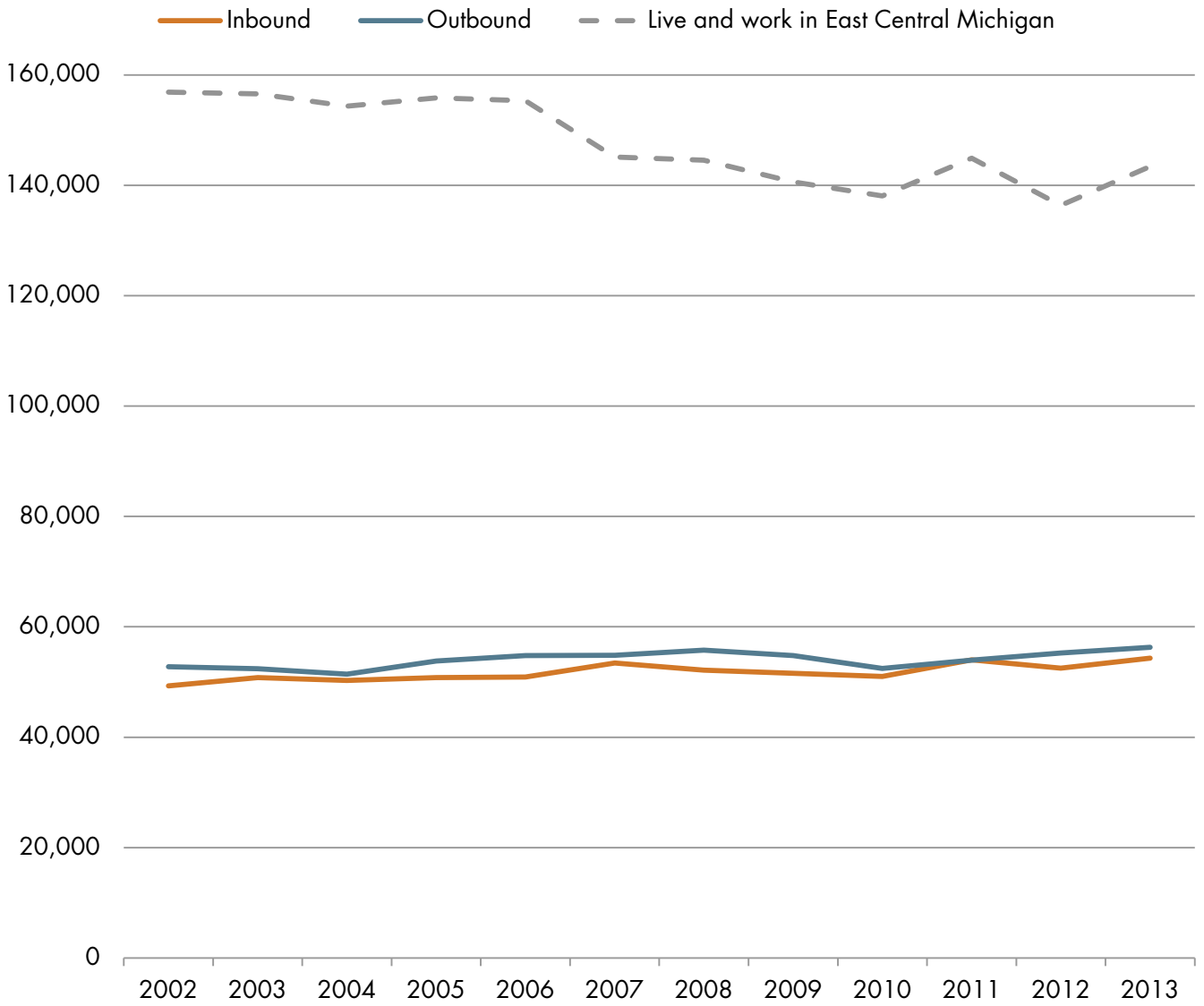
Source: National Center for Education Statistics

WORKFORCE ANALYSIS

East Central Michigan is self-sufficient in terms of commuting patterns. The majority (73%) of the region's workforce lives in the eight counties of Prosperity Region Five, meaning that the region truly functions as a cohesive region, at least in terms of its workforce. The number of people living and working in East Central Michigan is significantly lower than it was prior to the Great Recession due to the job losses that took place after 2006. There are similar numbers of inbound commuters (54,334) and outbound commuters (56,286) as of 2013. The ratio of inbound and outbound commuters has remained relatively unchanged since 2002.

FIGURE 13. NET DAILY COMMUTER TRAFFIC IN EAST CENTRAL MICHIGAN

INBOUND, OUTBOUND, AND INTERNAL COMMUTERS IN EAST CENTRAL MICHIGAN, 2002-2013

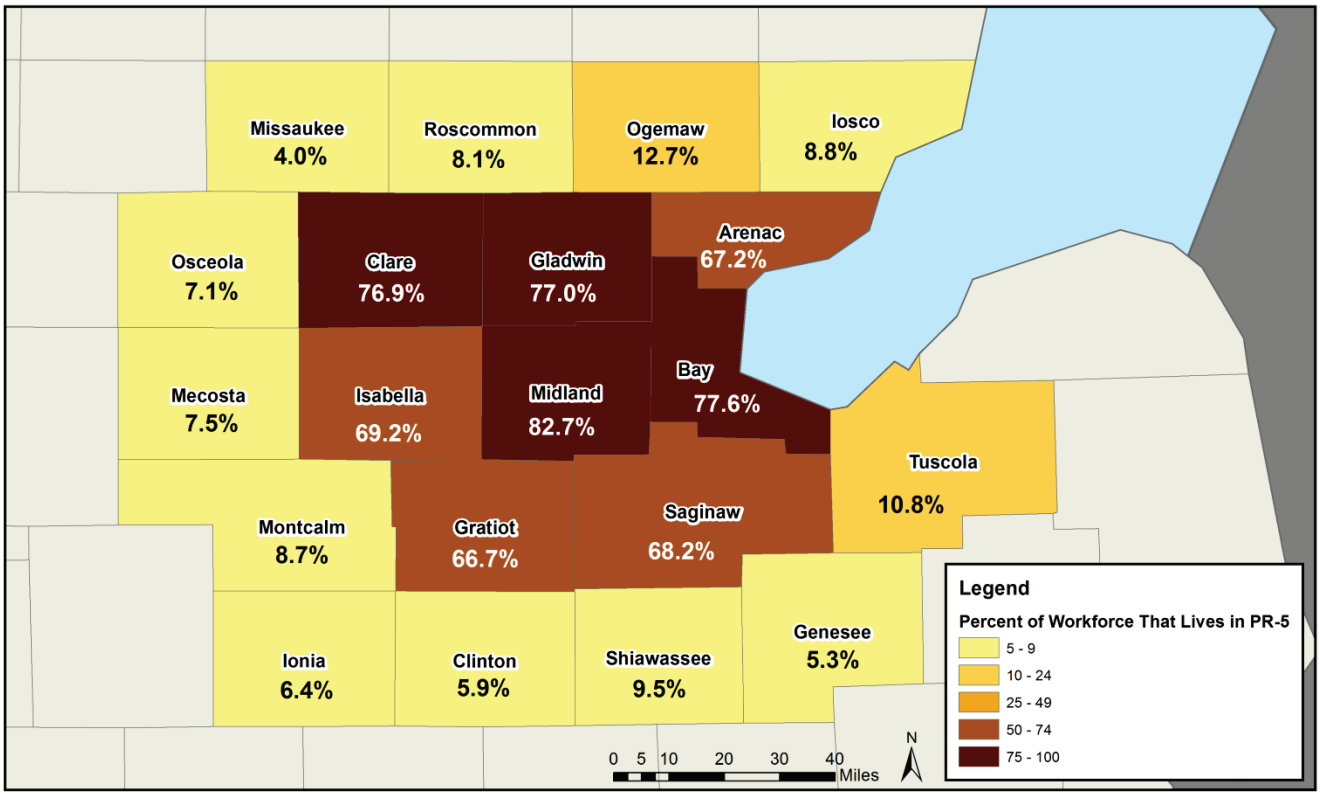


Source: US Census Bureau, Local Employment Dynamics (LED) Database

Each of East Central Michigan's eight counties draws at least two-thirds of its workforce from within the region. There is a clear dividing line between the 8-county region and the surrounding counties. Of the 12 surrounding counties, only Ogemaw and Tuscola draw more than 10 percent of their workforce from East Central Michigan. This data clearly shows that the East Central Michigan's workforce is a shared regional asset.

FIGURE 14. EAST CENTRAL MICHIGAN' LABOR SHED

PERCENT OF EACH COUNTY'S WORKFORCE THAT LIVES IN EAST CENTRAL MICHIGAN (PR-5), 2013

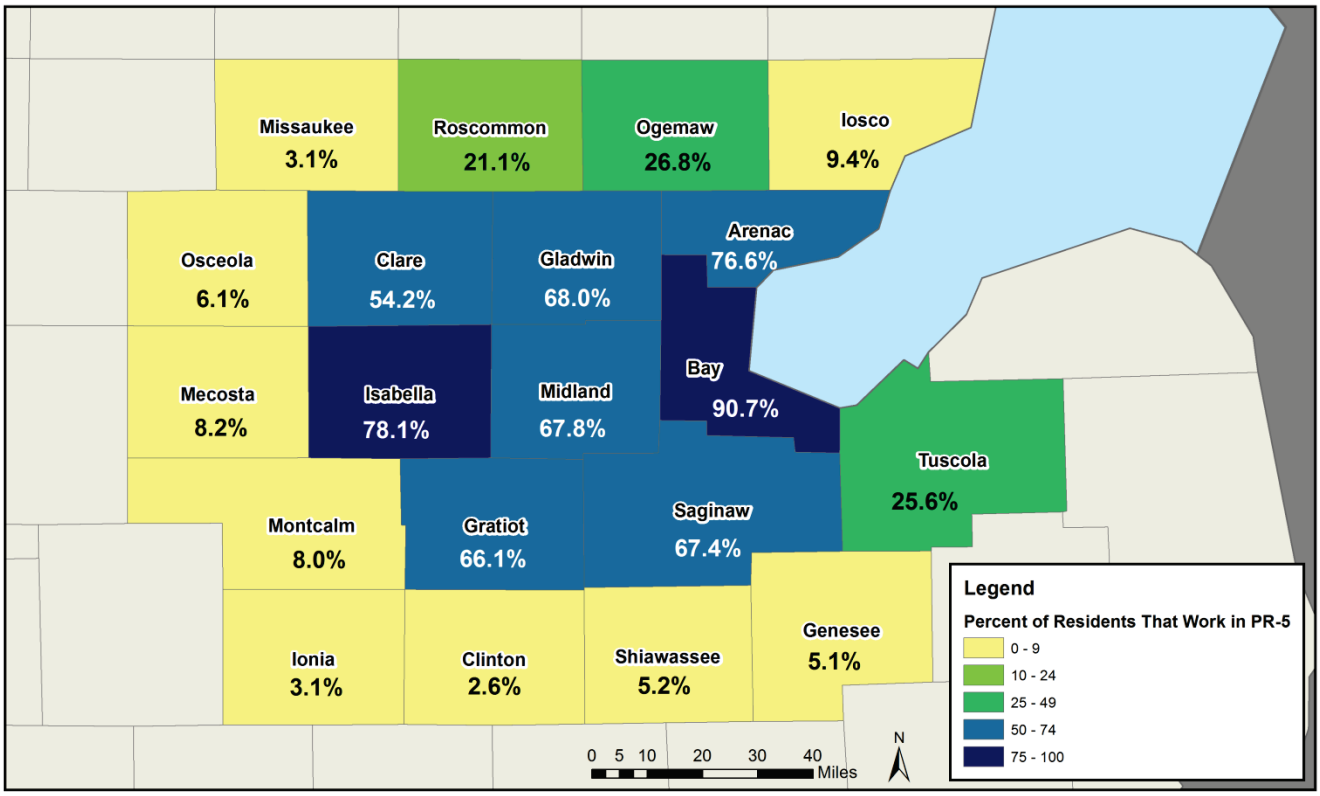


Source: US Census Bureau, Local Employment Dynamics (LED) database

Similar to the region's labor shed, the commute shed also shows a clear dividing line separating East Central Michigan from the surrounding 12 counties. More than 50 percent of employed residents in each of the region's eight counties stay in the region for their jobs. Of the surrounding 12 counties, only Roscommon, Ogemaw, and Tuscola send more than 20 percent of their employed workers to jobs based in East Central Michigan.

FIGURE 15. EAST CENTRAL MICHIGAN'S COMMUTE SHED

PERCENT OF EMPLOYED RESIDENTS IN EACH COUNTY THAT WORK IN EAST CENTRAL MICHIGAN (PR-5), 2013

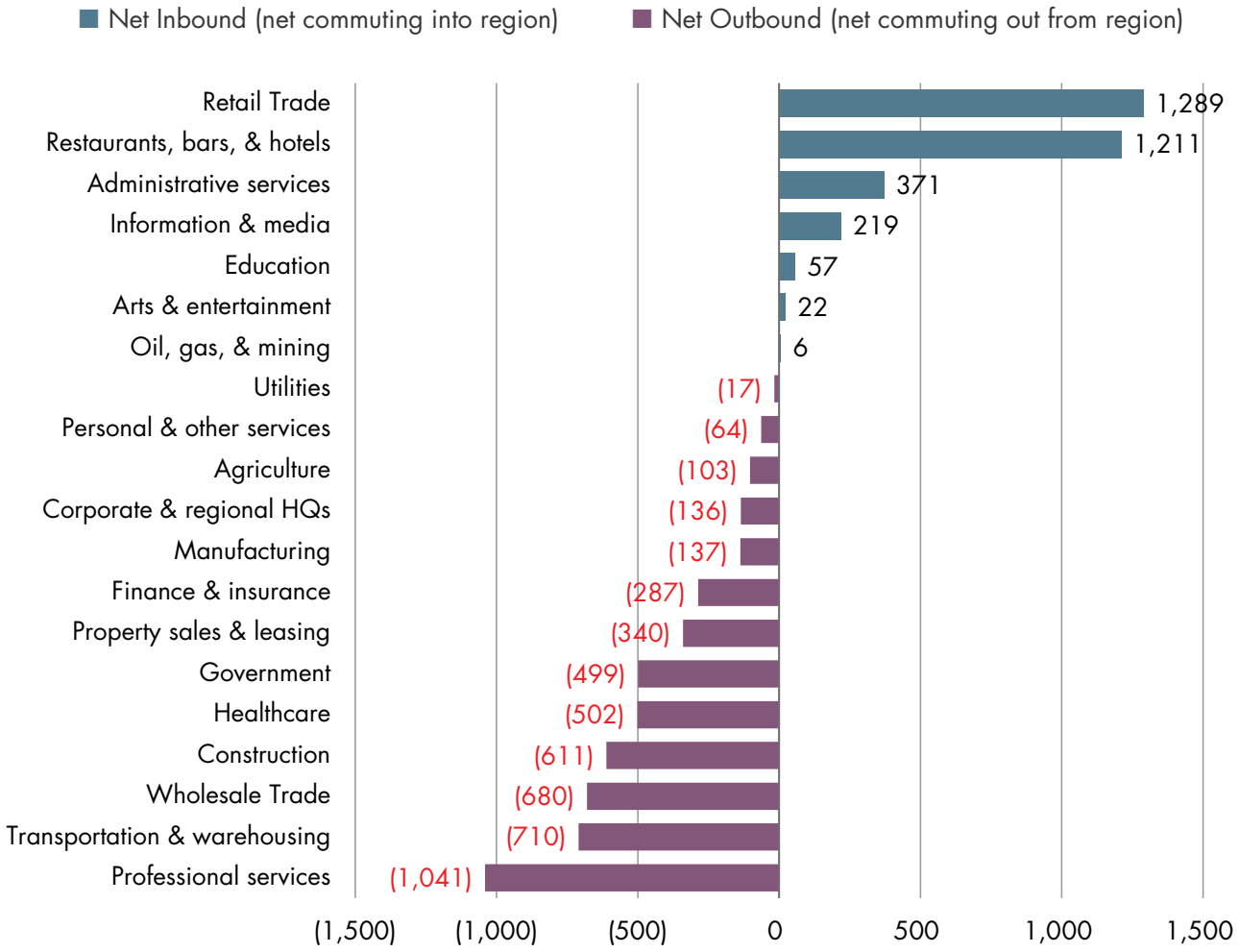


Source: US Census Bureau, Local Employment Dynamics (LED) database

East Central Michigan draws in workers for the retail and hospitality (restaurants, bars, & hotels) sectors. Commuters leave the region to work in professional services, largely because of the relatively low number of professional jobs (legal, architecture, engineering, accounting, IT, advertising, marketing, and consulting) available in the region. However, this is an untapped opportunity, because many of these professionals might prefer to work closer to home instead of in the Detroit metro, Lansing, or Grand Rapids. The region's professional talent could be better leveraged by the attraction of companies that rely on this talent.

FIGURE 16. EAST CENTRAL MICHIGAN COMMUTING PATTERNS BY SECTOR

NET INFLOW/OUTFLOW OF WORKERS BY SECTOR, 2013



Source: US Census Bureau, Local Employment Dynamics (LED) database

East Central Michigan's top three occupational groups are office and administrative support, sales, and food preparation occupations. Office and administrative support is the largest occupational group across all geographies. East Central Michigan and the State of Michigan have a significantly larger share of workers in production occupations than the US, reflecting the region and state's strong manufacturing industry. Health care occupations also represent a larger percentage of jobs in East Central Michigan than the in the state and US, a sign of the region's large health care industry. Computer and mathematical occupations have a particularly low share of employment in East Central Michigan.

FIGURE 17. DISTRIBUTION OF EMPLOYMENT BY OCCUPATION

SHARE OF TOTAL EMPLOYMENT BY MAJOR OCCUPATIONAL GROUP, 2015

SOC Code	& Description	East Central Michigan	Michigan	US
43-0000	Office & Administrative Support	**14.3%**	**14.7%**	**15.2%**
41-0000	Sales & Related	**11.0%**	**10.1%**	**10.3%**
35-0000	Food Prep. & Serving Related	**9.2%**	8.1%	**8.2%**
51-0000	Production	8.0%	**9.9%**	6.0%
29-0000	Healthcare Practitioners & Technical	6.4%	5.8%	5.4%
25-0000	Education, Training, & Library	5.8%	5.2%	5.7%
53-0000	Transportation & Material Moving	5.3%	6.1%	6.5%
11-0000	Management	5.2%	5.3%	5.3%
37-0000	Building/Grounds Cleaning & Maint.	4.6%	3.5%	3.8%
49-0000	Installation, Maintenance, & Repair	4.3%	3.8%	3.8%
47-0000	Construction & Extraction	4.2%	3.9%	4.5%
31-0000	Healthcare Support	4.1%	3.3%	2.8%
39-0000	Personal Care & Service	3.9%	3.4%	3.9%
13-0000	Business & Financial Operations	3.3%	4.5%	4.9%
21-0000	Community & Social Service	2.0%	1.5%	1.6%
17-0000	Architecture & Engineering	1.8%	2.8%	1.7%
33-0000	Protective Service	1.7%	1.6%	2.3%
15-0000	Computer & Mathematical	1.5%	2.4%	2.7%
27-0000	Arts, Entertainment, & Media	1.2%	1.6%	1.7%
45-0000	Farming, Fishing, & Forestry	0.6%	0.6%	0.7%
19-0000	Life, Physical, & Social Science	0.6%	0.7%	0.8%
23-0000	Legal	0.4%	0.6%	0.8%
55-0000	Military	0.4%	0.4%	1.3%

Source: EMSI, 2015.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed

East Central Michigan has a significant concentration of workers in the following occupational groups: healthcare support (1.49); production (1.33); community & social service (1.23); building/grounds cleaning & maintenance (1.22); and healthcare practitioners & technical (1.20). The region has a relatively low percentage of workers in military (0.33); legal (0.54); computer & math science (0.54); arts, entertainment, & media (0.66); business & finance (0.67); life, physical, & social science (0.72); and protective service (0.77).

US average for each industry = 1.00
Regional strength > 1.20
Regional weakness < 0.80

FIGURE 18. CONCENTRATION OF EMPLOYMENT BY OCCUPATION

LOCATION QUOTIENT (LQ) ANALYSIS BY MAJOR OCCUPATIONAL GROUP, 2015 (US= 1.00)

SOC Code	& Description	East Central Michigan	Michigan	US
31-0000	Healthcare Support	**1.49**	1.19	1.00
51-0000	Production	**1.33**	**1.64**	1.00
21-0000	Community & Social Service	**1.23**	0.96	1.00
37-0000	Building/Grounds Cleaning & Maint.	**1.22**	0.93	1.00
29-0000	Healthcare Practitioners & Technical	**1.20**	1.09	1.00
49-0000	Installation, Maintenance, & Repair	1.12	1.01	1.00
35-0000	Food Prep. & Serving Related	1.12	0.99	1.00
17-0000	Architecture & Engineering	1.07	**1.68**	1.00
41-0000	Sales & Related	1.07	0.98	1.00
25-0000	Education, Training, & Library	1.03	0.92	1.00
39-0000	Personal Care & Service	0.99	0.87	1.00
11-0000	Management	0.98	0.99	1.00
47-0000	Construction & Extraction	0.95	0.86	1.00
43-0000	Office & Administrative Support	0.94	0.97	1.00
53-0000	Transportation & Material Moving	0.82	0.95	1.00
45-0000	Farming, Fishing, & Forestry	0.82	0.74	1.00
33-0000	Protective Service	0.77	0.73	1.00
19-0000	Life, Physical, & Social Science	0.72	0.88	1.00
13-0000	Business & Financial Operations	0.67	0.91	1.00
27-0000	Arts, Entertainment, & Media	0.66	0.89	1.00
15-0000	Computer & Mathematical	0.54	0.89	1.00
23-0000	Legal	0.54	0.77	1.00
55-0000	Military	0.33	0.32	1.00

Source: EMSI, 2015.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed

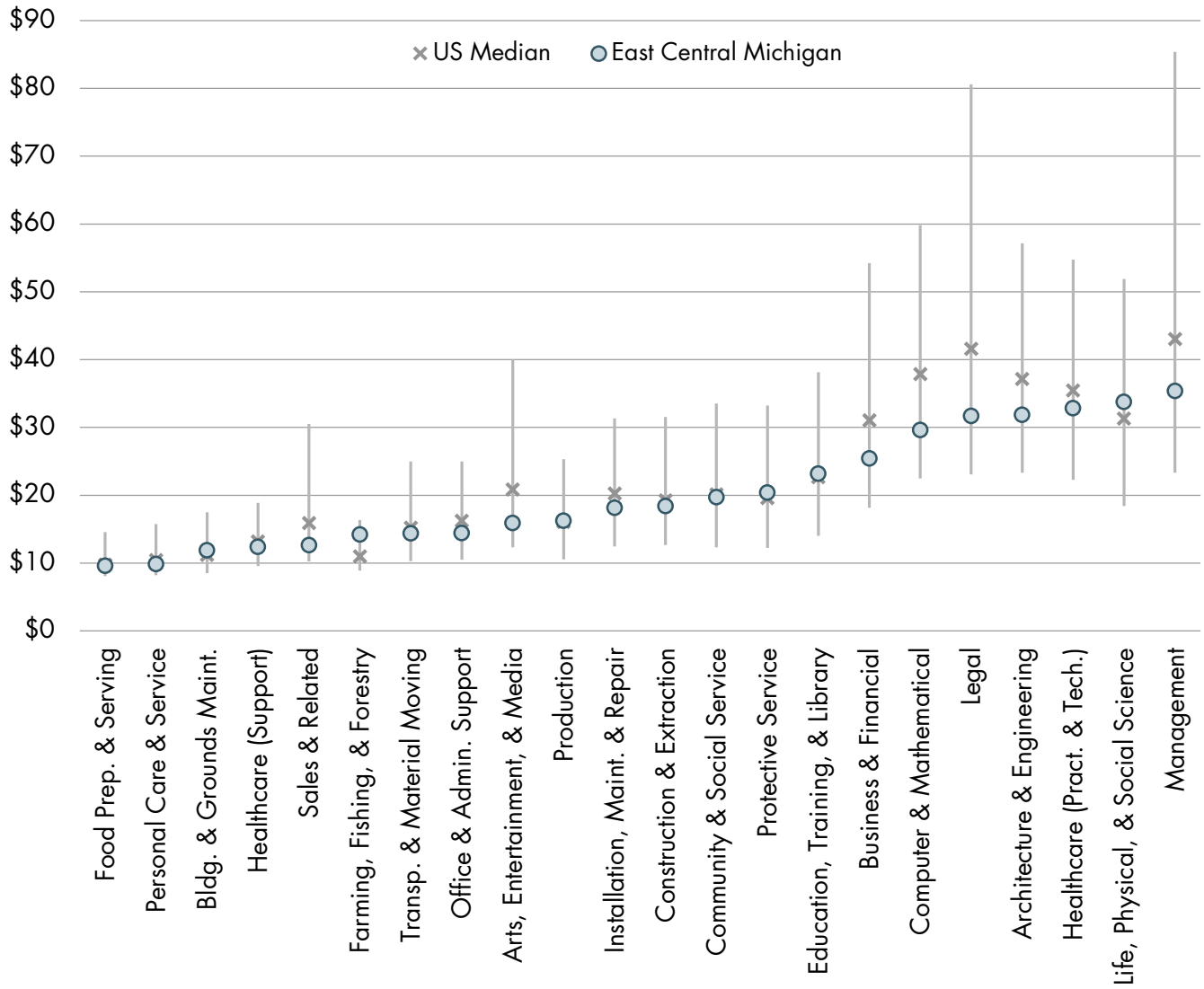
East Central Michigan's overall median hourly earnings in East Central Michigan are $17.87, compared to the US average of $20.37. This is a double-edged sword; lower wages help employers to operate efficiently from a cost perspective, however, low wages can also make it more difficult for a community to attract and retain workers. The region does have relatively high wages in farming and life, physical, & social science (due to the many scientists at Dow Chemical and Dow Corning). The region's wages are significantly lower than the US for the following occupations: business & finance, computer & math science, legal, architecture & engineering, and management.

FIGURE 19. EAST CENTRAL MICHIGAN MEDIAN HOURLY WAGE RATES BY OCCUPATION

EAST CENTRAL MICHIGAN WAGES PRESENTED IN THE CONTEXT OF US WAGE RANGE, 2015

Line = US wage range from 10th to 90th percentile

Markers = median hourly wage rates for US (x) and East Central Michigan (dot)



Source: EMSI, 2015.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed

INDUSTRY RESOURCES (ASSOCIATIONS & CONFERENCES/EVENTS)

ADVANCED MATERIALS/PLASTICS

TRADE ASSOCIATIONS	
SPI: The Plastics Industry Trade Association	http://plasticsindustry.org/
Society of Plastics Engineers	http://www.4spe.org/
Plastics Institute of America	http://www.plasticsinstitute.org/
National Council for Advanced Manufacturing	http://www.nacfam.org/
National Association of Manufacturers	http://www.nam.org/
Michigan Manufacturing Technology Center	http://www.mmtc.org/
Michigan Manufacturers Association	http://mimfg.org/
Central Michigan Manufacturers Association	http://www.centralmichiganmanufacturers.org/
Great Lakes Renewable Energy Association	http://www.2glrea.org/
Great Lakes Bay Manufacturers Association	http://www.mmtc.org/friends-of-manufacturing/glbma.html
Clean Technology Trade Alliance	http://www.cleantechtradealliance.org/
Clean Technology and Sustainable Industries Organization	http://www.ct-si.org/
Cleantech Open Midwest	https://midwest.cleantechopen.org
Clean Energy Coalition	http://cec-mi.org/
Midwest Energy Efficiency Alliance	http://www.mwalliance.org/
Michigan Energy Options	http://michiganenergyoptions.org/
MForesight: Alliance for Manufacturing Foresight	http://research.umich.edu/mforesight

RELEVANT CONFERENCES/EVENTS		
MMA Manufacturing Forum		
10 May 2016	*Detroit, MI*	http://mimfg.org/SeminarsEvents/ManufacturingForum.aspx
3rd Bioplastic Materials Tutorial & Topical Conference		
19-21 April 2016	*Bloomington, MN*	https://www.eiseverywhere.com//ehome/130808
Refocus: Recycling Summit & Expo (produced by SPI)		
25-27 April 2016	*Orlando, FL*	http://www.refocussummit.org/
TechConnect World Innovation Conference		
22-25 May 2016	*Washington, DC*	http://www.techconnectworld.com/World2016/
2016 Midwest Energy Solutions Conference		
24-26 February 2016	*Chicago, IL*	http://www.mwalliance.org/calendar/2016-midwest-energy-solutions-conference
Michigan Renewable Energy Fair & Great Lakes Emergency Preparedness Expo		
24-25 June 2016	*Mason, MI*	http://www.2glrea.org/energyfair

AGRICULTURE/ CRAFT BREWERIES		
TRADE ASSOCIATIONS		
Brewers Association		https://www.brewersassociation.org/
Master Brewers Association of the Americas		http://www.mbaa.com/
Master Brewers Association of the Americas- District Michigan		http://www.mbaa.com/districts/michigan/Pages/default.aspx
Hop Growers of America		http://www.usahops.org/
American Society of Brewing Chemists		http://www.asbcnet.org/
American Organic Hop Grower Association		http://www.usorganichops.com/
Midwest Organic Hops		http://www.midwestorganichops.com/
Michigan Brewers Guild		http://www.mibeer.com/
Michigan Hop Alliance		http://michiganhopalliance.com/
American Malting Barley Association		http://ambainc.org/
Michigan State University Extension		http://msue.anr.msu.edu/
RELEVANT CONFERENCES/EVENTS		
2016 Michigan Brewers Guild Winter Conference With MBAA District Michigan		
13-15 January 2016	*Kalamazoo, MI*	http://www.mibeer.com/winter-conference
World Brewing Congress 2016		
13-17 August 2016	*Denver, CO*	http://www.worldbrewingcongress.org/
Craft Brewers Conference & BrewExpo America		
3-6 May 2016	*Philadelphia, PA*	http://www.craftbrewersconference.com/
2016 American Hop Convention		
19-22 January 2016	*Palm Desert, CA*	http://www.usahops.org/index.cfm?fuseaction=news&pageID=15
Great American Beer Festival		
6-8 October 2016	*Denver, CO*	http://www.greatamericanbeerfestival.com/
2016 Great Lakes Hop and Barley Conference		
16-17 March 2016	*Traverse City, MI*	http://msue.anr.msu.edu/news/2016_great_lakes_hop_and_barley_conference

HEALTH SCIENCES			
TRADE ASSOCIATIONS			
National Association of Community Health Centers			http://www.nachc.com/
National Rural Health Association			http://www.ruralhealthweb.org/
Association for Community Health Improvement			http://www.healthycommunities.org/
Michigan Health & Hospital Association			http://www.mha.org/
Michigan Rural Council			http://rural.cedam.info/
Michigan Primary Care Association			http://www.mpca.net/
Michigan Community Action Agency Association			http://mcaaa.org/
Michigan Health Improvement Alliance			http://www.mihia.org/
Leaders Advancing and Helping Communities			http://lahc.org/
Institute for Population Health			http://ipophealth.org/
Hospital Council of East Central Michigan			http://www.hcecm.org/
Upper Midwest Telehealth Resource Center			http://www.umtrc.org/
RELEVANT CONFERENCES/EVENTS			
2016 ACHI National Conference: "From Health Care to Healthy Communities"			
1-3 March 2016	*Baltimore, MD*		http://www.healthycommunities.org/Conference/2016/main.shtml#.Vo7hfLYrJdh
NRHA's Annual Rural Health Conference			
10-13 May 2016	*Minneapolis, MN*		http://www.ruralhealthweb.org/annual
7th Annual "Region's Health and Health Care Systems: Communities Achieving Excellence and Accountability" Conference			
22 January 2016	*Saginaw, MI*		http://www.mihia.org/index.php/mihia-events/annual-health-conference
2016 Policy and Issues Forum			
16-19 March 2016	*Washington, DC*		http://meetings.nachc.com/policy-and-issues/
NACHC 2016 Community Health Institute & Expo			
28-30 August 2016	*Chicago, IL*		http://meetings.nachc.com/c-training/community-health-institute-and-expo/
2016 Michigan Rural Health Conference			
21-22 April 2016	*Mount Pleasant, MI*		http://www.umtrc.org/events/2016/04/21/general/2016-michigan-rural-health-conference/

INTERNATIONAL WORKFORCE	
TRADE ASSOCIATIONS	
Global Ties U.S.	http://www.globaltiesus.org/
Alliance for International Exchange	http://www.alliance-exchange.org/
NAFSA: Association of International Educators	http://www.nafsa.org/
Institute of International Education	http://www.iie.org/
International Student Organization in the USA	http://www.intlstudent.org/
Community Colleges for International Development	http://ccidinc.org/
Michigan International Students Society	http://missumich.org/
MSU International Students Association	https://www.msu.edu/~msuisa/about.html
EducationUSA	https://educationusa.state.gov/
US Department of State, Bureau of Educational and Cultural Affairs	http://eca.state.gov/ivlp
World Learning	http://www.worldlearning.org/
International Culture & Career Exchange	http://www.icceusa.com/icce/intro.aspx
International Exchange of North America	http://www.iena.org/?site=About-IENA
RELEVANT CONFERENCES/EVENTS	
CCID's 40th Anniversary Conference	
20-22 February 2016 *Orlando, FL*	http://www.ccidinc.org/annual_conference.php
NAFSA 2016 Annual Conference & Expo: Building Capacity for Global Learning	
29 May-3 June 2016 *Denver, CO*	http://www.nafsa.org/Attend_Events/Annual_Conference/Building_Capacity_for_Global_Learning/
Global Ties U.S. National Meeting: I am Diplomacy: The Power of Exchanges	
27-30 January 2016 *Washington, DC*	http://www.globaltiesus.org/our-work/national-meeting
International Education Week	
TBA 2016 *US*	http://eca.state.gov/programs-initiatives/international-education-week

APPENDIX B. BEST PRACTICE EXAMPLES

To inform potential focus areas for a Center of Excellence, TIP Strategies researched and profiled best practice examples of Centers of Excellence from across the US. For each example, we have prepared a case study that details strategic functions, organizational frameworks, facilities, budgets and funding sources (where available), and most importantly, results that have led to positive economic development outcomes. Most of the examples listed in this section correspond to one of the four concepts and are organized in this manner, but we have also included other select best practice examples. This Appendix is meant to serve as a resource for implementation efforts and also to inspire regional leaders by showcasing what other regions have been able to accomplish through collaboration among higher education institutions and businesses. It is worth noting that while some of these examples are bricks-and-mortar centers, many are virtual collaborations. Also, each one of these best practices illustrates at least one (if not all three) of the ingredients of a successful Center of Excellence: 1) a collaboration of multiple colleges/universities; 2) bringing together higher education and industry; and 3) narrowly focused on a specific industry or area of research.

ADVANCED MATERIALS/PLASTICS BEST PRACTICE EXAMPLES

SEMATECH & MCC: AUSTIN, TEXAS

In 1988, Austin, Texas, beat out 137 other cities to become the home of SEMATECH, the non-profit research consortium comprising most of the U.S. semiconductor manufacturers. Although Austin had been an outpost through the mid 1980s for such manufacturing operations as IBM, Texas Instruments, Motorola, and Advanced Micro Devices, it required careful collaboration among government, business, and educational institutions—especially the University of Texas—to create the climate that drew SEMATECH to Austin.

In 1985, after Austin had successfully competed for and achieved the first of its two big consortium wins—offering more than $20 million in incentives in 1983 to bring MCC (Microelectronics and Computer Technology Corporation) to Austin—the Greater Austin Chamber of Commerce commissioned a new long-range plan authored by Stanford Research Institute International (SRI). SRI's plan stressed, for the first time, the linkage between quality of life and economic development and recommended four primary thrusts for development in the city:

1. Continuing collaboration among business, government, and especially the University of Texas;
2. Creation of a climate for innovation in science and technology;
3. Development of programs to continue to attract, recruit, and grow technology firms; and
4. Availability of training more aligned with the kinds of industry being drawn to Austin through the city's educational institutions.

Austin's business, education, and community leaders worked together to implement these goals, investing in facilities and faculty in the area's colleges and universities, and encouraging the growth of a local venture capital and angel investment sector that is larger than the early-stage funding opportunities available in the Dallas-Fort Worth or Houston metro areas. In particular, the University of Texas has emphasized the creation of facilities for research consortia and start-ups, investments to accelerate research programs, and technology commercialization.

The climate for innovation continues to attract people, from Michael Dell, founder of Dell computers, to a growing number of entrepreneurs and start-ups who relocate to Austin because of the skilled workforce and a business culture which encourages the risk-taking that fuels innovation. Today, Austin is ranked among the top four high-tech regions in the US by most measures (along with Silicon Valley/San Francisco, Boston, and Seattle). And the roots of this success can be traced back to the visionary leadership and early steps taken three decades by Austin's business, academic, and community leaders.

THE WATER COUNCIL: MILWAUKEE, WISCONSIN

The Water Council grew out of a regional economic development initiative in 2006-07, an industry cluster analysis that revealed the depth and potential growth of the water technology cluster. The potential for growth in this cluster to transform the Milwaukee economy is what brought people together. The initiative was driven by the private sector; the universities; and two non-profits, the Greater Milwaukee Committee and the Spirit of Milwaukee. Through research, loaned executives, and extensive collaboration, the Water Council was formed as a non-profit in 2009. It is focused on five outcomes:

1. Increasing research in water technology;
2. Commercializing water technology research;
3. Promoting water entrepreneurship;
4. Increasing access to capital; and
5. Developing a workforce skilled in water.

The Water Council generates revenues through membership dues, its annual summit, and grants from local foundations, the state, and other entities. Through its higher education partners, the Council also benefits from research grants. The Council holds member meetings on a quarterly basis, featuring speakers and offering networking opportunities. Members can join various committees, of which there are currently four: talent & education, corporate-university linkages, communications, and water stewardship.

In 2009, the Water Council was inducted into the UN Global Compact Cities Programme, an initiative to help city leaders find solutions to urban issues with local capacity. The Water Council is focused on as set of defined research issues related to water technology as part of this initiative. They hold design challenges to encourage research around these issues.

In July 2013, the Global Water Center opened its doors with 100,000 square feet of offices, meeting spaces, labs, and an auditorium to accelerate research and development, business formation, and triple helix collaboration to promote growth in the water technology sector. The Water Center is home to entrepreneurs, researchers, and business services and serves as a convening point for the industry. The state government played a key role, through a $50 million investment to create the School of Freshwater Sciences (the only graduate program of its kind in the country) housed at the University of Wisconsin-Milwaukee. The Water Center and the School of Freshwater Sciences serve as two anchors of the Water Technology District, an area just south of downtown Milwaukee that has become the

epicenter for the region's water cluster, thanks to more than $220 million of new public and private investment from 2010 to 2014. The region's water cluster now includes over 200 companies that employ more than 35,000 people.

BETI (BUILDING ENERGY-EFFICIENCY TESTING AND INTEGRATION) CENTER: PUGET SOUND REGIONAL COUNCIL

In 2010, the Puget Sound Regional Council (PSRC) launched the Building Energy-Efficiency Testing and Integration (BETI) Center and Demonstration Network. This was an initiative to grow the Puget Sound's energy efficiency industry. The BETI Center was designed to focus on building energy management software and automation technology. BETI encouraged innovators – researchers, entrepreneurs, manufacturers and service providers – who have successfully developed promising products, applications, designs and services to test them in real world settings prior to launching them into the marketplace, and to work with members of the broader energy efficiency industry to integrate these technologies with the other aspects of the built environment.

The BETI Center addressed gaps in the product development process, specifically the "proof-of-concept" and "technology testing in situ" phases that come after initial technology development, but precede market adoption. BETI Center services included:

1. Controlled laboratory testing;
2. Field demonstration and testing;
3. Facilitated industry collaboration; and
4. Linkage to business assistance.

The successful implementation of the BETI project led the PSRC and partners to compete for and receive a federal i6 Green Challenge Grant to support smart building technology. This federal grant helped fund several innovative programs, including the Smart Building Center which opened in downtown Seattle in November 2015 as a program of the Northwest Energy Efficiency Council. The Smart Building Center is the most recent collaboration effort that is positioning the Puget Sound region as a national leader in energy efficiency technology development.

PECAN STREET: AUSTIN, TEXAS

Pecan Street is a nonprofit R&D organization, located at the University of Texas at Austin, which is focused on advancing university research and accelerating innovation in water and energy. Since 2010, Pecan Street has used the Mueller neighborhood in Austin, a new urbanist mixed-use development on 700 acres of land that once housed the city's airport, as ground zero in a super-ambitious data collection project that is aimed at providing an unprecedented understanding of consumer energy and water usage behavior. Using smart grid technologies, Pecan Street is leveraging its network of 1,200 volunteers in Texas, Colorado, and California to monitor energy and water usage behaviors in real-time. The database is the largest source of disaggregated customer energy data in the US, and is used by university researchers and industry-leading companies globally.

The data and analysis work led by Pecan Street is already challenging some conventional wisdom about solar energy. For many years, experts assumed that solar panels should face south to catch more total sunlight and generate more

electricity. But Pecan Street is learning that solar panels provide more value if they face west, so that they capture the most sunlight and generate the most electricity in late afternoon when power usage is highest and utilities are often required to bring online expensive "peaker" plants to prevent brownouts. Pecan Street is heading similar research efforts that will lead to a better understanding of energy and water usage, providing important data and findings to utility companies, the US Department of Energy, and other organizations involved in managing and implementing technologies related to green communities, energy data, and modernizing our electricity grid.

AGRICULTURE BEST PRACTICE EXAMPLES

AGLAUNCH: TENNESSEE

In response to a challenge issued by Governor Bill Haslam, officials with the Tennessee Farm Bureau Federation, the Tennessee Department of Agriculture, and the University of Tennessee Institute of Agriculture came together to craft a strategy in support of the state's $66 billion agriculture and forestry sector. The resulting plan, issued in December 2013, sets out 27 actions under four major strategies designed to achieve the Governor's goals of increasing farm income and agribusiness investment and positioning the state as the number one producer in the southeast. One initiative resulting from the planning process is AgLaunch, an agritech-focused business acceleration program developed by the Memphis Bioworks Foundation to capitalize on the growth in agricultural-related venture capital investment. When fully operational in July 2016, AgLaunch will integrate with the state's existing accelerator network, Launch Tennessee (launchtn.org), and will play a central role in the development of a Rural Business Investment Company, a US Department of Agriculture program designed to bring early-stage investment capital into rural areas.

ANIMAL HEALTH CORRIDOR: GREATER KANSAS CITY AREA

The Greater Kansas City Region (from Manhattan, KS to Columbia, MO) accounts for nearly 32 percent of total sales in the $19 billion global animal health market. The KC Animal Health Corridor is an initiative housed within the Kansas City Area Development Council (KCADC) with the goal of promoting the Greater Kansas City region as the premier location in the U.S. and globally for companies in the animal health industry. The lead organizations that have guided the creation and operation of the KC Animal Health Corridor are the KCADC, the Greater Kansas City Chamber of Commerce, and the Kansas City Area Life Sciences Institute, as well as an Advisory Board made up of local leaders.

KC Animal Health Corridor has successfully brought together all of the region's major animal health stakeholders and it functions as the industry's unified marketing and advocacy organization. It is engaged in multiple regional marketing activities aimed at increasing national awareness of the region's animal science assets and opportunities and improving communications and collaborative opportunities by providing greater connectivity amongst the region's animal science stakeholders. The initiative's 2013-2015 Strategic Priorities include:

1. Engagement of animal health industry with the Corridor;
2. Public policy development efforts; and
3. Workforce development.

Through these strategic priorities, the KC Animal Health Corridor aims to promote interaction and innovation within the animal health industry and to market the Corridor's assets, initiatives and successes to allow the region to be known worldwide as the center of the animal health industry. These priorities also focus the organization's efforts on leveraging the opportunities created by the new National Bio and Agro-Defense Facility (NBAF) and on developing strategies to attract and retain a workforce skilled in key competencies meeting the needs of Corridor companies and entities.

NBAF (NATIONAL BIO AND AGRO-DEFENSE FACILITY): MANHATTAN, KANSAS

The Plum Island Animal Disease Center (constructed in 1954 in Orient Point, NY) had become outdated and was nearing the end of its planned lifespan; a new state-of-the-art biocontainment facility was needed to study diseases that could threaten U.S. animal, agricultural, and public health. Kansas State University (KSU), in Manhattan, Kansas, pursued the contract for this facility, known as the National Bio and Agro-Defense Facility (NBAF). KSU, already the site of the Biosecurity Research Institute and a major hub in the veterinary pharmaceutical industry, offered an ideal location.

The Department of Homeland Security and the U.S. Department of Agriculture jointly conducted a three-year search that included a thorough assessment of the risks (an environmental impact assessment) and the ability to meet the intense security requirements (Biosafety Level [BSL] 4 containment) for the planned NBAF. A multi-year nationwide search that considered 29 potential sites culminated in 2008 with the selection of Manhattan and KSU as the site for the NBAF project. A key factor that helped Manhattan land the federal project was the close partnership between Kansas State University, the City of Manhattan, and the Manhattan Area Chamber of Commerce.

An economic impact analysis was prepared by Impact DataSource in 2012 that analyzed the effects of the facility over a 25-year period. It examined the fiscal and economic impacts, as well as the impacts to the bioscience industry in Kansas and the KSU area. During the construction phase, which began in 2012 (scheduled for completion in 2017), businesses in Kansas, particularly in Riley County (home to KSU), will receive more than $800 million in revenue, both directly and indirectly. More than 1,300 workers will be employed during construction. Once the facility begins operations, it will employ approximately 325 workers at an average annual salary of $77,000. The facility itself, consisting of two large laboratory structures and four outbuildings providing utility, parking, and guard services, is expected to draw more bioscience firms to the area, further expanding the economy.

ASHEVILLE BREWERS ALLIANCE: ASHEVILLE, NORTH CAROLINA

The Asheville Brewers Alliance was created to promote breweries in Asheville and the surrounding Western North Carolina region. The Alliance supports the region's craft beer industry through networking, promotion and marketing efforts, knowledge exchange, and events. The Alliance is a key supporter of Asheville Beer Week, an annual event including tastings, dinners, beer education, and other beer-related activities. The Beer Week culminates in the annual Beer City Festival, Asheville's premier downtown craft beer festival that brings together local and regional breweries for a day of beer and live music. The Alliance is expanding its reach in 2016 through its first annual AVL Beer Expo, which will showcase all elements of craft beer production—from raw ingredients to brewing to packaging and distribution—while providing tastings of beers from across Western North Carolina.

The Alliance and its members have successfully facilitated the growth of Asheville's craft brewing industry, along with assistance from key partners such as the Asheville-Buncombe County Economic Development Coalition. In just the last two years, several major brewery expansion projects have been announced in the region. Burial Beer Company will add 17 new jobs and $1.8 million of new capital investment. Hi-Wire Brewing has announced 15 new jobs and $1.62 million of new capital investment. Wicked Weed Brewing is adding 82 new jobs and $5 million in new capital investment with its expansion project. And the most significant announcement is from Fort-Collins, Colorado-based New Belgium Brewing Company (the nation's third largest craft brewer), which is adding 154 new jobs and $140 million of new capital investment in a state-of-the-art brewery in Asheville's historic River Arts District.

HEALTH SCIENCES BEST PRACTICE EXAMPLES

ROUND ROCK HIGHER EDUCATION CENTER: ROUND ROCK, TEXAS

The Round Rock Higher Education Center (RRHEC) is a prime example of a collaborative development for establishing a higher education presence. Originally established as the North Austin/Williamson County Multi-Institution Teaching Center (The MITC) in 1998, the name was changed for marketing purposes to build name recognition and public awareness. Funding for the RRHEC was secured by the community's congressional delegates in response to a strong vision by local leaders for the development of a higher education institution to serve the needs of a booming population.

The RRHEC combines the efforts of Texas State University-San Marcos, Austin Community College, and the Texas A&M University Health Sciences Center to offer educational opportunities for residents of North Austin and Williamson County. These colleges collaborate to provide Associate's, Bachelor's, and Master's degrees, as well as workforce training and development, most of which is focused on health care training for students at all stages of their medical careers. The RRHEC is co-located in a district that houses Seton Healthcare's Williamson County Medical Center and is within close proximity to two additional regional hospitals and a community health clinic. All of the nearby health care facilities provide students with opportunities for clinical training. Furthermore, the education center acts as an anchor for a 900+ acre mixed-use development that also includes regional retail, restaurant, and entertainment establishments.

GLOBAL CENTER FOR HEALTH INNOVATION: CLEVELAND, OHIO

The Global Center for Health Innovation serves health and health care innovation, education, and commerce for the entire Northeast Ohio region through state-of-the-art spaces, programs, and virtual offerings. The Global Center was created to tap the expertise of the region's leadership in the medical field, starting with the Cleveland Clinic, but also including several other leading medical institutions in the greater Cleveland area. More than 700 bioscience firms are located in the Cleveland region, including startups that have attracted nearly $200 million of investments in the last two years.

Part of the Cleveland Convention Center complex, the Global Center brings together large corporations, healthcare systems, educational institutions and med-tech innovation firms from the Cleveland area and across the world to encourage collaboration and discovery, with a the goal of generating ideas that lead to future advancements in health care innovation. The Cleveland Convention Center and the Global Center for Health Innovation are

managed by SMG, the nation's largest convention center and facility management firm. The Global Center features four themed floors. Health and Home is the theme of the first floor, highlighted by the State-of-the-Art Patient Home. People, Patients and Caregivers is on the second floor, and Clinical Spaces on the third. The fourth floor features Health Care information technology. The $465 million Global Center opened its doors in 2014 and recently (December 2015) announced its 20th tenant-partner, Siemens Healthcare, a global leader in medical imaging, lab diagnostics, and health care information technology. Other notable entities have been recruited to the Global Center, including the Healthcare Information and Management Systems Society (HIMSS) Innovation Center, which relocated from Chicago where HIMSS is headquartered. HIMSS is a global nonprofit focused on better health through information technology. Beyond encouraging innovation and economic development in the region's health care industry, the Global Center is also serving as a catalyst project in the ongoing revival of downtown Cleveland, which is quickly becoming a talent magnet and a leading market for real estate investment in Northeast Ohio.

MED-TECH INNOVATION DISTRICT: AUSTIN, TEXAS

The University of Texas at Austin, state legislators, and local voters collaborated with Seton Healthcare Family and Central Health to create the new Dell Medical School and teaching hospital in downtown Austin. Construction started in 2014. Local business and community leaders are positioning the new campus and surrounding properties as an innovation district focused on medical technologies. The district, located between the University of Texas campus and the downtown commercial core, will be a major economic driver over the next decade. BioAustin, the trade group representing local life sciences companies, predicts that a fully built-out innovation district could grow Austin's life sciences economy to more than 200 businesses from the current 140 and could also help existing startups grow into major players or targets for acquisitions.

An October 2015 article by Evie Nagy of Fast Company Magazine profiled the new medical school and its potential to transform the health care industry through innovation. Nagy states that "the new med school at the University of Texas takes a totally new approach to training doctors—and could turn health care upside down." One way that the Dell Medical School is aiming to spark innovation is through a first-of-its-kind Design Institute for Health, a joint collaboration between the medical school and the University of Texas College of Fine Arts, which is being led by two former executives from the creative design firm IDEO. The Design Institute for Health will inform the medical schools clinical, educational, and research efforts through design thinking applications to health care challenges and innovation. The new medical school and the surrounding med-tech innovation district are well on their way to serving as a catalyst for growth in Austin's health technology industry and fueling investment and innovation in the region's economy.

HEALTHY CHICAGO 2.0: CHICAGO, ILLINOIS

Healthy Chicago 2.0 is a community health assessment and improvement plan being developed by the Partnership for Healthy Chicago. The Partnership for Healthy Chicago is a public-private collaboration of stakeholders working to strengthen the city's public health system. The Partnership initially convened in 1998 as part of the National Turning Point Demonstration Project through the W.K. Kellogg and Robert Wood Johnson Foundations and has since developed and implemented several strategic plans. Members of the Partnership include government agencies, hospital systems, higher education institutions, research and policy organizations, faith and business

communities, and community and social service organizations. The Partnership for Healthy Chicago is co-chaired by the Chicago Department of Public Health (CDPH) and one partner organization. CDPH staffs the Partnership.

Healthy Chicago 2.0 will expand on the Partnership's past successes through the development of a new four-year plan. This plan will outline goals and strategies to be implemented by the CDPH and other community health stakeholders that will improve the health of Chicago residents. The plan is focused specifically on addressing disparities and inequities among vulnerable populations and on improving health outcomes for all members of the community. The plan development process has identified overarching strategic issues that will be addressed by the following ten Priority Action Areas:

1. Access to health care and human services
2. Child and adolescent health
3. Chronic disease prevention and control
4. Community development
5. Data and research
6. Education equity;
7. Infectious disease;
8. Mental health and substance abuse;
9. Partnerships and community engagement
10. Violence and injury prevention

INTERNATIONAL WORKFORCE BEST PRACTICE EXAMPLES

SOUTH TEXAS/BORDER INITIATIVE

In 1987, a lawsuit was filed—LULAC v. Richards—alleging that the Texas state government did not provide equal higher education opportunities along the border area as it did in the rest of the state. The lawsuit was supported by the Mexican American Legal Defense and Educational Fund (MALDEF) and argued that South Texas and border universities were not getting their fair share of funding from the state. MALDEF also pointed to stark differences in the quantity and quality of academic programs at these universities compared to those in other parts of the state. At the time of the lawsuit, about 20 percent of the Texas population lived in the border area, but only 10 percent of state funds for public universities went to schools there. And there were only two Ph.D. programs along the border out of the nearly 600 doctoral programs in the state as a whole.

Although the Texas Supreme Court eventually overturned a lower court's decision that ruled in favor of MALDEF, the lawsuit was a catalyst that led the 71st Texas Legislature to create the South Texas/Border Initiative in 1989. This initiative increased funding from the state to enhance the quality and resources of higher education institutions along the Texas-Mexico border region. Nine institutions along the border region received nearly $900 million in special item funding from 1990 to 2003 as part of this program, which led to substantial improvements in the scope and quality of higher education in previously underserved communities. The initiative enabled border universities to significantly increase enrollment, expand academic R&D spending, and add hundreds of new degree programs across the region, including new law, medical, dental, and professional schools that were previously lacking.

DELTA RESEARCH CONSORTIUM

The Delta Research Consortium is a collaborative network of four-year colleges and universities throughout the Mississippi River Delta region, supported by the Delta Regional Authority (DRA). The DRA is a federally-mandated

agency that works to improve regional economic opportunity by helping to create jobs, build communities, and improve the lives of the 10 million people who reside in the 252 counties and parishes of the 8-state Mississippi River Delta region. The Consortium kicked off at an inaugural summit in April 2015, jointly hosted by the DRA and Arkansas State University. The summit included executives from regional higher education institutions and stakeholders from public and private organizations. The Consortium works to maximize funding and collaboration for positive and solutions-driven research in the Delta region by connecting researchers, practitioners, and communities to the data that can help develop strategies and solutions for addressing the region's greatest challenges. In addition to Arkansas State University, which hosted the summit, additional institutions that are partners in the Consortium include Delta State University, Louisiana State University, Mississippi State University, Southeast Missouri State University, University of Memphis, and University of Tennessee at Martin. The Consortium is driven by the following three guiding principles:

1. Collaborative and inclusive of many: Building our shared capacity for engaging research and innovation across all sectors
2. Innovative and entrepreneurial: Elevating faculty and student research, demonstrating to stakeholders the value and relevance of research in higher education
3. Inspiring and impactful: Committed to bringing our shared assets to bear on the significant social and economic opportunities and challenges in the Delta for meaningful impact

The Consortium is still in the early stages of development, but is already a great example of cross-institution collaboration. Not only is this group encouraging partnerships across multiple colleges and universities, but it is doing so across state boundaries, thanks in large part to the leadership of the DRA. If successful, the Consortium could transform the Delta region's economy through supporting the advancement of research, innovation, and training across the region by leveraging the diverse assets found within each of the region's higher education institutions.

UNIVERSITIES AT SHADY GROVE: MONTGOMERY COUNTY, MARYLAND

Montgomery County is the largest county in Maryland and the second largest in the DC metro area, after Fairfax County, Virginia. Prior to the year 2000, higher education was lacking within the county, despite the existence of many high quality colleges and universities in the surrounding region. The Universities at Shady Grove (USG) was established in 2000 to address this challenge. USG is a unique collaboration of nine degree-granting public institutions that are all part of the University System of Maryland. What began in 2000 as a satellite campus with only night and weekend courses, has grown to become a sizable university campus offering 80 of the most popular upper level undergraduate and graduate degree programs.

The unique partnership model allows students to enroll in one of the nine partner universities that offers their degree or certificate program; take full-time, part-time, evening, or weekend courses at USG; and receive their degree from the offering university upon completion. This approach has yielded impressive results and has enabled USG to successfully deliver on its stated mission: "To bring the highest quality University System of Maryland education, research, and services to citizens, businesses, and government in Montgomery County and the surrounding region." The campus now serves more than 4,000 currently enrolled students, including a high percentage of minority

students (64 percent of undergraduate students are minorities and 60 percent of graduate students are minorities). Moreover, USG is a valuable community asset with nearly 90 percent of graduates working in the region and state.

GENERAL BEST PRACTICE EXAMPLES

KC STARTUP VILLAGE

When Google Fiber was first introduced in Kansas City in 2012, service was originally offered exclusively in residential areas. To extend high-speed, low-cost internet access to the city's growing community of startups, a handful of entrepreneurs purchased homes in the Spring Valley neighborhood, the country's first-ever Google "fiberhood." Ultimately labeled the Kansas City Startup Village (KCSV), this grass-roots initiative has grown to include 25 companies located in roughly a dozen houses, including two highly visible properties: Homes for Hackers and the Brad Feld Fiber House. Along with the unique access to gigabit internet speeds, a dense community of like-minded entrepreneurs, and the opportunity for serendipitous "collisions," KCSV promotes the city's affordable cost of living to encourage aspiring entrepreneurs to set up shop in Kansas City. While KCSV is completely entrepreneur-led, its creation coincided with the Greater Kansas City Chamber of Commerce's "Big 5" initiative, which originated from a months-long visioning process started in July 2011. The initiative focuses local talent and resources on five community-based projects, including making Kansas City "America's Most Entrepreneurial City." In addition to KC Startup Village, Kansas City is home to the Ewing Marion Kauffman Foundation, as well as a number of incubators, accelerators, and other entrepreneurship-focused initiatives.

UNCONVENTIONAL PRODUCTION TECHNOLOGY AND ENVIRONMENTAL CONSORTIUM: LUBBOCK, TEXAS

In 2014, Texas Tech University created the Unconventional Production Technology and Environmental Consortium (UpTec), formerly the Hydraulic Fracturing Research Group, with the goal of establishing Texas Tech and the Lubbock region as the global leader in hydraulic fracturing (also known as "fracking") research. UpTec researches "the chemistry processes, technological development and materials, environmental components, and the overall effects of hydraulic fracturing in the West Texas area." This consortium includes over 50 collaborators from 14 departments at Texas Tech University and the School of Law. It is focused on four research areas/sub-groups:

1. Chemistry, Materials, and Technological Developments;
2. Water and Environmental Consequences and their Minimization;
3. Public Engagement and Education; and
4. Subsurface Processes & Technologies.

UpTec started as an internal collaboration across multiple departments at Texas Tech, but now involves researchers from other universities across the state, including the University of Texas at Austin and Texas A&M University. This initiative is also in the early stages of engaging private sector leaders involved in fracking technology development. As this initiative continues to build expertise and research around hydraulic fracturing, it has the potential to leverage Lubbock's location in West Texas, the largest on-shore oil and gas production region in North America

(which is also a water-scarce region) to create an industry cluster that specializes on technology development that focuses on addressing these opportunities and challenges.

SAMSUNG DESIGN STUDIO & ROGER WILLIAMS UNIVERSITY: BRISTOL, RHODE ISLAND

In 2012, Roger Williams University (RWU) embarked on a unique partnership with Samsung Electronics America to create the Samsung Design Studio at the university's School of Architecture. The project began as a pilot educational technology initiative with 100 LED workstations donated by Samsung. As part of this project, Samsung also provided cloud access technology and interactive whiteboards to architecture students. Students no longer have to purchase expensive programs; they can now access specialized software via the cloud through the "bring-your-own-device" approach now in place at the design studio. Thanks to the success of the initial pilot project, RWU expanded the initiative to include an additional 275 energy-efficient Samsung LED monitors installed at student workstations, with additional plans to move the initiative beyond the School of Architecture. RWU President Donald Farish describes the success of this effort, "This forward-thinking partnership reduces student costs, and most importantly, results in a hands-on, technology-driven learning environment that will prepare our students to thrive in the professional worlds they will encounter after graduation."

THE CENTER FOR IDENTITY: UNIVERSITY OF TEXAS AT AUSTIN

The University of Texas at Austin established the Center for Identity to serve as a state and national Center of Excellence to advance the fundamental understanding of identity protection and to become a global leader in the development of a "Trusted Internet Economy". Strategic partners include law enforcement (Federal Bureau of Investigation, Texas Department of Public Safety); federal government (US Secret Service, US Department of Homeland Security); state government (Texas Office of the Comptroller, Texas Department of Information Resources); and corporations (CSID, Equifax, HID Global, LexisNexis, LifeLock, TransUnion, and others). The Center is focused on its mission to "deliver the highest quality discoveries, applications, education, and outreach for excellence in identity management, privacy, and security."

The Center for Identity advances basic and applied research opportunities, as well as technology transfer and commercialization, in a wide range of application areas including financial services, consumer services, energy, health care, government, and national security. Education is another key aspect of the Center's efforts. Through the development of a Master of Science in Identity Management and Security (MSIMS) degree program, in collaboration with the university's School of Information, the Center is working to train new professionals in fast-growing and critical areas of the field. The MSIMS program is the first of its kind and welcomes its inaugural class in spring 2016. The Center has also developed successful short courses, children's education programs, and other educational resources. Another important initiative spearheaded by the Center is the promotion of events, such as the ID360 two-day conference, which brings together experts and stakeholders to engage in discussions to learn, share, and exchange ideas, experiences, and innovations. While the Center and its partners are focused on national and industry-wide identity management issues, the ongoing work of this organization is helping the greater Austin region to establish itself as one of the global leaders in the development of a "Trusted Internet Economy," which will fuel additional innovation, job growth, and investment for the Austin economy.