

# BUILDING FROM STRENGTH

CREATING OPPORTUNITY  
IN GREATER BALTIMORE'S  
NEXT ECONOMY

JENNIFER S. VEY  
FELLOW

# Acknowledgments

The Brookings Institution Metropolitan Policy Program would like to thank the Annie E. Casey Foundation for their generous support of this report. The author is particularly grateful to Patrice Cromwell (Director of Economic Development and Integration Initiatives, Center for Community and Economic Opportunity), whose knowledge of and passion for the issues discussed in these pages have been critical to the project. The Metro Program also thanks the Rockefeller Foundation, John D. and Catherine T. MacArthur Foundation, Heinz Endowments, Ford Foundation, George Gund Foundation, F.B. Heron Foundation, and the Metropolitan Leadership Council for their ongoing support of the program.

The author also wishes to express her thanks and gratitude to the many people who provided important information, guidance, and advice that helped build and improve the report. First, she wants to thank all those who provided personal or small group interviews, or otherwise provided feedback on the project, including (in alphabetical order): Tim Armbruster (Goldseker Foundation); Bill Barnes (University of Maryland, Manufacturing Assistance Program); Diane Bell-McKoy (Associated Black Charities); Avonette Blanding (Maritime Applied Physics Corporation); Paul Brophy (Brophy and Reilly, LLC); Bill Burwell, Martin Herbst, Paul Matino, Janee Pierre-Louis, and Jeanne Townsend (U.S. Export Assistance Center); Richard Clinch (University of Baltimore Jacob France Institute); Martha Connolly (Maryland Industrial Partnerships program); Neil Davis (Emerging Technology Centers); Dennis Faber (TIME Center at the Community College of Baltimore County); Stuart FitzGibbon (Domino Sugar); Kirby Fowler (Downtown Partnership of Baltimore); Andy Frank (Johns Hopkins University); Mike Galiazzo (The Regional Manufacturing Institute of Maryland); Susan Ganz (Lion Brothers Inc.); Bob Giloth (Annie E. Casey Foundation); Elizabeth Hines (Baltimore Development Corporation); Seema Iyer (University of Baltimore Jacob France Institute); Bill King (Roadmap); Tom Loveland (Mind Over Machines); Brad McDearman (Brookings Institution); Aris Melissaratos (Johns Hopkins University); Tom Murphy (Urban Land Institute); Katherine Newman (Johns Hopkins University); Mary Jane Norris (Maryland Port Authority); Brian O'Malley (Central Maryland Transportation Alliance); Jason Perkins-Cohen (Job Opportunities Task Force); Mark Rice (Maritime Applied Physics Corporation); Michael Rosenbaum (Catalyst IT Services); Larysa Salamacha (Baltimore Development Corporation); Jane Schaab (UMB BioPark); Gloria Sandstrom and Kipp Snow (Anne Arundel Community College); Marsha Schachtel (Johns Hopkins Institute for Policy Studies); Eric Seleznow (National Skills Coalition); Karen Sitnick and Mary Sloat (Baltimore City Mayors Office of Employment Development); Melanie Styles (Abell Foundation); Michael Thomas (Baltimore City Public Schools); David Troy (410Labs); Ken Ulman, Ira Levy, Laura Neuman, and David Nitkin (Howard County); Robert Wallace (BITHGROUP Technologies); and Sharon Webb (formerly of the Greater Baltimore Technology Council).

She'd also like to thank Alan Berube (Brookings Institution); Neil Davis (Emerging Technology Centers); Elizabeth Kneebone (Brookings Institution); Amy Liu (Brookings Institution); Jason Perkins-Cohen (Job Opportunities Task Force); and Mark Rice (Maritime Applied Physics Corporation) for their very helpful feedback on earlier drafts of this report.

Finally, the author wishes to thank Emilia Istrate, Jonathan Rothwell, and Adie Tomer at the Brookings Institution for providing advice, suggestions, and critical data and analysis, and David Jackson, John Fairbanks, Rachel Harvey, and Rahsheeda Ali for polishing and disseminating the final report. She especially wants to express her deep appreciation to Alan Berube for his always sage guidance, and to Carey Nadeau for her tireless data collection, rigorous analysis, keen suggestions, and overall good spirit throughout the duration of this project.

**About the author:** Jennifer S. Vey is a fellow with the Brookings Institution Metropolitan Policy Program and a Baltimore resident. Contact her at [jvey@brookings.edu](mailto:jvey@brookings.edu).

# Contents

<b>Acknowledgments .....</b>	<b>2</b>
<b>Executive Summary .....</b>	<b>4</b>
<b>I. Introduction.....</b>	<b>11</b>
<b>II. Greater Baltimore's Opportunity Challenge.....</b>	<b>15</b>
A Wide Opportunity Gap.....	17
A Faulty Opportunity Structure .....	18
A New Economic Order .....	20
<b>III. Greater Baltimore's Next Economy .....</b>	<b>23</b>
Greater Baltimore's Next Economy Today.....	24
Opportunity in the Next Economy.....	25
Manufacturing.....	28
Information Technology .....	32
Bioscience .....	36
The Clean Economy .....	40
Transportation and Logistics.....	44
<b>IV. Barriers to Opportunity .....</b>	<b>50</b>
Barriers to Growing the Next Economy .....	51
Barriers to Accessing the Next Economy .....	52
<b>V. A New Framework for Change .....</b>	<b>57</b>
<b>VI. Conclusion .....</b>	<b>63</b>
<b>Endnotes .....</b>	<b>65</b>



## Executive Summary

According to many broad economic indicators, the Baltimore metropolitan area is doing better than fine. In 2010, the median household income for the region was nearly \$15,000 higher than for the country at large, and over the 10 years prior, real incomes rose in the metro, if slowly, even while incomes nationally shrank by more than 7 percent. Employment grew from 2000 to 2010 while declining nationwide, and during the economic downturn, the area's unemployment rate was consistently lower than the majority of its metropolitan peers.

Yet anyone who lives and works in Greater Baltimore knows the region is also home to many families and neighborhoods challenged by varying levels of economic and social distress. Although only about 10 percent of the region's residents are considered poor, nearly a quarter are low-income, meaning they are part of a family with a total income that is below 200 percent of the federal poverty line. Yet the regional economy hums along, baring the somewhat disquieting truth that a good economy for most can be had even while many aren't reaping its benefits.

Efforts and ideas to change this paradigm abound. The public, non-profit, and philanthropic sectors—in Baltimore and throughout the country—spend billions each year trying to help fill the gap between what a household can afford and what it actually takes to pay for basic needs. As critical as these interventions are, however, they are not targeted at expanding opportunity—that is, making greater numbers of middle-wage jobs available and accessible to those who want to get ahead—as much as trying to compensate for the fact that there isn't enough of it.

This report proposes a different approach, one simultaneously focused on investing in efforts to grow a more opportunity-rich “next economy” and helping low-income residents gain the education, skills, and other capacities needed to participate in it. To this end, it advances three primary messages:

**① Greater Baltimore is not generating enough quality jobs, and low-income people aren't accessing them.** Although Baltimore's low-income residents have higher rates of unemployment than metro residents overall, 97 percent of them have a job or have held one in the recent past.

Some of those workers may be only tenuously attached to the labor force, either moving in and out of employment or steadily working, but only part-time. But the fact remains that many low-income residents simply don't earn very much. In fact, about three-quarters of the region's low-

income workers are employed in just a few industries, including healthcare, social, or educational services, arts and entertainment, accommodation and food services, retail, construction, and administrative services. These industries don't pay uniformly low wages, but they are big regional employers, with large shares of low-wage occupations. For example, approximately 10 percent of the total metro workforce is employed in retail, an industry in which more than 76 percent of jobs were in low-wage occupations. And while average annual wages in the healthcare and social assistance sector are approaching the average for all industries in the metro, 47 percent of the nearly 182,000 workers in the sector are employed in low-paying jobs.<sup>TPD</sup>

Yet it is not just low wages themselves that explain why Greater Baltimore has so many low-income residents. Rather, the region has an economic structure that for years has been producing too few decent-paying jobs that too few low-income workers are able to access.

Though the Baltimore region saw somewhat stronger job growth than the U.S. in the seven years leading up to the recession and experienced less job loss during it, its jobs engine over the past few decades has been sputtering. An examination of job growth by industry reveals that during the 27-year period prior to the Great Recession, growth in the lowest-paying third of Greater Baltimore's industries was 62.5 percent, closely mirroring that of the nation as a whole. But the number of jobs in the middle-paying third of industries rose by less than 37 percent, compared to 40 percent nationally, and growth in the highest-paying third was just 9.6 percent, while the U.S. saw an increase nearly three times that much.

Economists have been working furiously to understand these trends, and in so doing have revealed several key factors that for years have conspired to undermine the nation's—and its metros'—ability to create more and better-quality jobs. For one thing, the pace of U.S. innovation—a key driver

of productivity and ultimately wage growth—has slowed over the past few decades. Meanwhile, the vast majority of U.S. firms have not adequately positioned themselves to take advantage of growing markets abroad, and few states and metros have put adequate policies and resources in place to help them. Finally, the American workforce has been losing some of its competitive edge, with many workers lacking the skills and education needed to successfully compete in a globalizing economy.

Given that the U.S. economy is largely driven by its metropolitan areas, it makes sense that employment and wage trends in Greater Baltimore have been strongly influenced by these same forces.

② **Greater Baltimore has significant assets on which to build a more opportunity-rich next economy, but they aren't being fully exploited.**

If the past tells us anything about the future, it's clear that realizing a more productive, inclusive economic future will require a new model for next economy growth. Such a model demands that we take advantage of growing talent, demand, and investment from countries abroad by supporting **export-oriented** firms and other kinds of global engagement. It will require that we continually **innovate** in the products and processes that improve how we live and work—including in the **low carbon** technologies that will advance global health and environmental sustainability, strengthen our resource security, and boost U.S. leadership in the clean energy revolution. And it will compel us to provide better ways for workers to get the skills and education they need to produce, deploy, and ultimately share the rewards from that which we invent.

Greater Baltimore has a powerful set of assets and advantages that should allow it to grow and excel in such an economy, including a robust network of colleges and universities, several world-class hospital systems, close proximity to the nation's capital and, importantly, sophisticated firms, skilled talent, and formidable research capacity.

But these assets haven't been fully leveraged. Though the Baltimore metro produced \$9.7 billion in total international exports in the 2010, the export share of the metro's total GMP is only 6.7 percent, ranking it 89<sup>th</sup> among its metro peers nationwide. Though the region excels on many typical indicators of scientific discovery and technological advancement, it is weak when it comes to translating its significant amount of life sciences and other research into new products and services, and the creation of new businesses is slow. And though its green economy is relatively large based on sheer size—its nearly 23,000 jobs ranks the area 22<sup>nd</sup> among the top 100 metros—the sector comprises a fairly small share (1.7 percent, ranking it 51<sup>st</sup>) of its overall economy.

Given its strengths—and weaknesses—it seems evident that efforts to move the region more firmly into the next economy will require a particular focus on industries that have the best potential to drive economic growth:

- a healthy, globally-connected **manufacturing** sector
- a robust, market-oriented **bioscience** industry
- an open, entrepreneurial **information technology** sector
- a large, diverse set of firms and jobs that convey a **"green"** benefit, and
- a **transportation and logistics** system that can efficiently and effectively move goods and people both within and outside the region.

Together, these five often intertwining industries can help ease the way we do business, improve our health, preserve natural resources, and allow us to access goods, services, and information more quickly than ever before. But perhaps the best reason Greater Baltimore should work to grow and develop these industries is because doing so will help build an economy characterized by greater numbers of good-paying jobs that greater numbers of workers can access.



Indeed, a detailed analysis of these five key next economy industries reveals that the share of workers earning a middle wage or better is higher in each than it is for the Baltimore metro as a whole. Even better, these industries *have a higher share of workers who are earning a decent living without having completed a 4-year college degree*: Though only 31 percent of all Baltimore workers without a bachelor's degree are employed in well-paying occupations, the same can be said for 51 percent of transportation and logistics workers, 45 percent of manufacturing workers, 42 percent of clean economy workers, 39 percent of bioscience workers, and 36 percent of IT workers. It's just these "opportunity sweet spots" that the region should be working to expand.

**③ Greater Baltimore needs to focus both on investing in the next economy and ensuring low-income people are connected to it.** The Baltimore metro has strong seeds from which to grow a more export-oriented, innovative, greener region. But for the metro's low-income residents, the next economy is still too small, and too far out of reach. In fact, only a small fraction of the working poor were employed in the region's five next economy industries at some point during the past 5 years, which is precisely the point: If they were—at least somewhat steadily—they very likely wouldn't be low-income.

It is, in part, a matter of scale: As yet, these industries today simply aren't large enough—nor growing enough—to absorb all the low-income workers who might wish to join their ranks. Beyond this is the fact that many of the region's low-income workers face a range of barriers to attaining next economy jobs, possessing neither the education and skills employers need, nor the robust social, institutional, and physical connections needed to access—or perhaps even know about—the opportunities embedded in them.

As this report argues, it's time to take a different tack.

In the first place, Greater Baltimore's public, private, and non-profit leaders—along with the state—need to be **far more visionary, far more coordinated, and far more strategic about growing the next economy industries in which good wage jobs are the norm rather than the exception**. This means strengthening the next economy attributes that makes these sectors so critical to the region's future:

➤ **Build a stronger export economy.** To succeed in an increasingly competitive global economy, Maryland and Greater Baltimore must help firms overcome their reticence to export, and find new ways to tap growing markets abroad. This will require a thorough assessment of the major barriers to exporting that companies face, and what they need to surmount them. Armed with that information, the state and region should then work together to develop a strategy for increasing regional exports, with both quantifiable goals and clear measures for evaluating progress.

➤ **Provide greater support for innovation and entrepreneurship.** Greater Baltimore needs to convert more of its research into new products and firms, while at the same time ensuring that existing businesses—particularly manufacturers—are able to embrace new innovations:

● **Help new ideas become new businesses.** To support the development and commercialization of early stage technologies, the public, nonprofit, and private sector must continue to work together to grow and organize the metro's angel community and mobilize it to make the early investments that traditional venture capitalists won't. Regional leaders should also consider how universities, incubators, educational and business coaching services, housing, and other amenities can be brought together in close geographic space—as leaders in Barcelona, Spain did—to advance innovation and entrepreneurship.



- **Help manufacturers stay on the cutting edge.** To help small- and mid-sized manufacturers (SMMs) implement new technologies—as well as the changes in management processes, work organization, and supply-chain relationships that often must accompany them—state and regional leaders could in the short term encourage firms to form a consortia focused on promoting manufacturing innovation, and helping workforce providers design training programs that meet their needs. Over the longer term, the public and private sectors should work with universities and other organizations to establish an advanced manufacturing research center in the region that would assist firms with research commercialization, technology transfer, and production innovation.

- ***Build on the region's clean economy strengths.*** To grow the clean economy, the region, aided by the state, should rigorously appraise the metro's clean economy strengths, opportunities, and the impediments to future growth and development. Leaders then need to use this analysis to help break down existing regulatory, financial, and other barriers to firm and job growth. Such efforts might include, at one end the spectrum, a revamping of government procurement processes so as to stimulate demand for local green products and services, or at the other, marketing Maryland firms to countries and companies abroad.



# Greater Baltimore has the institutional and economic strength necessary to bring about the kind of transformational change suggested by these strategies.

These and other strategies aimed at promoting the growth of Greater Baltimore's next economy industries are essential—but they are not enough. Growing an opportunity-rich next economy also means **ensuring that regional workers have the information, skills, and connections needed to participate in it**, and that next economy employers thus have the labor force they need to expand and succeed:

➤ **Help young and incumbent workers get the skills and education next economy employers need.** To respond to a rapidly changing economy, Greater Baltimore's education and training providers must be able to nimbly adapt their curricula around the specific skills next economy firms require, while also employing 'bridge' and other programs that help more of those who enter their programs—whether straight from high school, or after years of work—stay the course and earn a credential. Perhaps most importantly, the workforce system needs to work much more closely with employers to increase the availability of apprenticeships, mentoring programs, and on-the-job training opportunities so that formal schooling is accompanied by real world experience.

➤ **Build a more coordinated workforce delivery system.** To create a more integrated, comprehensive, and ultimately successful education and workforce structure, leaders need to take an inventory of all the public, private, and nonprofit providers in the delivery system, the types of programs they offer, how successful they are in helping residents secure a good job, and the industries in which they are landing. Only by doing so can they begin to identify gaps and then work with providers and employers to help fill them. Then all the players in the system—businesses, community colleges, government, non-profits—must together develop a common regional vision and a set of goals against which to measure their joint progress toward not simply serving residents, but actually helping them access, maintain, and ultimately help create quality employment opportunities in growing sectors.

➤ **Improve low-income workers' ability to get to next economy jobs.** To broaden participation in the next economy, regional leaders must target land use, transportation, and infrastructure investments so as to better align, and help spur, residential and business development, while also helping improve physical connectivity between people and jobs. Integrating existing state and local efforts to foster transit-oriented development (TOD) in the metro into a next economy economic development strategy will be critical to this process, as will the continued build out of transportation infrastructure like the proposed Red Line.

Greater Baltimore has the institutional and economic strength necessary to bring about the kind of transformational change suggested by these strategies. Regional leaders must now build on that strength with a bold vision of the possible, and the collective will to achieve it. ■







# I. Introduction

In 2010, the Economic Alliance of Greater Baltimore developed a presentation designed to debunk the long-held myth that Baltimore was a distressed, post-industrial region still struggling to gain a foothold in the 21<sup>st</sup>

century economy. “The New Greater Baltimore,” which was presented to groups around the metropolitan area, argued—quite rightly—that the metro area outshined many of its peers on a wide range of indicators. The presentation showed that by the late 2000s the region ranked in the top 10 of U.S. metropolitan areas in terms of per capita personal income (9<sup>th</sup>), growth in per capita income (1<sup>st</sup>), employment growth (8<sup>th</sup>), concentration of management occupations (8<sup>th</sup>), and bachelor’s degree attainment (9<sup>th</sup>), to name just a few.<sup>1</sup> Moreover, investments in downtown Baltimore City and adjacent communities had grown substantially, and although the region was hardly unscathed by the recession, it had weathered it far better than many other regions had.<sup>2</sup> The overall message of the presentation was strong and positive: Greater Baltimore is healthy and thriving and it



possesses a potent combination of talent and assets necessary for a region to compete in the global economy.

**GREATER BALTIMORE** is defined here as the Baltimore-Towson Metropolitan Statistical Area (MSA), which comprises Baltimore City, and Anne Arundel, Baltimore, Carroll, Harford, Howard, and Queen Anne’s counties. The MSA is also referred to as the “metro area” or “region” throughout the report.



But not everyone was buying it. Although no one could dispute the veracity of the numbers as presented, the facts did not resonate so well with those audience members who experienced a very different side of Baltimore—the side where the deep social and economic challenges, such as those portrayed in *The Wire*, were being lived out in the real world by thousands of city and, increasingly, suburban families every day. Such feelings were, perhaps, based less on outright disbelief of the regional statistics and more on the conviction that true economic success must be far more inclusive of all of the region’s constituent parts. Should a metropolitan area really tout its progress and prosperity if so many of its residents are being left so far behind?

It is a fair question, embedded in which is a messy set of queries not just about issues of equity and social justice but also about the goals of regional economic development, the measures of economic success, and the ability of a region to sustain economic growth if not enough residents are fully participating in it. At its heart, it is a question about economic opportunity: what it means and what strategies public, private, and philanthropic leaders should employ in order to expand it.

This report takes a hard and somewhat unique look at these issues. By citing findings from both empirical analyses and dozens of interviews, it strives to make the case that efforts to increase economic opportunity must be rooted in efforts to create a more opportunity-rich regional economy and to help low-income residents gain the education, skills, and other capacities necessary to connect to it.

This idea, which focuses on re-shaping the structure of regional economic growth and the labor market needed to fuel it, is generally accepted in theory but is rarely adopted in actual practice, in Baltimore or elsewhere. For their part, economic development professionals tend to focus on job creation and income growth in the main

This report presents a different way of thinking about opportunity and how efforts to increase it should be moved from the margins into the mainstream of regional economic planning and development.

and are less deeply concerned—particularly if the numbers look good—with how the nature of that growth impacts the status and success of all of the households and neighborhoods in their purview. The precise opposite is true of many nonprofit and advocacy organizations, which tend to take the economy as it is and then try to make up for its opportunity gaps through poverty alleviation, workforce, or neighborhood revitalization programs narrowly targeted to the people and communities most in need. Meanwhile, neither of these approaches has at its core a focus on expanding what Michael Porter and Mark Kramer call “the total pool of economic and social value,” which in this case is the overall regional “pie” of better-paying industries providing better-paying jobs that span the skills spectrum.<sup>3</sup>

So, what is behind this disconnect? And how, then, can it be bridged?

As these pages argue, it is not the theory itself that is the problem: Everyone wants a strong regional economy. Rather, the problem is an economic development model that, positive statistics notwithstanding, has not focused on advancing the sectors that could broaden Baltimore's economic prosperity, and on helping to increase workers' ability to access them. Summarizing the work of several economists, this report discusses the impact this has had on the type and quality of job growth and how that informs where the metro area, and the nation, should go from here. Ultimately, if Greater Baltimore and its peers truly want to increase economic opportunity, they must embrace a different framework for the "next economy," one based not on greater domestic consumption—of real estate, retail, government, and health care, for example—but rather on *exporting* goods, services, and ideas to consumers both outside the region and abroad; on developing and sharing innovations in how things are made and people are served; and on creating and implementing low-carbon technologies and practices that will improve and sustain environmental health and security for future generations (while creating good jobs in the process). And Greater Baltimore must ensure that it has a coordinated, cutting-edge education and workforce delivery system that can produce the labor force this growth will require.

Greater Baltimore has a powerful set of assets and advantages that should allow it to grow and excel in such an economy, including a robust network of colleges and universities, several world-class hospital systems, a close proximity to the nation's capital, and, importantly, the sophisticated firms, skilled talent, and formidable research capacity that have grown from and around these institutions. However, these assets have not been fully leveraged. Indeed, although these institutional anchors have helped to ensure economic stability in the metro area, they have also weighed it down, making it too comfortable and too complacent to vigorously appraise the strengths and sectors that drive real economic growth and develop a regional

vision and strategy to more aggressively exploit it. The metro area thus plods along, content with the "good-enough-for-most" economy it has rather than the globally connected, and ultimately more inclusive, economy it should have.

## **It is time to shake things up**

This report presents a different way of thinking about opportunity and how efforts to increase it should be moved from the margins into the mainstream of regional economic planning and development. It begins by describing how, despite Greater Baltimore's overall good health, low incomes and limited mobility remain a steep challenge in the region. It then examines the extent to which this is a function of how the region's economy—like that of the nation—had been growing prior to the Great Recession of 2007-2009. From here it examines the metro area's next-economy assets, specifically focusing on the industries and sectors—manufacturing, information technology, bioscience, the "clean" economy, and transportation and logistics—that offer the most promise for more and better quality employment opportunities in the years to come. It then looks at the major challenges to keeping and creating jobs in these industries as well as the information, skills, and spatial barriers that can keep individuals from attaining these jobs. Finally, the report urges metro area leaders to develop and embrace a new regional vision for a more opportunity-rich Greater Baltimore, and it suggests some of the key strategies they must employ—concertedly and collectively—to help realize it. ■







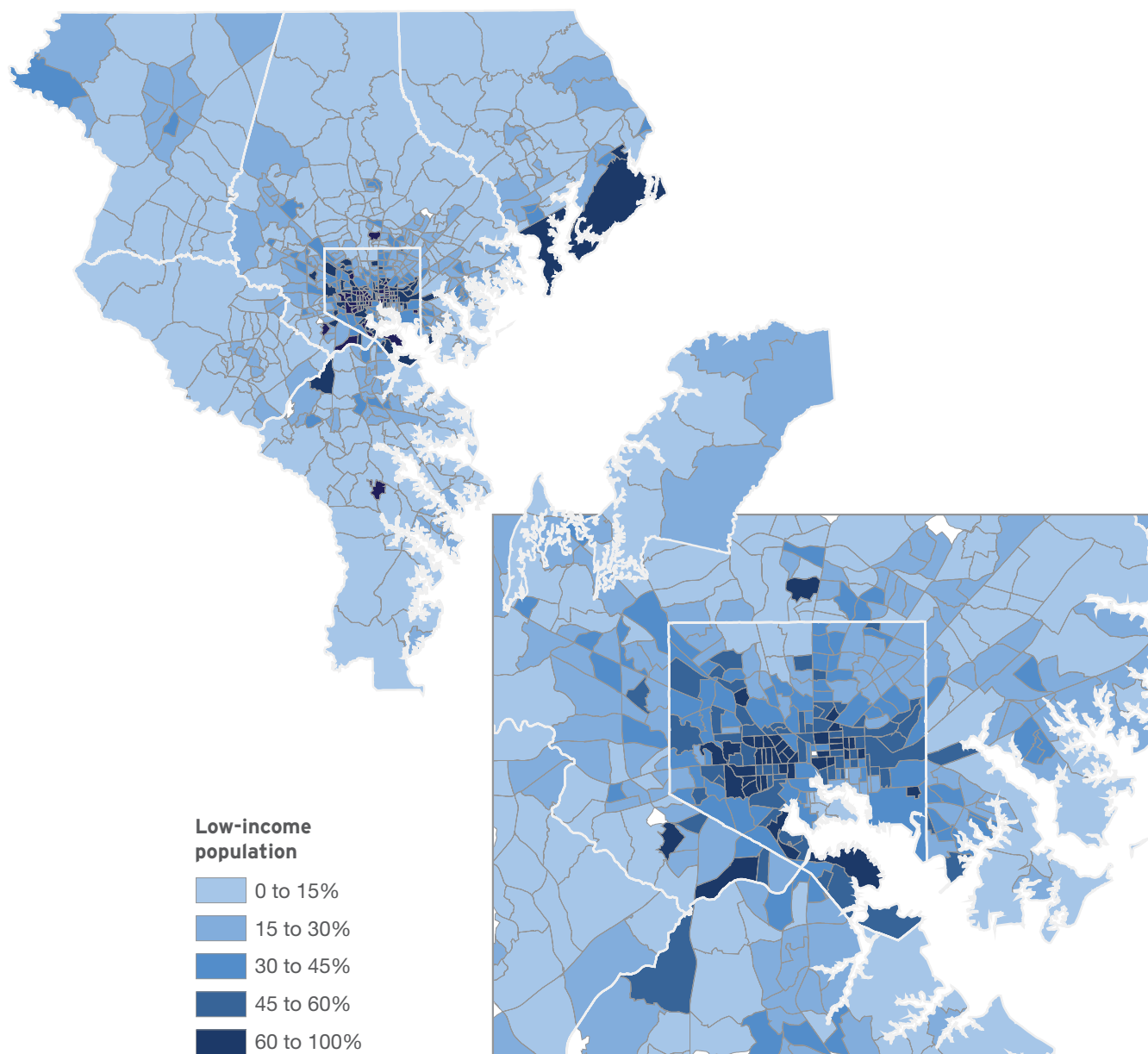
## II. Greater Baltimore's Opportunity Challenge

As the Economic Alliance presentation emphasized, the Baltimore metro area does indeed perform well on many broad indicators of overall economic strength. In 2010 the median household income for the region was \$64,812, compared with \$50,046 for the entire United States, and over the 10 years prior, real incomes rose in the region—albeit slowly—even while U.S. incomes shrunk by more than 7 percent.<sup>4</sup> Employment figures in the region grew 1.7 percent from 2000 to 2010 while declining nationwide, and at 6.8 percent, the unemployment rate of the Baltimore metro area in December 2011 was lower than most of its metropolitan peers.<sup>5</sup>

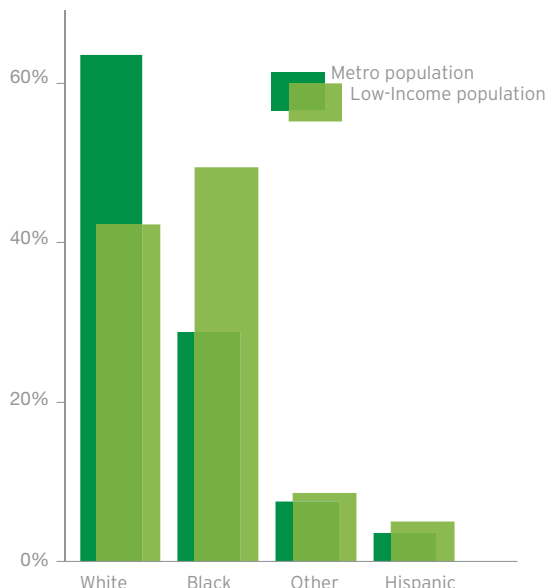


But, as legitimately rosy as these numbers are, they do not provide a complete picture of the metro area, obscuring—as averages by definition do—the wide chasm between rich and poor and the steep opportunity challenges facing the over 594,000 low-income residents struggling to reach and remain somewhere in the middle.<sup>6</sup> These numbers also tell us nothing about the types of jobs being created, the resultant structure of occupations and wages, and what these trends might mean for the region's true long-term economic success.

GREATER BALTIMORE'S LOW-INCOME RESIDENTS ARE HEAVILY CONCENTRATED IN THE CITY, BUT LIVE IN COMMUNITIES THROUGHOUT THE REGIONS.



## NEARLY HALF OF THE METRO'S LOW-INCOME POPULATION IS AFRICAN-AMERICAN



## A WIDE OPPORTUNITY GAP

Although official metropolitan poverty statistics are an instructive measure of an area's poor population, they provide only a conservative estimate of the true scope and scale of its opportunity gap. In fact, although slightly more than 10 percent of the residents of Greater Baltimore are living in poverty, a far larger 23 percent of the region's residents are low income, meaning that they are part of a family with a total income that is less than 200 percent of the federal poverty line, or less than \$46,630 for a family of four.<sup>7</sup> And their numbers have been growing. Although the total metro area population increased just 6.2 percent over the period 2000 to 2010, the total number of low-income residents rose by 7.6 percent.<sup>8</sup>

Having a low annual income is just one of things that sets low-income metro area residents apart from many of their wealthier counterparts. In the

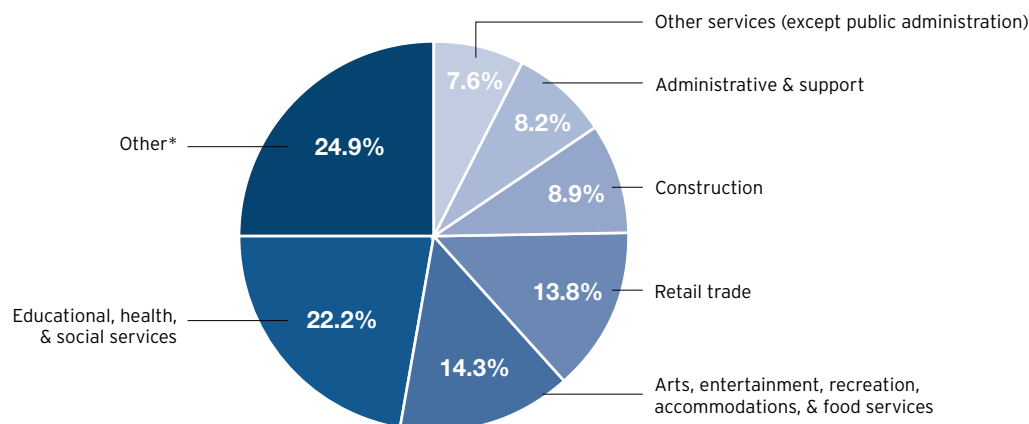
first place, they are more densely clustered in city and inner suburban neighborhoods, although not exclusively so.<sup>9</sup> They are most heavily concentrated in the now-famed areas of East and West Baltimore, but many live in the southern and northwestern parts of the city, Towson, Edgewood, and Catonsville, among other areas. (See map.) The region's low-income residents are also disproportionately black—nearly one-half, in fact, despite the fact that blacks make up only 29 percent of the metro area population—and 45.5 percent of low-income households are headed by single parents, compared with 23 percent of all metro area households. Perhaps not surprisingly, low-income Baltimoreans are also much more likely to be unemployed: nearly 24 percent, compared with 8 percent of all metro area residents in 2009 (the latest year for which data on employment status for low-income residents are available).<sup>10</sup>

Although being chronically out of work is one explanation for why some Baltimoreans have low incomes, it is only part of the problem. In fact, nearly 97 percent of low-income people in the metro area worked at some point during the last five years of the 2000s, a statistic that begs the region's big opportunity question:<sup>11</sup> If so many of Greater Baltimore's low-income residents have or have recently had a job, why aren't they getting further ahead?

The answer, of course, is complicated. Some portion of the metro area's low-income workers, for instance, recurrently move in and out of work as a result of myriad factors that might include job loss associated with the economic downturn, substance abuse or other health problems, child care or transportation challenges, or a shaky work ethic, among others. Some individuals may work only part-time or only part of the year, and not always by choice. And still others might have steady, full-time work that pays well enough to be a middle income single person but, because income status is based in part on the number of family members, not well enough to be a middle income single parent of two.

---

**FROM 2005 TO 2009, OVER 97% OF LOW-INCOME RESIDENTS WERE EMPLOYED FOR SOME PERIOD, LARGELY IN JUST A HANDFUL OF INDUSTRIES.**



*\*No one industry has more than 5 percent share of total employment.*

---

But the fact remains that many low-income Baltimoreans simply do not earn very much. This is partly because of the obvious truth that certain jobs pay low wages, and those with low incomes are concentrated in those jobs. As the pie chart above illustrates, about three-fourths of the region's working poor are employed in just a handful of industries. For example, over 22 percent of low-income workers are employed in health care, social, or educational services; more than 14 percent work in arts, entertainment, recreation, accommodations, and food services; and another 14 percent work in retail.<sup>12</sup>

These industries do not pay uniformly low wages, but they are big regional employers that provide large numbers of low-wage jobs. In 2009, for example, about 133,500 Baltimoreans—approximately 10 percent of the total metro area workforce—were employed in retail, where more than 76 percent of jobs are in low-wage occupations. Similarly, nearly 95,450 metro area residents (7.3 percent) were working in accommodation and food services, where more than 93 percent of jobs are low wage. And although average wages in health care and social assistance (\$49,460) are higher than those in retail (\$30,040) or accommodation

and food services (\$20,840), 47 percent of the nearly 181,650 workers in the field are employed in low-paying jobs.<sup>13</sup>

However, it is not just low wages that explain why there are so many low-income residents, but an economic structure that has been producing too few better-paying jobs—jobs that, as this report discusses later, too few low-income workers are able to access.

## **A FAULTY OPPORTUNITY STRUCTURE**

Long before the Great Recession swept the globe, something went amiss with the U.S. jobs engine. For one thing, the national economy simply had not been generating many jobs. As documented in a January 2011 *National Journal* article, between the 2001 recession and the financial collapse in 2008, the United States experienced strong growth in gross national product, skyrocketing corporate profits, and a low unemployment rate, but job creation rates were slower than at any time since World War II.<sup>14</sup> From 2000 to 2007, job growth in the United States was just 3.8 percent, following nearly 19 percent growth during each



**IN THE DECADES LEADING UP TO THE GREAT RECESSION, GREATER BALTIMORE'S JOB GROWTH TRENDS FAVORED LOW-WAGE INDUSTRIES.**

	<b>Job Change, 1980-2007</b>	<b>Real Average Wage, 2007</b>	<b>Total Share of Jobs, 1980</b>	<b>Total Share of Jobs, 2007</b>
High-wage industries	+9.6%	\$80,477	34.8%	28.5%
Mid-wage industries	+35.9%	\$50,881	39.3%	40.1%
Low-wage industries	+62.5%	\$28,308	25.9%	31.4%

of the previous two decades. Job creation then plummeted during the Great Recession, with the 4.7 percent rate of job loss from 2007 to 2009 wiping out every new job created since the new century began, and then some.<sup>15</sup>

And so it went in Greater Baltimore. Indeed, though the region saw somewhat stronger job growth than the United States as a whole in the seven years leading up to the recession (5.0 percent) and experienced less job loss during this time, its own jobs engine has been sputtering. The 7.7 percent job growth rate that occurred in the metro area during the 1990s was far lower than the national average, and was a steep drop from the 18.5 percent growth rate the region witnessed during the 1980s.<sup>16</sup>

Perhaps even more significant than the slow pace of job creation over the past few decades is the type of jobs that were being created. An examination of long-term job growth by industry reveals the lopsided growth in lower-paying jobs. During the 27-year period prior to the Great Recession, industries that provided the lowest-paying one-third of jobs in Greater Baltimore grew 62.5 percent, a rate that closely mirrored that of the nation as a whole. The number of jobs in the middle-paying one-third of industries, however, rose by less than 37 percent, compared with 46 percent nationally, and growth in the highest-paying one-third of industries—such as utilities, management of companies, and professional, scientific, and technical services, among others—was just 9.6 percent in the metro area, while the United

States saw an increase of nearly three times that rate.<sup>17</sup> By 2007, the proportion of jobs that were in what by then the metro area's highest-paid industries was 28.5 percent, down from 34.8 in 1980, and the share of jobs in the middle remained virtually flat, at around 40 percent. Meanwhile, jobs in the bottom one-third increased during the period, from 25.9 percent to 31.4 percent.<sup>18</sup>

Although these comparative 2007 shares themselves may not look very bad—more than 68 percent of jobs in the region still paid a middle or a high wage—the trajectory does not look so good. This is even more apparent when one examines changes in certain industries together with the corresponding wage trends for these jobs.

To be sure, the growth rates in some still-low-wage industries have been trending in a positive manner. For example, the explosive 207 percent growth in nursing and residential care facility jobs that occurred in Greater Baltimore from 1980 to 2007 (from 10,670 to 32,750 jobs) was accompanied by a real average wage growth of 96 percent. Similarly, jobs in the administrative and support service industry jumped from just over 30,100 to more than 76,500, while wages increased by 94.5 percent.<sup>19</sup>

However, pay in other large, fast-growing low-wage job sectors followed a very different pattern. By 2007, the number of jobs in food service and drinking establishments, for instance, had grown by more than 85 percent, to nearly 87,600. However, real average wages had declined by almost 26

percent. At the same time, the number of social assistance jobs increased 242 percent, to almost 25,000, while wages in that industry dropped by 13 percent. Meanwhile, the number of jobs in some of the highest-paying industries with the largest wage gains declined. From 1980 to 2007, real wages in nine high-paying manufacturing subsectors grew anywhere from 16 to 301 percent, while every one of those nine experienced steep job losses.<sup>20</sup>

With the economy for years churning out a higher proportion of jobs in low-wage industries—some of which have seen their real wages slip—it is no wonder that nearly one-quarter of Greater Baltimore’s population has been finding it difficult to make a decent income. But what has been driving these trends? And how do we reverse them?

## A NEW ECONOMIC ORDER

The persistent current economic crisis has shone a bright, near-blinding light on America’s “jobs problem,” and there is no shortage of research on what has gone wrong. A recent paper by economists Michael Spence and Sandil Hlathshwayo both summarizes the nature of challenge and offers some explanation for how we got here. From 1990 to 2008, they note, the United States’ strong growth in non-tradable employment—that is, jobs in industries like government, health care, retail, construction, and hotels and food services, which more or less must be carried out or sold locally—was accompanied by weaker increases in output. Because workers earn less when they produce less, this in turn has contributed to generally slower wage and benefits growth in many of those types of jobs. Meanwhile, the opposite has occurred in many globally oriented tradable sectors like manufacturing and some business and financial services. Global competition has led to the outsourcing of low- and middle-skilled work in these sectors, driving domestic job numbers down and pushing productivity up—while allowing the (far fewer) high-skilled American workers remaining in those firms to secure high and growing wages as a result.<sup>21</sup>

As Jim Tankersley contends in his 2011 *National Journal* article, this is not how the shifting global economy should be working. According to him, this is how it should:

Mature economies with high living standards, such as the United States, ship some of their lower-skill jobs to developing countries, where wages are lower. The costs of outsourced goods and services go down, and the buying power of the developing countries goes up. American firms reap higher profits, which they invest in developing higher-value products that can’t be made elsewhere... American workers find jobs in the innovative industries that result.

Part of the reason this has not occurred, Tankersley points out, is that the pace of U.S. innovation—a key driver of productivity and ultimately of wage growth—has slowed over the past few decades.<sup>22</sup> Companies in the United States are not investing enough in stateside innovation and hence in the good jobs that this innovation should generate. In fact, American corporate spending on nonresidential plant equipment—for example, on factories and not shopping malls—has fallen to its lowest proportion of the economy in four decades. Instead, American firms are returning the wealth generated by globalization and technology to their shareholders and/or spending it on new projects—in other countries.<sup>23</sup> Meanwhile, investment by the United States in innovation is waning. Federal spending on research and development—critical to funding the kind of widely applicable basic research that private firms have little incentive to perform on their own—has declined from a high of 2.2 percent of gross domestic product (GDP) in 1964 to just 1 percent today.<sup>24</sup>

At the same time, the majority of U.S. firms have not positioned themselves to capitalize on the escalating purchasing power of other countries. With U.S. consumer spending down and the overall economy growing slowly, near-term growth opportunities for many American companies will most likely come from growing markets like those

in Asia and Latin America. As well, in the years to come, rapid urbanization and the rise of the global middle class will continue to generate an enormous base of global customers for U.S. businesses. Yet, according to the U.S. Department of Commerce, only 1 percent of American firms sell a product or service outside of the United States, and as yet too few states and metro areas have put adequate policies and resources in place for them to take advantage of the trade economy.<sup>25</sup>

Finally, many economists argue that the American workforce has been losing some of its competitive edge, with many workers lacking the skills and education needed to successfully compete in this new world order. According to recent analysis by Anthony Carnavale and Stephen J. Rose, the United States has been underproducing workers with a post-secondary education—that is, those with at least some college experience—for decades.<sup>26</sup> As globalization and technology drive down job creation in middle-skill, middle-wage jobs, the workers who once held these jobs, who lack the skills and education to move up the jobs ladder, are thus pushed into the burgeoning number of lower-skill, lower-paid occupations. As Jacob Funk Kirkegaard, a fellow at the Peter G. Peterson Institution for International Economics, says: “It is the best educated and those with the highest skills that derive the most benefits from a globalizing economy.”<sup>27</sup>

The U.S. economy, of course, is largely driven by its 366 metropolitan parts. As a group, these areas contain 85 percent of jobs and generate 88 percent of GDP.<sup>28</sup> It follows that Greater Baltimore’s job and wage numbers over the past few decades strongly reflect the patterns Spence, Tankersley, and their colleagues describe: Employment in the metro area’s non-tradable sectors has been rising just as the number of jobs in some key high-value tradable sectors—especially “middle-skill” sectors like manufacturing—have been falling. Meanwhile, the strong-wage, innovative sectors that are growing in the region—such as scientific research and development services and some information sec-

tors—still make up a relatively small share of the metro area’s economy, and barriers to entry for low-skilled workers are comparatively high.

So what, then, is a nation—and metro areas like Baltimore—to do? If the economists have it right, realizing a more productive, inclusive economic future “does not lie [solely] in further expanding employment in healthcare, government, restaurants, and real estate,” given that this approach has clearly not worked very well.<sup>29</sup> Rather, it demands that we reorient the tradable, innovative sectors of the economy to not only create greater numbers of jobs but also produce higher-quality jobs accessible by a far wider cadre of citizens. Creating a stronger, more prosperous next economy, in other words, will demand that we take advantage of growing demand, talent, and investment from other countries by increasing and supporting export-oriented firms and other kinds of global engagement. It will demand that we continually innovate in the products and processes that improve how we live and work, including in the low-carbon technologies that will advance global health and environmental sustainability, strengthen our resource security, and boost U.S. leadership in the clean-energy revolution. And it will compel us to provide better ways for workers to obtain the skills and education necessary to produce, deploy, and ultimately share the rewards of what we invent. ■





### III. Greater Baltimore's Next Economy

**W**hen people think about the Baltimore metro area, three significant things likely come to mind: its waterfront, its “eds and meds,” and its proximity to Washington, DC. This is all for good reason, as each has been a draw for out-of-town visitors and a major driver of the region’s growth and development. Together they have helped to attract and create a tremendous asset-base—a strong industrial heritage; an outsized research capacity, particularly in the biosciences; a large number of well-educated workers; and sophisticated, technologically savvy companies—that are essential to growing the metro area’s export base, developing the innovations that will drive productivity and wage growth, and helping to create a cleaner, more sustainable region, nation, and world. Yet, as vital as Baltimore’s assets are to its overall economic health, they haven’t been fully exploited so as to spur and sustain the level of next-economy growth needed to create a more inclusive opportunity structure.





## GREATER BALTIMORE'S NEXT ECONOMY TODAY

Consider the region's export economy. In 2010, the Baltimore metro area produced \$9.7 billion in total international exports, a dollar amount that directly supported approximately 40,000 employees in the region. These are significant numbers, and they placed the region among the top one-third of the largest 100 metro areas nationwide on both measures. But, exports make up a comparatively small slice of the metro area's overall economy. The export share of the metro area's total gross metropolitan product (GMP) is in fact a fairly paltry 6.7 percent, ranking Baltimore 89<sup>th</sup> among its peers. Meanwhile, an annual growth in exports from 2003 to 2008 of 6.5 percent was 1.5 percentage points below the average growth rate for the top 100 metro areas, and Baltimore's growth from 2009 to 2010 of 9.9 percent, although certainly a positive uptick, was still comparatively modest.

Greater Baltimore's innovation story is also complicated. On many typical indicators of scientific discovery and technological advancement, the region clearly excels. It ranks sixth among the nation's 100 largest metro areas on basis of its share of workers in science, technology, engineering, and mathematics (STEM) jobs, for example. And Maryland is third among states in terms of the total amount of university research and development expenditure in science and engineering fields, a rank driven in large part by the fact that Johns Hopkins University consistently tops the list of educational institutions in the United States for this indicator.<sup>30</sup>

However, the metro area is far weaker when it comes to translating its significant amount of life sciences and other research into new products and services, and the creation of new businesses is slow. The region ranks just 51<sup>st</sup> in terms of the number of patents granted per 1,000 workers, for instance, and, according to the Kauffman Index of Entrepreneurial Activity, the overall rate of new firm creation in Maryland over the past 15 years

has been middling when compared with that in other states.<sup>31</sup>

Greater Baltimore's "clean" or low-carbon economy, finally, is solid yet sluggish. Although it is relatively large on the basis of sheer size—with nearly 23,000 jobs in this sector, Baltimore ranks 22<sup>nd</sup> among the top 100 metro areas by this metric—this industry makes up a fairly small share (1.7 percent, ranking it 51<sup>st</sup> nationwide) of the overall metro economy. Furthermore, the region added only 3,700 clean economy jobs between 2003 and 2010, which represents an average of 2.6 percent annual growth, putting it 76<sup>th</sup> among its peers.<sup>32</sup>

Given what we know about the relationship between employment, wages, and the structure of economic growth, Baltimore's performance in these three pillars of the next economy does not bode particularly well for its future prosperity, however good it currently looks on many measures of general economic health. Therein lies the call to action: Getting serious about the growth of more and better quality jobs will demand that the region leverage its assets in ways that improve its capacity to produce exportable goods and services, help convert its scientific research into new companies and jobs, and stimulate greater demand for clean products and processes—and use its technology prowess to invent new and better ways of doing all of this. Getting serious about growing a more opportunity-rich Greater Baltimore, in other words, must include a focus on growing and sustaining the industries and sectors that offer the best promise for next-economy success.

## OPPORTUNITY IN THE NEXT ECONOMY

Many Baltimore companies and institutions are well positioned to succeed in the next economy, and they thus provide the foundation on which future economic development efforts can be built. For example, the region's computer and electronic products, chemical, and machinery manufacturers are largely responsible for the metro area's goods

# Getting serious about growing a more opportunity-rich Greater Baltimore must include a focus on growing and sustaining the industries and sectors that offer the best promise for next-economy success.

exports. Other types of manufacturing companies, including but not limited to food manufacturers such as McCormick and Phillips Seafood, metal fabricators such as Marlin Steel Wire, and motor vehicle parts firms such as SAVER, also sell their products abroad. The total volume of the region's service exports, moreover, is actually higher than that of the average metro area, driven in large part by clusters in research and development and computer services.<sup>33</sup> Many of these sectors are also among the most innovative. A look at where scientists and engineers are employed, along with analyses of other measures of innovative activity such as productivity growth and patenting, reveal that professional and scientific services—a catch-all term for research and development activities, architecture and engineering, computer system design, and some other areas of regional strength—and most major types of manufacturing are consistently among the economic sectors in which new products and processes are being invented and/or implemented.<sup>34</sup>

This is certainly not a fully inclusive list of firms and industries with next-economy attributes. Businesses of all types and sizes can and do tap global markets for their products and services. Furthermore, innovation is both broader and more ubiquitous than common indicators suggest, as both private firms and the public sector—ideally, at least—are constantly finding new ways to improve what they produce and how efficiently and, increasingly, cleanly they produce it. But, given Greater Baltimore's existing strengths and weaknesses, it seems evident that efforts to move the region more firmly into the next economy require a focus on the next-economy industries that are best poised to drive real economic growth:

- a healthy, globally connected manufacturing sector,
- a robust, market-oriented bioscience industry,
- an open, entrepreneurial information technology sector, and
- a large, diverse set of firms and jobs that convey a “green” benefit.

In addition, the metro area must continue to invest in a transportation and logistics system that can efficiently and effectively move goods and people both within and outside of the region.

These five industries are not mutually exclusive. In many ways they interact, intertwine, and in some cases overlap with one another. Expanding the metro area's biosciences sector should include growing the volume of pharmaceutical and medical device manufacturing, for instance, just as the development of a new software package could, say, help to track energy efficiency at the port. In fact, leveraging the connections among these industries—as well as between them and other vital economic sectors like health care, educational and financial services, government, and even hospitality—should be a key part of the region's next-economy strategy.

This leveraging is already happening, and for good reason. Together these five industries can help to



Many Baltimore companies and institutions are well positioned to succeed in the next economy, and they thus provide the foundation on which future economic development efforts can be built.

ease the way we do business, improve our health and vitality, preserve natural resources, and allow access to goods, services, and information more quickly than ever before. Beyond this, perhaps the best reason Baltimore should invest in efforts to grow and develop these industries is because, as an analysis of each bears out, doing so will help to build an economy that is characterized by greater numbers of good-paying jobs for workers without a four-year degree.

The following pages describe how. A précis of each of the five next-economy industries details the role that each plays in the metro area's economy today, the potential for each industry to grow and develop, and the extent to which such growth could provide better jobs for more Baltimoreans. Together this information tells us that when it comes to wages and education requirements, each industry can be considered "opportunity rich" when compared against the whole of industries in the region.

## GREATER BALTIMORE'S NEXT ECONOMY POTENTIAL LIES IN SEVERAL KEY SECTORS

	Jobs	Share of Metro Jobs*	Average Annual Wage
Manufacturing	63,600	4.9%	\$68,920
Information Technology	50,410	3.9%	\$85,810
Bioscience	15,980	1.2%	\$80,460
Clean Economy	22,620	1.7%	\$44,570
Transportation and Logistics	29,220	2.2%	\$49,730

*\*Some overlap of jobs exists across the five sectors*

*Source: Moody's Analytics; Bureau of Labor Statistics Occupational Employment Statistics; Brookings/Battelle Clean Economy Database; Battelle Technology Partnerships Practice and BIO*

### HEALTH CARE AND THE NEXT ECONOMY?

The health care sector is a huge and important driver of Greater Baltimore's economy. From 2000 to 2009, it added more jobs—over 34,000—than any other sector, and in 2009 it was the second-largest employment sector in the region in terms of total employment (government was the first). This alone does not make the metro area unique, however. Health care was the largest jobs generator in 75 of the other largest 99 metro areas in the United States, and it was the second largest in most of the others. It was also the biggest employer in 14 metro areas and the second biggest in another 45. Jobs in this sector, vast in their overall numbers, span the occupational and pay spectrum and can thus provide good opportunities for low-income workers to advance along solid career pathways.

With nationally ranked hospitals such as Johns Hopkins, the University of Maryland, and Union Memorial, Baltimore is on the cutting edge of innovations in patient care and an “exporter” of health care services to individuals living both outside the region and outside the United States.<sup>35</sup> Despite this, the vast majority of health care in the metro area, similar to that found in other regions of the country, is local serving and thus unsustainable as the primary engine of economic growth. However, the region's exceptional health care industry is and should continue to be a “center of gravity” for growth in several key next-economy sectors in the region, including biosciences and information technology (IT), as well as industries like hospitality and tourism.<sup>36</sup> In fact, the use of new diagnostic methods, therapies, devices, and IT applications for managing health and health records are vital to making more efficient and cost effective the treatment and care of the injured, sick, and elderly, and thus to improving our nation's overall well-being in the decades to come. Given Greater Baltimore's existing prowess in these areas, this region can and should help to lead the nation in this transformation.



## MANUFACTURING<sup>37</sup>

Over the past couple of decades, Baltimore has reached a point where it no longer thinks of itself as a manufacturing town—or, at any rate, not a very successful one. This represents a major shift since the mid-20<sup>th</sup> century, before the docks and warehouses gave way to Harborplace, before the mills were converted into hip urban housing and restaurants, and before the deindustrialization of Dundalk and other communities so dramatically altered the ways of life of their residents.

And, yet, this change in perception is one that is not wholly based on reality.

To be sure, Baltimore—like many metro areas—is not the industrial powerhouse it once was. At various points a center for steel processing, automobile manufacturing, canning, aircraft and ship building, textiles and clothing, and other types of goods production, from 1980 to 2009 the region lost nearly 108,000 manufacturing jobs, and the sector's share of overall jobs dropped from 17 percent to less than 5 percent. Industrial employment dropped by more than one-third during the 2000s alone.<sup>38</sup>

But, as of 2009, more than 63,000 people still worked at one of the region's approximately 1,850 manufacturing firms—over 9,000 more than were employed in the finance and insurance fields and only about 3,000 fewer than the number working in information technology and biosciences combined.<sup>39</sup> These manufacturing workers are today part of a sector that is diverse and dominated by small and mid-sized firms. Although the metro area still boasts a number of large manufacturers such as Northrop Grumman, WL Gore, and RG Steel (formerly Severstal Sparrows Point), more than 93 percent of the region's manufacturing establishments have fewer than 100 employees.<sup>40</sup> Computer and electronic parts manufacturers—which include a high concentration of employees producing defense-related navigational, measuring, and control devices—together employ the

greatest number of workers and are followed by the food, chemical, fabricated metal, and machinery producers. Three-quarters of the metro area's manufacturing jobs are located in either Baltimore County (33.5 percent), Baltimore City (21.6 percent), or Anne Arundel County (20.6 percent).<sup>41</sup>

The smaller size of many of today's manufacturing firms is in large part due to the extent to which they create, drive, and use new technologies to improve efficiency. Although global competition has pushed labor-intensive, low-tech production activities from Baltimore—and from the nation as a whole—many of those firms that remain are highly productive, meaning that they produce more with fewer workers. In fact, manufacturing's share of the region's GMP in 2010 was 7.2 percent, about 2.3 percentage points higher than its share of employment. The opposite is true in most other industries. The health care industry employees nearly 14 percent of the region's workers, for example, yet it generates less than 9 percent of GMP. For retail, those shares are 10 percent and 5.7 percent, respectively.<sup>42</sup>

Although industrial jobs may be declining, those that remain have an outsized economic impact. The sector's comparatively high productivity translates into far greater sales revenue per worker than government, health care, retail, and other sectors, which in turn generates far more direct and indirect ripple-effect spending throughout the broader economy.<sup>43</sup> Indeed, a recent Milken Institute report found that for every job created in manufacturing, 2.5 jobs are created in other sectors; research has found the multiplier to be even greater for modern, high-tech factories.<sup>44</sup>





## OVERVIEW: MANUFACTURING

	Jobs (2009)	Change in Jobs (annualized 2000 to 2009)	Location Quotient (2009)
<b>TOTAL</b>	<b>63,597</b>	<b>-4.4%</b>	<b>0.56</b>
<b>Industry subsector</b>			
Computer and Electronic Product Manufacturing	11,387	-1.7%	1.05
Food Manufacturing	8,473	-1.2%	0.61
Chemical Manufacturing	6,966	-4.7%	0.91
Fabricated Metal Product Manufacturing	4,951	-4.4%	0.39
Printing and Related Support Activities	4,265	-7.7%	0.85
Transportation Equipment Manufacturing	4,206	-3.5%	0.32
Machinery Manufacturing	3,798	-5.9%	0.39
Primary Metal Manufacturing	2,958	-7.1%	0.85
Plastics and Rubber Products Manufacturing	2,448	-5.7%	0.41
Miscellaneous Manufacturing	2,249	-2.5%	0.40
Paper Manufacturing	2,040	-7.6%	0.53
Nonmetallic Mineral Product Manufacturing	2,013	-6.1%	0.54
Beverage and Tobacco Product Manufacturing	1,943	-4.8%	1.08
Electrical Equipment, Appliance, and Component Manufacturing	1,160	-1.0%	0.33
Furniture and Related Product Manufacturing	1,102	-7.0%	0.30
Apparel Manufacturing	1,074	-5.1%	0.67
Wood Product Manufacturing	1,051	-6.9%	0.30
Textile Product Mills	483	-8.1%	0.40
Petroleum and Coal Products Manufacturing	464	-2.4%	0.42
Textile Mills	397	-8.8%	0.33
Leather and Allied Product Manufacturing	170	-4.8%	0.60

Source: Moody's Analytics

## EXAMPLE OCCUPATIONS: MANUFACTURING

Occupation	Number of Jobs (2009)	Share of all Occupations in Industry (2009)	Median Wage (2009)	Share of Workers with Less than a BA
First-line supervisors/managers of production and operating workers	2,321	3.7%	\$55,870	85.0%
Machinists	1,588	2.5%	\$46,760	96.3%
Inspectors, testers, sorters, samplers, and weighers	1,564	2.5%	\$39,070	86.5%
Welders, cutters, solderers, and brazers	1,224	1.9%	\$37,970	97.7%
Maintenance and repair workers, general	1,170	1.8%	\$37,840	93.3%
Industrial machinery mechanics	858	1.3%	\$47,050	93.7%

Source: Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data



### OPPORTUNITY STRUCTURE

A strong manufacturing sector isn't just important to the metro area's ability to create more jobs. The fact that manufacturing firms are engines of innovation and productivity is key to why the sector is such a major producer of good paying jobs—and hence a prime reason why supporting the sector is vital to Baltimore's and the nation's economic health. The retirement of aging employees alone will provide thousands of job openings in the years to come, demanding new workers who have the skills needed to successfully fill them.<sup>45</sup>

In 2009, Baltimore manufacturers paid an average annual wage of \$68,920—over \$16,000 more than the regional average wage for all industries. Within this sector, the high-tech producers pay the best. Computer and electronic products and chemical manufacturers—two of the largest of the metro area's manufacturing subsectors—provide the highest (and rising) average wages. Low-tech apparel producers and textile mills pay the least, and wages in those firms have been falling over the past few decades.<sup>46</sup>

As an added bonus, although good-paying manufacturing paying jobs generally require specialized skills, they are by no means limited to the most educated individuals. Forty-five percent of Baltimore's manufacturing workers do not have a bachelor's degree yet work in occupations where the median wage is at least 80 percent of the area median; 40 percent of these middle-wage manufacturing employees have only some college (i.e., not yet a two-year degree) or less. Approximately 85 percent of the metro area's 2,300 first-line supervisors and production managers have earned less than a bachelor's degree, for example, but are making a median wage of \$55,870 a year, and the 1,600 machinists working in this sector make a median wage of almost \$46,800, even though fewer than 4 percent have a four-year degree.<sup>47</sup> These wages do not include the substantial benefits typically paid to manufacturing workers. In Maryland, this amounted to about 21 percent of wages, or about \$1.6 billion, in 2006.<sup>48</sup>



## POTENTIAL FOR GROWTH

Given all of this, it is clear that efforts to create more and better jobs in the Baltimore region must include a more intense focus on strengthening and sustaining its manufacturing sector. Declining job rates notwithstanding, the sector still holds promise and potential, for several reasons.

First, the manufacturing sector has significant room to grow in its capacity to export, which could open opportunities for firm growth and expansion. With rapid urbanization, population and economic growth, and burgeoning numbers of middle-class citizens, the world's large emerging economies—led by China, India, and Brazil—will dominate global consumption increases in the decades to come.<sup>49</sup> Yet, in 2010, manufactured goods represented just over 53 percent of the metro area's total export volume, compared with nearly 67 percent nationally (service exports made up the balance).<sup>50</sup> For manufacturers in Baltimore to remain competitive, they must overcome their reticence to export—as found in a recent survey of local firms—and find new global markets.<sup>51</sup>

Second, Baltimore possesses key assets that keep existing manufacturers here and—if supported—could help to strengthen the sector. The metro area sits in the middle of a robust supply chain that extends across the dense mid-Atlantic region, and its proximity to Washington has been a key driver of the defense-related manufacturing activities that, although declining, still support a solid share of the sector's employment. The region has strong transportation and logistics networks of roads, railways, and warehouses, as well as Baltimore-Washington International Marshall Airport (BWI) and the port, and all of these are vital to moving materials, supplies, and finished products into and back out of the region. There exists a strong “industrial commons” that includes heavy-machine shops, rubber fabricators, and other specialized companies that many manufacturers need

for their operations. Finally, it has access to a large labor market of engineers and IT workers who are increasingly critical to ensuring that firms remain on the forefront of innovation.<sup>52</sup>

Finally, the region has a number of state and regional organizations that already support the sector and could be better aligned to respond to the needs of small and middle-sized companies. The Baltimore U.S. Export Assistance Center (the creator of the nationally implemented ExporTech program), the state's Office of International Investment and Trade, Towson Global, and the World Trade Center Institute are among the organizations that provide various types of export assistance to state and regional manufacturers. The Maryland Technology Enterprise Institute (MTech) at the University of Maryland houses the state's Manufacturing Assistance Program, which provides technical assistance to Maryland firms, as well as several other programs that are focused on product and business development. Other organizations such as the Regional Manufacturing Institute, the Baltimore Industrial Group, and the Manufacturer's Alliance of Maryland provide support for the sector through events, networking, advocacy, and other activities.

The necessary assets and resources are there. The issue at hand is how they can be leveraged to improve manufacturing's competitiveness in the region.

## INFORMATION TECHNOLOGY<sup>53</sup>

With a bigger base and a higher concentration of IT workers than either the San Francisco/San Jose or Boston/Worcester areas, the Baltimore-Washington corridor is one of the strongest IT markets in the country.<sup>54</sup> Furthermore, it is an industry that is poised for even greater growth.

Although in Baltimore there exist dedicated IT-related firms, such as computer and electronic parts manufacturers and computer service companies, IT—and thus those working in IT fields—can be found across nearly all sectors of the economy. In the Baltimore metro area alone there were approximately 50,410 workers employed in IT occupations in 2010, almost 17,000 more than in 2000. The region added nearly 6,500 software engineers, for example, and nearly 3,000 computer support specialists. These IT-related jobs together account for just under 4 percent of all employment in the region.<sup>55</sup>

As discussed in a 2008 Economic Alliance report on IT, the IT market in Baltimore comprises two primary ecosystems.<sup>56</sup> The federal government market is driven by the huge base of federal agencies in the Baltimore-Washington area, which include Fort Meade, Aberdeen Proving Ground, the National Security Agency, the Social Security Administration, and several others located within the Baltimore metro area. These agencies are a substantial consumer of IT contracting services provided by large firms such as Northrop Grumman, Lockheed Martin, General Dynamics, and AAI, along with many smaller subcontracting firms. Meanwhile, the area projects to add thousands of new IT jobs over the next several years as a result of Defense Base Realignment and Closure Commission (BRAC) moves. This growth, combined with rising concerns over information security, has compelled the state of Maryland to put up new resources—all part of the new CyberMaryland initiative—aimed at making Maryland the nation’s “epicenter” for cybersecurity.<sup>57</sup>

The second ecosystem, the “business-to-business” (B2B) IT sector, comprises innovative firms serving the private sector, including those focused on software and other product development or providing in-house or outsourced IT services. Unlike the more established government ecosystem, the B2B market is an emerging strength for the region. A small cluster of gaming and simulation companies such as Breakaway, Big Huge Games, and Firaxis Games has grown up in northern Baltimore County, for example, and several new ventures like Well Doc, Salar, and Vigilant Medical are on the cutting edge of health service delivery, inpatient documentation, and medical image sharing, respectively. The region is reaching something of a critical mass of individuals and companies developing open-source software and application platforms, including Millennial Media, LocalUp, Zenoss, and Bizelo to name just a few. And with protection of information a growing concern across all types of industries, cybersecurity is quickly moving beyond the government ecosystem to become a major area for commercial growth.



## OVERVIEW: INFORMATION TECHNOLOGY

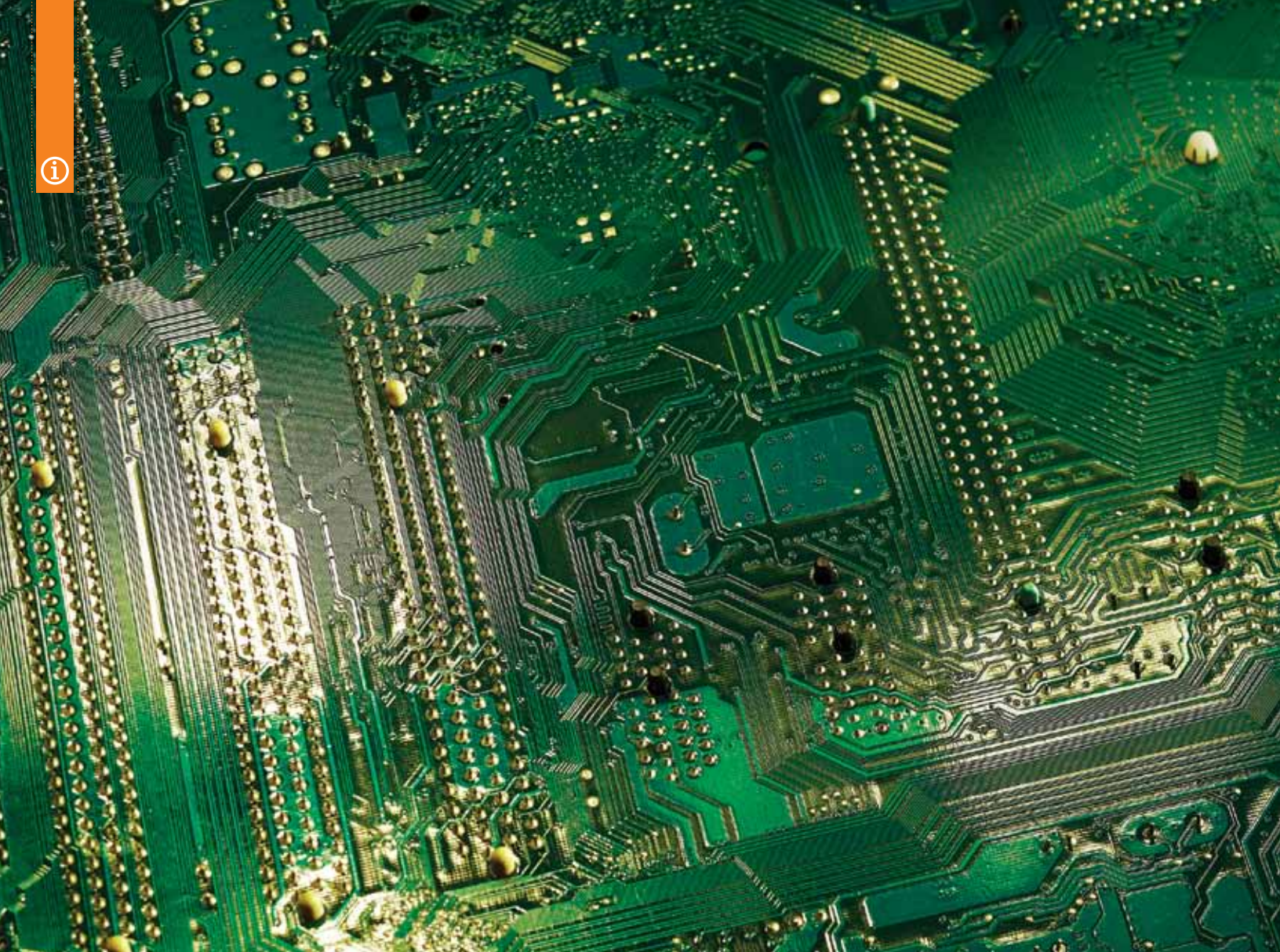
	<b>Jobs (2009)</b>	<b>Change in Jobs (annualized 2000 to 2009)</b>	<b>Location Quotient (2009)</b>
<b>TOTAL</b>	<b>50,410</b>	<b>4.2%</b>	<b>1.42</b>
<b>Occupation</b>			
Computer support specialists	7,050	5.5%	1.27
Computer software engineers, systems software	5,880	7.9%	1.62
All other computer specialists	5,750	*	3.29
Computer systems analysts	5,280	-2.1%	1.11
Computer software engineers, applications	5,190	10.8%	1.09
Network and computer systems administrators	4,550	7.1%	1.43
Computer and information systems managers	3,800	1.0%	1.38
Network systems and data communications analysts	3,670	9.0%	1.58
Computer programmers	3,220	-4.8%	1.01
Database administrators	1,690	4.3%	1.70
Operations research analysts	1,240	7.5%	2.09
Computer operators	1,030	-8.3%	1.31
Computer hardware engineers	950	5.2%	1.48
Computer and information scientists, research	520	2.4%	2.18
Statisticians	270	0.0%	1.24
Actuaries	230	5.9%	1.31
Mathematicians	90	2.5%	3.32

Source: Bureau of Labor Statistics Occupational Employment Statistics

## EXAMPLE OCCUPATIONS: INFORMATION TECHNOLOGY

<b>Occupation</b>	<b>Number of Jobs (2009)</b>	<b>Share of all Occupations in Industry (2009)</b>	<b>Median Wage (2009)</b>	<b>Share of Workers with Less than a BA</b>
Computer Support Specialists	7,050	14.0%	\$50,200	58.9%
Computer Occupations All Other	5,750	11.4%	\$94,970	34.5%
Network and Computer Systems Administrators	4,550	9.0%	\$78,440	49.8%
Computer and Information Systems Managers	3,800	7.5%	\$113,270	30.0%
Computer Programmers	3,220	6.4%	\$73,240	30.0%
Computer Operators	1,030	2.0%	\$41,450	74.7%

Source: Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics



### **OPPORTUNITY STRUCTURE**

Across the board, IT occupations pay good wages. The annual median wage for IT workers on the whole is \$82,457, and of the 17 IT occupations examined here, only computer operators have a median wage that is below the metrowide median of \$43,240—and then just barely.<sup>58</sup>

Educational attainment levels are generally higher for IT compared with the region's other next-economy industries, which no doubt explains the higher pay. More than 80 percent of the region's 11,000 software engineers—who earn a median wage between \$89,000 and \$95,000 per year—have at least a four-year degree, for example, as do about 70 percent of systems managers (who have a median wage of \$113,000 per year).<sup>59</sup>

Still, 36 percent of all IT workers—about 18,000—have earned less than a bachelor's degree, and one-quarter have experienced only some college or less. For example, almost 60 percent of the 7,050 computer support specialists (annual median wage, \$50,200) and about one-half of the 4,550 network and systems administrators (median wage, \$78,400) do not have a four-year degree. Although these jobs clearly require a particular skill set, that knowledge can often be acquired through certificate or other technical training programs as well as formal and informal on-the-job training.<sup>60</sup> With approximately 37,000 IT jobs projected to become available in Maryland between 2008 and 2018, opportunities for middle-skill workers will thus abound.<sup>61</sup>



## POTENTIAL FOR GROWTH

The Baltimore region, already a dominant player in the government IT sector, possesses a powerful set of assets and resources that, if leveraged in the right ways, could help push the region into the top-tier of commercial markets. In the first place, the region has a strong set of “basics” that undergird the sector. The Baltimore-Washington corridor is home to a large concentration of IT workers, and the state’s colleges, universities, and training centers confer about 3,560 new degrees or certificates in computer and information sciences each year.<sup>62</sup> Its mid-Atlantic location provides a huge, accessible base of potential clients and investors. And its thick IT job market and overall quality of life make it an attractive place for young workers and entrepreneurs. That the IT community is burgeoning is apparent in the growing number of initiatives and events, from Ignite Baltimore to Tech Crawls, aimed at drawing technologists, investors, and others together in new and innovative ways.

Moreover, numerous organizations and resources help to support entrepreneurship and IT business growth in the region. The state’s 25 business incubators—most of which have a technology focus—have provided hundreds of companies with the space, resources, connections, and technical assistance they need to get off the ground. Baltimore City’s Emerging Technology Centers (ETC) alone has 85 companies in its current portfolio.<sup>63</sup> The Greater Baltimore Technology Council (based in Baltimore) and the Chesapeake Regional Tech Council (based in Annapolis) serve as hubs for the sector and offer a range of resources aimed at helping to grow and build technology businesses in the greater region. And although access to capital is a frequently cited concern among IT firms, the Baltimore-Washington region ranks among the top 10 U.S. regions on the basis of venture capital dollars invested and the number of deals, with entrepreneur.com ranking Maryland TEDCO as the number one source in the nation for investment in early-stage companies.<sup>64</sup>

Finally, the region’s broadband infrastructure will soon be state-of-the-art. The intergovernmental One Maryland Inter County Broadband Network (ICBN) is using \$115 million granted under the American Recovery and Reinvestment Act’s (ARRA) Broadband Technology Opportunities Program to build a high-speed fiber-optic network that will directly connect 715 anchor institutions in central Maryland, including hundreds of K-12 public schools, libraries, public safety agencies, community colleges, and other government institutions. The ICBN will also make nearly 800 miles of fiber optic cable available for low-cost lease by commercial entities, at once improving quality and reducing costs for businesses.<sup>65</sup>

With mounting concerns about the contraction of federal defense budgets and hence federal contracting opportunities, members of the IT community are focusing more intently on how to best align this rich set of IT assets to exploit new opportunities for B2B IT growth in the region. The growing market for open-source and mobile technologies offers a wide field for new start-ups and for early- and middle-stage companies looking to take their businesses to the next level. The region’s potential to grow commercially oriented cyber-security firms, meanwhile, looms large. Finally, a unique opportunity exists in the metro area to cross-fertilize IT with other regionally represented industries, particularly health care and the life sciences. As health care nationally continues to strive toward wellness and individualized health management, improved diagnostics, and advanced systems for maintaining and utilizing health information, the need for new software, web-based applications, and computerized devices and equipment will continue to rise.<sup>66</sup> Greater Baltimore has a real chance to be at the forefront of those innovations.



## BIOSCIENCE<sup>67</sup>

If the role of Greater Baltimore's manufacturing sector in the regional economy is consistently undervalued, the role of bioscience surely is not. State, local, and regional leaders all recognize the potential of this industry for the state and the metro area, and there is no dearth of ideas for growing the cluster.

Driven by its stand-out strength in research and development, the Baltimore-Washington corridor has grown to be one of the nation's largest bioscience hubs. In 2008, nearly 16,000 people were employed in the sector in the Baltimore metro area alone. Although it comprises just 1.2 percent of all jobs in the region, between 2001 and 2008 the sector saw an increase of 4,600 jobs and approximately 140 net new firms.<sup>68</sup> Bioscience companies are spread throughout the metro area but are most concentrated in Baltimore City, Baltimore County, and Howard County.<sup>69</sup>

Baltimore's bioscience cluster is dominated by research, testing, and medical laboratories, which employ over 11,000 of its workers (70 percent of the metro area total for the bioscience sector) and account for most of the regional job growth in the industry.<sup>70</sup> These 11,000 jobs rank Baltimore as 10<sup>th</sup> among metro areas and make it one of the most concentrated areas for bioscience research and development in the nation. The region's drugs and pharmaceuticals sector employs an additional 2,750 people, ranking the metro area 19<sup>th</sup> among its peers, and another 1,800 individuals work in the medical devices and equipment industry.<sup>71</sup> Maryland as a whole has more than 200 businesses that are primarily involved in producing surgical and medical instruments, appliances, and supplies; almost one-half of these are located in the Baltimore metro area.<sup>72</sup>

Baltimore's bioscience strengths can in large part be attributed to Johns Hopkins and the University of Maryland, which have together served as key anchors for the life sciences industry in the metro area and the state. Because they are

The best reason Baltimore should invest in efforts to grow and develop these industries is because doing so will help to build an economy that is characterized by greater numbers of good-paying jobs for workers without a four-year degree.

major magnets for top researchers and federal research dollars—Johns Hopkins alone received nearly \$1.6 billion in 2009—both are centers for the life sciences in terms of research and development.<sup>73</sup> They have also helped to seed the growth of private-sector firms throughout the state and the region. A 2002 report on the state's bioscience companies revealed that a large share of company founders had ties to these two institutions, the National Institutes of Health, and/or Walter Reed Army Institute or large companies such as Baltimore-based BD Diagnostics, the state's largest bioscience firm.<sup>74</sup>





## OVERVIEW: BIOSCIENCES

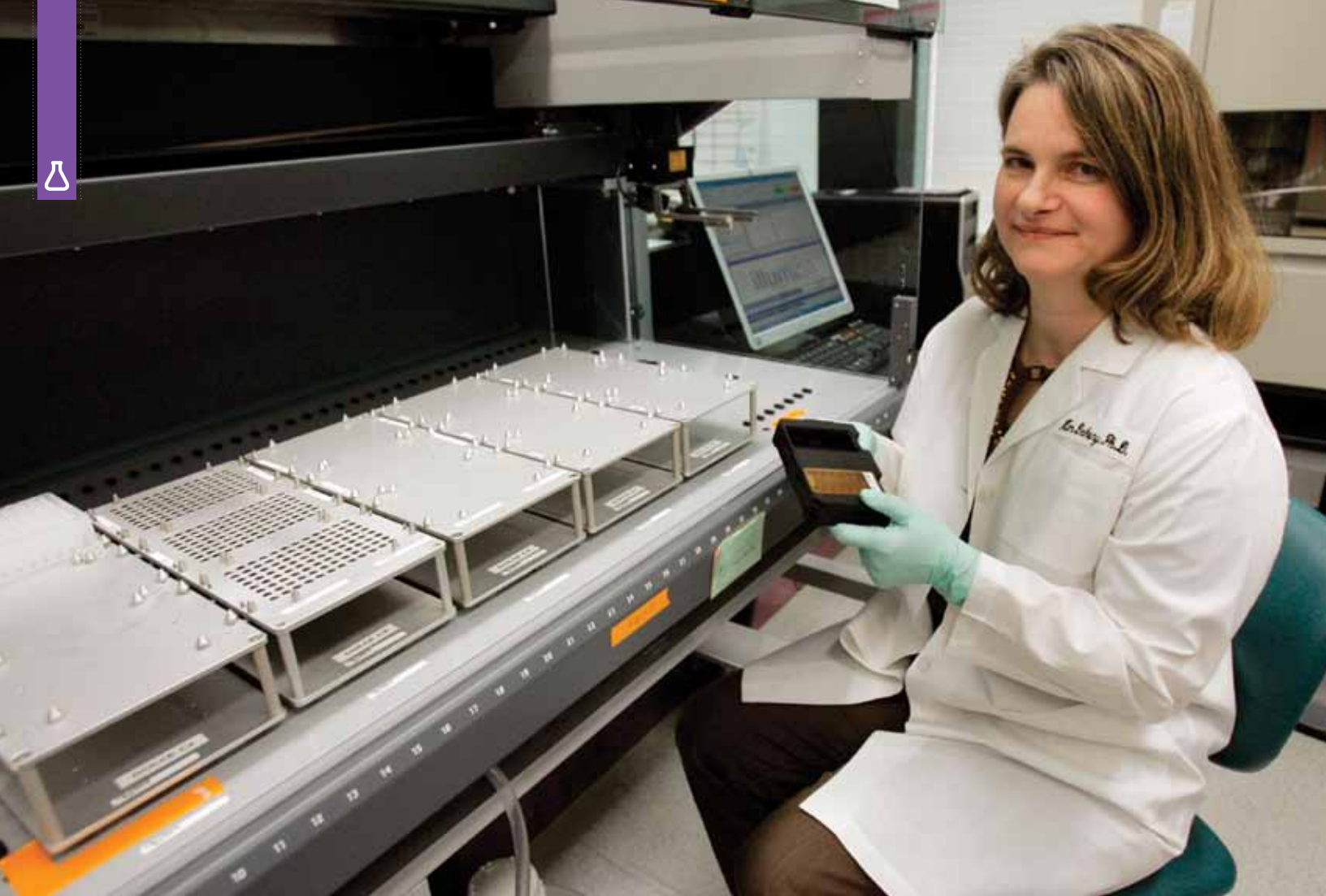
	Jobs (2009)	Change in Jobs (annualized 2000 to 2009)	Location Quotient (2009)
<b>TOTAL</b>	<b>15,981</b>	<b>5.0%</b>	<b>1.23</b>
<b>Industry subsector</b>			
Research, Testing, and Medical Laboratories	11,205	7.8%	2.13
Drugs and Pharmaceuticals	2,738	-1.8%	1.01
Medical Devices and Equipment	1,810	4.4%	0.46
Agricultural Feedstock and Chemicals	227	-3.5%	0.21

Source: Bureau of Labor Statistics Occupational Employment Statistics

## EXAMPLE OCCUPATIONS: BIOSCIENCE

Occupation	Number of Jobs (2009)	Share of all Occupations in Industry (2009)	Median Wage (2009)	Share of Workers with Less than a BA
Executive secretaries and administrative assistants	407	2.4%	\$48,020	83.4%
Biological technicians	398	2.4%	\$40,550	49.9%
Business operation specialists	360	2.1%	\$71,860	52.1%
General and operations managers	337	2.0%	\$98,180	51.4%
First-line supervisors/managers of production and operating workers	274	1.6%	\$55,870	85.0%
Chemical technicians	236	1.4%	\$40,340	68.4%

Source: Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data



### OPPORTUNITY STRUCTURE

Baltimore's bioscience industry might as yet be relatively small, but with an average annual wage of about \$80,500 it boasts a strong concentration of well-paying jobs. In fact, more than 80 percent of employees in the sector are working in occupations that pay at least 80 percent of the area's median wage.<sup>75</sup>

The cluster's high wages arise in large part from the high educational levels of many of its workers. In 2008, about 45 percent of Baltimore's bioscience employees possessed at least a bachelor's degree, and nearly 19 percent of these had a master's or a doctoral degree. Nearly all of the sector's 700-plus medical scientists—who earn a median wage of about \$85,800—have at least a bachelor's degree, as do 92 percent of the over 400 chemists (median wage, \$77,360) and 82 percent of the nearly 300 software engineers (median wage, \$95,370).<sup>76</sup>

However, the college educated are a minority among all bioscience employees; more than one-half (55.2 percent) of those working in the sector—some 9,000 employees—had a two-year degree or less, and nearly one-half (46.7 percent) had some college (no degree) or less. And although most of these workers are not earning as much as their more educated colleagues, a fair share are still making a solid wage. In fact, almost 39 percent of all bioscience workers have less than a bachelor's degree and earn at least 80 percent of the median wage in the metro area. This includes about 340 executive secretaries and assistants (median wage, \$48,000), 200 biological technicians (median wage, \$40,550), and 160 chemical technicians (median wage, \$40,340).<sup>77</sup>



## POTENTIAL FOR GROWTH

Despite the substantial amount of activity and talent in Maryland's bioscience research and development sector, the state has not accomplished a high level of success in the transfer of technology and the commercialization of research. In many reports on the industry, the same admonition can be found: If Maryland's metro areas want to successfully compete with their peers in California, North Carolina, and Massachusetts, they must use their robust research capacity as a launching pad for the development of more new products and the creation of more new companies that can bring these products to market.<sup>78</sup>

To be sure, the region has had some commercial success with the start-up and growth of companies such as Martek (a leading developer of nutritional products that was recently acquired by Royal DSM), Hemagen Diagnostics, Pharmaceuticals International, and others that are developing and producing a range of new drugs, therapies, and diagnostics. And although the metro area still has an undersized employment concentration in the development and manufacturing of medical devices and equipment, between 2001 and 2008 Baltimore gained about 475 jobs in the subsector, even while it lost about 400 jobs in drug and pharmaceutical manufacturing.<sup>79</sup> Overall, however, the industry is still just emerging. The gap between research and commercialization is wide, and the state and the region have been slow in their ability to help to bridge it.

Baltimore has a huge and growing bioscience infrastructure that will serve as a platform for the sector's continued development. It boasts about 3.5 million square feet of built or planned space in three bioparks—located at the University of Maryland, Baltimore County, the University of Maryland, Baltimore, and Johns Hopkins University—among some of the nation's best hospitals, a formidable information technology sector, and a high-quality environment in which to live and work.<sup>80</sup> The metro area also benefits from its proximity to Washington's bioscience cluster. Indeed, people

Baltimore has a huge and growing bioscience infrastructure that will serve as a platform for the sector's continued development.

in the industry consider the two metro areas to be part of the same overall market. Finally, it has the support of the state through the Maryland Biotechnology Center, TEDCO, and associated initiatives and funding resources, including the bioscience tax credits program.

All are key ingredients to promoting a thriving sector that, if matched with greater efforts to improve the access to early-stage capital, stimulate product development, support and recruit entrepreneurs, and encourage more collaboration between academia and industry, can help to convert more bioscience research into greater numbers of commercial products, firms, and, ultimately, good-paying jobs.<sup>81</sup>



## THE CLEAN ECONOMY<sup>82</sup>

As the global economy recovers, the United States must continue to cut its energy usage, reduce the amount of carbon and other pollutants in its air and water, deepen its global integration, and step up its reliance on innovation. These developments are integrally linked, whereby innovations that advance sustainability not only improve the environment but also help to drive firms' global competitiveness and enhance resource security both here and abroad.

A new Brookings-Battelle study examines this move toward a clean economy in the nation's largest metro areas, and in the process provides a detailed, realistic assessment of what this much ballyhooed but not-so-carefully examined field is and isn't.<sup>83</sup> From this we have a sense of the relative size of Baltimore's clean economy, as well as its relative strengths.

As noted earlier, in 2010 Greater Baltimore's clean economy employed about 22,600 workers in fields ranging from cutting-edge solar photovoltaic cell development and installation (only 44 jobs) to the more mundane area of waste management and treatment (4,600 jobs). This last category represents the largest number of green jobs in the metro area, followed by public mass transit, conservation (mostly with the state's Department of Natural Resources), professional environmental services, and regulation and compliance. These

latter four categories represent some of the largest areas of raw clean economy job growth in the region since 2003.<sup>84</sup>

Baltimore also boasts a few areas that have larger concentrations of clean economy jobs than the nation as a whole. The professional and environmental services segment—which includes firms like EA Engineering, Science, and Technology, in Hunt Valley and KCI in Sparks—hits the trifecta of employment strength. It is large (2,360 jobs), it is growing (by over 900 jobs since 2003), and its share of metro area employment is about 74 percent larger than that in the nation as a whole. The region also has something of a specialization in areas like remediation (about 1,000 jobs total), green architecture and construction (800 jobs), and battery technologies (270 jobs).<sup>85</sup>

Finally, although the \$6,869 of exports produced per clean economy job puts the Baltimore metro area near the bottom (81<sup>st</sup>) of a list of its peers, a number of the region's clean economy firms are successfully tapping into rising global demands for green products and services. The highest overall dollar volume of exported goods and services is generated by the professional and environmental services segment, which includes firms such as SciTech Services and EA (among many others) followed by battery technology companies such as Saft America and HVAC and building control systems firms such as Baltimore Aircoil Company.<sup>86</sup>

### EXAMPLE OCCUPATIONS: CLEAN ECONOMY

Occupation	Number of Jobs (2009)	Share of all Occupations in Industry (2009)	Median Wage (2009)	Share of Workers with Less than a BA
Truck drivers, heavy and tractor-trailer	567	2.6%	\$39,120	94.9%
General and operations managers	395	1.8%	\$98,180	51.4%
Sales representatives, wholesale and manufacturing	387	1.8%	\$58,490	52.9%
Executive secretaries and administrative assistants	324	1.5%	\$48,020	83.4%
Water and liquid waste treatment plant and system operators	191	0.9%	\$39,740	90.4%
Operating engineers and other construction equipment operators	169	0.8%	\$41,750	97.3%

Source: Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Brookings/Battelle Clean Economy Database



## OVERVIEW: CLEAN ECONOMY

	Jobs (2009)	Change in Jobs (annualized 2000 to 2009)	Location Quotient (2009)
<b>TOTAL</b>	<b>22619</b>	<b>2.6%</b>	<b>0.90</b>
<b>Industry Segment</b>			
Waste Management and Treatment	4,606	-1.2%	1.24
Public Mass Transit	2,898	4.1%	0.86
Conservation	2,834	9.8%	0.94
Professional Environmental Services	2,360	7.2%	1.74
Regulation and Compliance	1,994	0.8%	1.46
Recycling and Reuse	1,417	2.4%	1.14
Organic Food and Farming	1,019	3.7%	0.82
Energy-saving Building Materials	1,000	1.8%	0.64
Remediation	997	4.9%	1.85
Green Architecture and Construction Services	799	-0.2%	1.48
HVAC and Building Control Systems	525	-1.3%	0.74
Green Building Materials	456	-0.4%	0.62
Hydropower	315	-3.6%	0.59
Battery Technologies	271	5.3%	1.75
Green Consumer Products	238	0.0%	0.32
Professional Energy Services	215	5.4%	0.45
Lighting	100	N/A	0.73
Air and Water Purification Technologies	75	4.0%	0.31
Energy-saving Consumer Products	75	47.2%	0.41
Pollution Reduction	72	0.8%	0.75
Waste-to-Energy	66	0.0%	2.07
Green Chemical Products	65	0.0%	0.30
Recycled-Content Products	55	0.0%	0.10
Solar Photovoltaic	44	36.4%	0.19
Fuel Cells	40	-15.0%	0.59
Sustainable Forestry Products	37	4.6%	0.06
Nuclear Energy	27	13.7%	0.04
Biofuels/Biomass	6	N/A	0.03
Water Efficient Products	5	N/A	0.04
Wind	5	-18.0%	0.02
Training	3	N/A	1.17

Source: Bureau of Labor Statistics Occupational Employment Statistics



## OPPORTUNITY STRUCTURE

Nationwide, the clean economy provides more opportunity and better pay for low- to moderately-skilled workers than the economy as whole. The same is true in Baltimore.

The median annual wage for all clean economy jobs in the region is about \$44,600, which is slightly higher than that for the region as whole. However, a closer look at who is getting paid what in the sector reveals that more than 65 percent of clean economy employees in the region work in occupations that pay at least 80 percent of the area's median. Many of these occupations require high-level technical skills, which accounts for some of the good pay. Seven percent of clean economy

workers are in architectural and engineering occupations, for example, compared with just over 2 percent for the metro area as a whole.<sup>87</sup>

But the clean economy also has a larger share of middle-skill, middle-wage production workers than the general economy (6.8 percent vs. 3.6 percent), a sign of just how manufacturing-intensive the sector is. As well, a comparatively large share of clean economy workers is employed in construction (7.7 percent versus 4.4 percent), which pay a median-wage of about \$40,000 per year. All told, 42 percent of Baltimore's "green" workers are in these and other middle- to high-paying occupations but do not have a four-year degree.<sup>88</sup>



## POTENTIAL FOR GROWTH

Growing the clean economy is not just an environmental proposition but an economic one. As stated in the Brookings-Battelle report, “While the emergence of the green or low-carbon economy originally flowed from environmental concerns, a market vision now prevails.”

The potential for growth stems from that vision, whereby new industries, new firms, and new jobs will emerge from the drive to create a healthier, more secure planet. In 2010, approximately \$154 billion in private capital was invested worldwide in renewable energy alone, which represents an increase of 650 percent since 2004. Furthermore, investments in the broader global low-carbon energy market are expected to reach \$2.2 trillion by 2020.<sup>89</sup> These amounts do not include the billions of dollars that will be spent on everything from home weatherization and green construction in our own cities and suburbs to ensuring the availability of clean water in developing nations worldwide.

Metro areas like Baltimore have an opportunity to tap into growing U.S. and international demand as well as to find ways to spur a greater desire for green products and services in their own backyards. Federal and state policies and regulations—vis-à-vis carbon pricing standards for clean energy, and emission and other pollution limits, for example—will be a huge factor in the extent to and pace at which domestic demands (and the number of associated green jobs) increase. However, even absent strong new federal and state policy responses, state and local governments, universities, businesses, and other institutions and organizations can fuel growth in the sector by changing their own procurement and other practices. Such market-making actions could include everything from retrofitting buildings to purchasing more environmentally friendly products, from buying from local organic farms to improving the fuel efficiency of aging auto fleets.

In fact, this is already happening. For their part, local governments throughout the region are employing a variety of efforts aimed at improving the environmental health of their respective jurisdictions, while also growing the number of green jobs.<sup>90</sup> The Port of Baltimore is taking a range of steps to make their operations more green, as is the Baltimore Convention Center, while manufacturing firms like Domino Sugar have used new technology to successfully drive down their energy usage (and costs).<sup>91</sup> In addition, numerous local organizations and businesses have constructed LEED (Leadership in Energy and Environmental Design)-certified buildings in recent years, including the nation’s first LEED-Platinum-certified federally qualified health care center.<sup>92</sup>

Baltimore’s strong concentration of environmental service, engineering, architecture, and construction firms are just some of those that could be poised to respond to—and ultimately benefit from—a rise in such efforts. This progress alone will not fuel the jobs renaissance that some advocates might have hoped for. However, expanding this sector in Baltimore and other metro areas will be critical to securing the investments and innovations necessary to improve America’s global clean economy leadership in the decades to come.



## TRANSPORTATION AND LOGISTICS<sup>93</sup>

The ability to move people and goods has always been a linchpin of economic growth and development. This is as true now as it has ever been, making transportation and logistics a crucial if perhaps less recognized part of the next economy.

With about 8.3 million people, the Baltimore-Washington region is the fourth-largest consumer market in the country, and one of the wealthiest. Further, Maryland's centralized East-Coast location and sophisticated, multimodal transportation infrastructure systems make it both a major destination and an important through state for both freight and people on their way to someplace else.<sup>94</sup>

Greater Baltimore stands at the center of this activity, with a transportation and logistics sector that employs 29,000 people, a figure that represents a little over 2 percent of all jobs in the region. The largest share of those jobs, about 7,250, are in trucking, while nearly 5,500 involve warehousing and storage or other transportation-support activities such as air traffic control, marine cargo handling, and other port- and airport-related activities.<sup>95</sup> While data limitations make it impossible to know precisely how many transportation and logistics jobs are directly related to the Port of Baltimore and BWI, independent studies put those numbers at 16,700 and 11,700, respectively.<sup>96</sup> The vast majority of the port jobs are held by Baltimore City and County residents.

Jobs trends in the transportation and logistics sector tend to follow those of the broader economy. From 2007 to 2009, regional employment in this area declined across the board.<sup>97</sup> But parts of the sector were expanding in the years leading up to the recession. From 2000 to 2007 the numbers of truck, air, and rail transportation jobs had already begun to slide, but the number of warehousing and storage jobs increased by almost 50 percent.

Just as Greater Baltimore's transportation and infrastructure network has been a vital part of its history and development, how and where new investments are targeted will be a crucial determinant of its next-economy future.

Employment in water transportation and transportation support activities also grew during this period.

On the flip side, transportation and logistics jobs also help to spur significant regional economic activity. The Port of Baltimore alone supports approximately 34,000 induced and indirect jobs on top of the nearly 17,000 that are directly generated by its cargo and vessel activities. In 2006, the port was responsible for \$3.6 billion in personal wages and salaries and another \$1.9 billion in business revenues.<sup>98</sup> BWI, for its part, put its induced and indirect job numbers at nearly 11,000 in 2005, and it estimated that the 5.6 million airport arrivals visiting the state generated nearly 75,000 additional jobs.<sup>99</sup>





## OVERVIEW: TRANSPORTATION AND LOGISTICS

	Jobs (2009)	Change in Jobs (annualized 2000 to 2009)	Location Quotient (2009)
<b>TOTAL</b>	<b>29,219</b>	<b>-3.1%</b>	<b>0.90</b>
<b>Industry subsector</b>			
Truck Transportation	7,229	-3.4%	0.60
Support Activities for Transportation	5,569	-0.4%	1.05
Warehousing and Storage	5,460	3.0%	0.89
Air Transportation	4,361	-3.6%	0.98
Couriers and Messengers	4,282	-1.0%	0.83
Rail Transportation	1,762	-2.0%	0.93
Water Transportation	557	-1.1%	1.00

Source: Moody's Analytics

## EXAMPLE OCCUPATIONS: TRANSPORTATION AND LOGISTICS

Occupation	Number of Jobs (2009)	Share of all Occupations in Industry (2009)	Median Wage (2009)	Share of Workers with Less than a BA
Truck drivers, heavy and tractor-trailer	6711	23.0%	\$39,120	94.9%
Industrial truck and tractor operators	993	3.4%	\$35,820	97.5%
Cargo and freight agents	587	2.0%	\$35,260	79.4%
Aircraft mechanics and service technicians	493	1.7%	\$52,330	88.0%
First-line supervisors/managers of transportation and material- moving machine and vehicle operators	472	1.6%	\$55,370	82.9%
Bus and truck mechanics and diesel engine specialists	439	1.5%	\$42,140	97.0%

Source: Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data



## OPPORTUNITY STRUCTURE

With an average annual wage of just under \$50,000, the transportation and logistics sector is a solid generator of middle-wage jobs, many of which have relatively low barriers to entry.

In fact, about 46 percent of workers in this sector are in occupations with median wages within 20 percent of the area median, that is, between \$34,500 to \$52,000 per year. Another 14 percent work in higher-wage occupations. More than one-half of these well-paid workers do not have a four-year college degree, and nearly one-half (46 percent) have completed only some college-level coursework. Ninety-five percent of the region's 6,700 truck drivers do not have a bachelor's degree, for example—70 percent have no college training at all—and following a moderate level of on-the-job training earn nearly \$40,000 per year. Cargo and freight agents, as well as dispatchers, earn more than \$35,000 per year, typically with on-the-job training.<sup>100</sup>

Furthermore, the transportation and logistics sector provides a fair amount of room to move up the jobs ladder, often into supervisory positions. Related work experience can help a worker land a job as a warehouse supervisor (median wage of nearly \$47,000 per year), an office or administrative manager (\$49,600 per year), a supervisor of transportation or material-moving machine operators (\$55,400 per year), or a transportation, storage, and distribution manager (\$59,700 per year). Only about a one-fifth of the workers in these occupations—which together employed about 1,400 people in the region in 2009—have a four-year college degree.<sup>101</sup>



## POTENTIAL FOR GROWTH

As the national economy recovers and grows, with more goods produced and more people to serve and be served, the transportation and logistics sector will follow. More than that, the move toward a more innovative, globally connected economy—in Baltimore and throughout the country—will cause important shifts in the types and destinations of people, goods, and services and thus the means by which they will travel. The Port of Baltimore and BWI and the trucking, railroad, warehousing, and supply-chain companies that serve them stand to grow as a result.

In 2010, the Port of Baltimore alone handled 18 million tons of export cargo, a 72 percent increase from 2009, and an amount that could rise substantially if more companies begin shipping more goods to foreign locales.<sup>102</sup> Today the port's exports include everything from bulk materials such as coal and coke to cars, food items, and beyond. Some of these materials originate in the Greater Baltimore region and others come from outside of it. The port is the number one roll-on/roll-off port in the United States, for example, in part because of the heavy volume of Midwest-manufactured farm and construction equipment that is shipped through its terminals.<sup>103</sup> If the level of these and other types of exports increase, the amount of imported items that feed their respective supply chains—and the jobs needed to handle, store, and transport them—will grow as well.

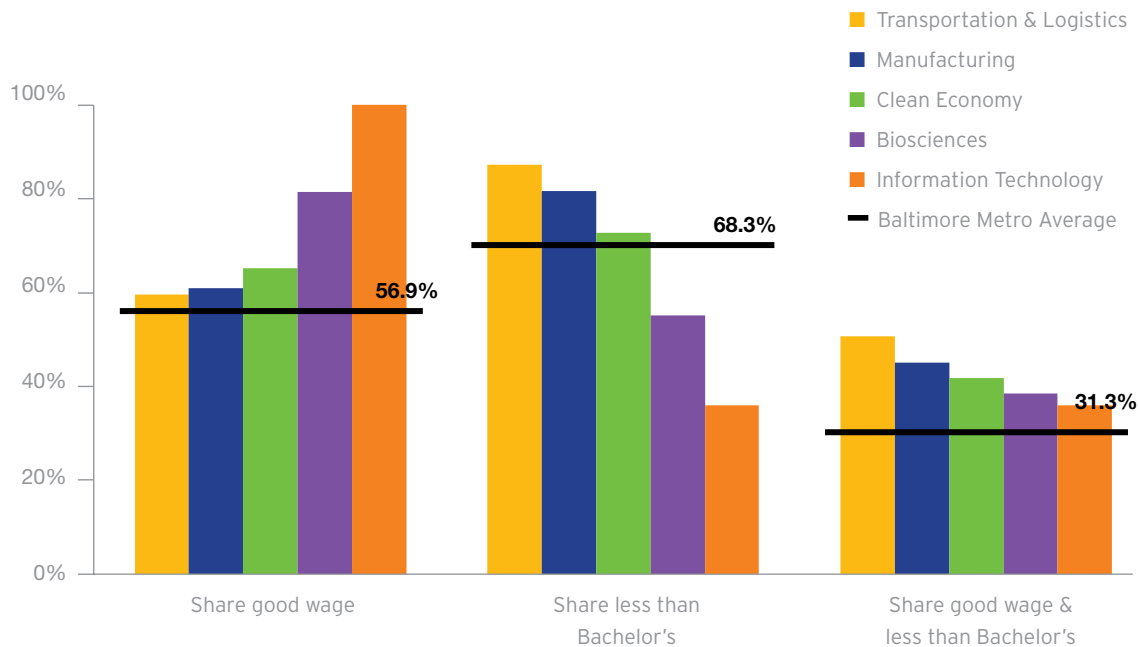
Meanwhile, continuous technological advancements in how cargo is managed and handled at the port allow it to load, unload, and move goods more efficiently than ever before. Such innovations will be increasingly vital in the years to come. Ports America Chesapeake has entered into an agreement with the Maryland Ports Administration to construct a 50-foot container berth at the Seagirt Marine Terminal and to undertake over \$460 million worth of other improvements. The new berth, which is scheduled to open in 2012, will make Baltimore one of only two East Coast ports able to handle the mega-container ships that will soon

able to pass through an expanded Panama Canal. The increased volume that is expected at the port is estimated to generate approximately 2,700 new permanent jobs.

Growth in Baltimore's next-economy industries would also have substantial impacts on BWI. Although less than 3 percent of the airport's total cargo is classified as "non-stop" international, approximately one-third of it is destined to leave the country via Philadelphia, Dulles, JFK, or other international gateways. Machine parts, aircraft/spacecraft components, seafood, chemicals, and pharmaceutical products are some of the main commodities that move through the airport, and the volumes of these goods could increase as these industries grow and expand their markets.<sup>104</sup> The airport will also continue to be vitally important for scientists, doctors, IT specialists, architects, and others who provide services to clients abroad, as well as foreign clients seeking medical treatment, tourists, and others coming into the region for business purposes. In 2011, passenger travel at the airport set new records, and officials expect international travel to increase in the years to come.<sup>105</sup>

Just as Greater Baltimore's transportation and infrastructure network has been a vital part of its history and development, how and where new investments are targeted will be a crucial determinant of its next-economy future.

**GREATER BALTIMORE'S NEXT ECONOMY INDUSTRIES PAY BETTER THAN AVERAGE WAGES, EVEN FOR WORKERS WITHOUT A BACHELOR'S DEGREE.**



What all of the above statistics together tell us, and what the bar chart shows, is that the share of those workers earning a middle wage or better is higher in every one of Greater Baltimore's five key next-economy industries than it is for the metro area as a whole. All IT occupations, for example, pay a median wage that is at least 80 percent of the metro area median, that is, at least \$34,500 per year. The same is true for more than 81 percent of bioscience jobs, 65 percent of clean economy jobs, 61 percent of manufacturing jobs, and almost 60 percent of transportation and logistics jobs. However, only 57 percent of all jobs in the metro area pay a decent wage.<sup>106</sup>

Of course, good-wage industries do not necessarily provide broad-based opportunity if the well-paying jobs they offer are accessible only to highly educated workers. The real opportunity sweet spot, rather, is in those industries where a good share of workers are able to earn a decent living with some training, a certificate, and/or college-level courses

but without having completed a four-year college degree. In these five next-economy industries, this is possible. Although only 31 percent of all workers in Baltimore who do not have a bachelor's degree are employed in well-paying occupations, the same can be said for 51 percent of transportation and logistics workers, 45 percent of manufacturing workers, 42 percent of clean-economy workers, 39 percent of bioscience workers, and 36 percent of IT workers.<sup>107</sup>

That these five industries pay higher wages than those in many other sectors has nothing to do with the altruism level of their employers. Rather, these industries simply have a jobs structure that is built upon greater numbers of middle- and high-wage, middle- and high-skilled occupations. For example, consider the clean economy. Only 2.4 percent of this sector's workers are in low-wage health care support, personal care, or food service occupations, compared with 13 percent of metro area workers overall. Conversely, almost 14 percent of



green industry workers are in either middle-wage production jobs or even better-paying architecture or engineering occupations, compared with fewer than 6 percent of all metro area workers. The story is similar in the other industries. More than 31 percent of bioscience workers and 55 percent of manufacturing workers are in production or engineering-related jobs, for instance, while fewer than 1 percent of each work in health support, personal care, or food services fields.<sup>108</sup>

All of this is not to say that jobs in these and other low-wage occupations are not important or worthy of investment. Such occupations—and the industries in which they are most prevalent—provide essential services to businesses and residents while offering workers a chance to get a foot on the economic ladder, even if it is on a bottom rung. But what this analysis does tell us is that if the region wants to provide low-income residents a better chance for upward movement, it must invest in industries with a strong opportunity structure while at the same time work to raze the barriers—of skills, of information, and others—that can stand in the way of their climb. ■

If the region wants to provide low-income residents a better chance for upward movement, it must invest in industries with a strong opportunity structure.



## IV. Barriers to Opportunity

Greater Baltimore has strong seeds from which to grow a more export-oriented, more innovative, and greener region. For the metro area's low-income residents, however, the next economy is as yet still too small and too far out of reach.

In fact, only a small fraction of the working poor were employed in the region's five next-economy industries at some point during the past five years, which is precisely the point. If they were, at least somewhat steadily, then they very likely would not be low income.<sup>109</sup>



This issue is, in part, a matter of scale. Intersections among the five industries—for example, manufacturing workers who make medical devices or IT specialists working in clean tech industries—make it nearly impossible to obtain a perfect count of the total jobs number. It is fairly safe to say, however, that only around 170,000 Baltimore workers, or about 13 percent of the regional total, are employed by these industries. As such, these industries are simply not large enough—nor are they growing enough—to absorb all of the low-income workers who might wish to join their ranks.

The sheer size of Baltimore's next economy is not the only barrier. Beyond this is the fact that many of the region's low-income workers are otherwise detached from these jobs as they possess neither the skills their employers need nor the robust social, institutional, and physical connections needed to access (or perhaps even know about) them. If these barriers to better employment are not torn down, they will not only keep residents from accessing such opportunities as the next economy grows, but to the extent that next-economy employers cannot find the workforce they require, they could actually impede growth overall.

## **BARRIERS TO GROWING THE NEXT ECONOMY**

Creating an opportunity-rich Greater Baltimore first demands an approach to economic development that is intentional about expanding industries with an opportunity-rich occupational structure. This is not a simple charge.

Indeed, each of the five next-economy industries discussed here faces its own challenges to growth, not all of which are unique to Baltimore. The commercialization of biotechnologies, for example, is a complicated, expensive, long-term process that is affected by federal funding, FDA regulations, and the availability of venture capital, among other things.<sup>110</sup> For their part, American manufacturers are undercut by competitor-nation's cheap wages, low environmental standards, and unfair prac-

tices such as currency manipulation while lacking research funding and other coordinated forms of federal support that are enjoyed by firms in peer nations such as Germany and Japan.<sup>111</sup> Furthermore, transportation infrastructure nationwide is in need of some serious care, as well as the targeted funding to provide it.

But Baltimore's ability to grow the next economy is also hampered by its own acute lack of regional vision and coordination. In fact, nearly all of those interviewed for this report expressed a similar lament about what seems an inability (or disinclination) of state and metro area leaders—from all sectors—to unite around a set of regional goals. Despite all Baltimore has going for it—and it has a lot going for it—the region, as Dan Rodricks noted in the Sun last summer, “just snorts along, with a post-industrial drip, hardly ever making a boast or a brag.” One interviewee put an even finer point on it, claiming that “Baltimore does less with more” than any other region he had ever worked in.

Rodricks chalks up this apparent lack of “collective civic ambition” to “something endemic to the region's character and its ancestry.” Many others finger plain-old complacency. The region has not fully gotten its act together because it has not had to. Anchored by many federal government-induced jobs, a health care system that keeps growing, and an enviable set of educational and other institutions, the region has been able to maintain a fairly impressive set of broad-based economic statistics absent much strategizing to fully exploit its plentitude of assets. This appears to be true across industries, from biosciences to manufacturing to IT. A robust set of resources and institutions support each, but for the most part they are not working in concert toward or benchmarking themselves against a common set of aims or objectives.

The whole, in other words, is still less than the sum of its parts.

## **BARRIERS TO ACCESSING THE NEXT ECONOMY**

Beyond the economic development-related challenges to building a more opportunity-rich next economy are a complex, interwoven set of barriers surrounding access to information, skills, and transport that are keeping many low-income Baltimoreans from participating in it—and thus from moving into the middle class.

### **Information Barriers**

The ability of low-income workers to connect to next-economy jobs is compromised in part by a lack of basic knowledge and information about and links to the opportunities that are available, as well as what it takes to be able to advantage of them.

For the middle-class worker, a rudimentary understanding of occupations and career paths comes in large part from family and community and is imparted from an early age. However, many low-income residents are brought up in low-income, poorly educated households and live in neighborhoods where employment and wage levels are low. For example, more than one-fifth of children living in Baltimore City live in families in which neither parent has a high school diploma, and nearly 11 percent grow up in neighborhoods with poverty rates of 40 percent or higher.<sup>112</sup> As such, low-income job seekers tend to have fewer and smaller networks of relatives, friends, and acquaintances who work in well-paying, next-economy fields or have direct information about training programs and job opportunities. They also then have fewer ties to people who might personally vouch for their character or abilities or who have a vested interest in helping them to secure a decent job.<sup>113</sup> Although these workers may turn to public or nonprofit intermediaries to help them train for and connect to good jobs, service providers themselves can also suffer from a lack of good information about the skills demanded by employers in tradable, next-economy sectors.

The challenge for Greater Baltimore's black residents is particularly steep. First, they make up the vast majority of poor people living in poor city neighborhoods, and their networks are generally weaker than those for whites. Research shows, for example, that black business owners as a group are more likely than white owners to employ black workers, and yet census data show that fewer than 4 percent of metro area businesses with paid employees are black-owned businesses.<sup>114</sup> In addition, low-income black residents are more likely than their white counterparts to be disconnected from work at an early age, making it all the harder to engage as they get older. In fact, young black youth are the least likely of the region's residents to be employed or even participate in the labor force, which in turn means that they are not exposed to different types of jobs and careers, nor are they learning the soft skills needed to succeed in the world of work.<sup>115</sup>

### **Education and Skills Barriers**

Of course, while the right information about available opportunities is critical, it must be accompanied by the right education and skills to be able to pursue them. As discussed above, workers do not necessarily need a bachelor's degree to get their foot in the door of the next economy. But most middle-wage, next-economy occupations, from computer operators to machinists, biological technicians to aircraft mechanics, do demand some level training or education that can then be advanced through on-the-job training and work experience. For low-income Baltimoreans, this can be a second major roadblock to the next economy.



### **A Lack of Basic Skills**

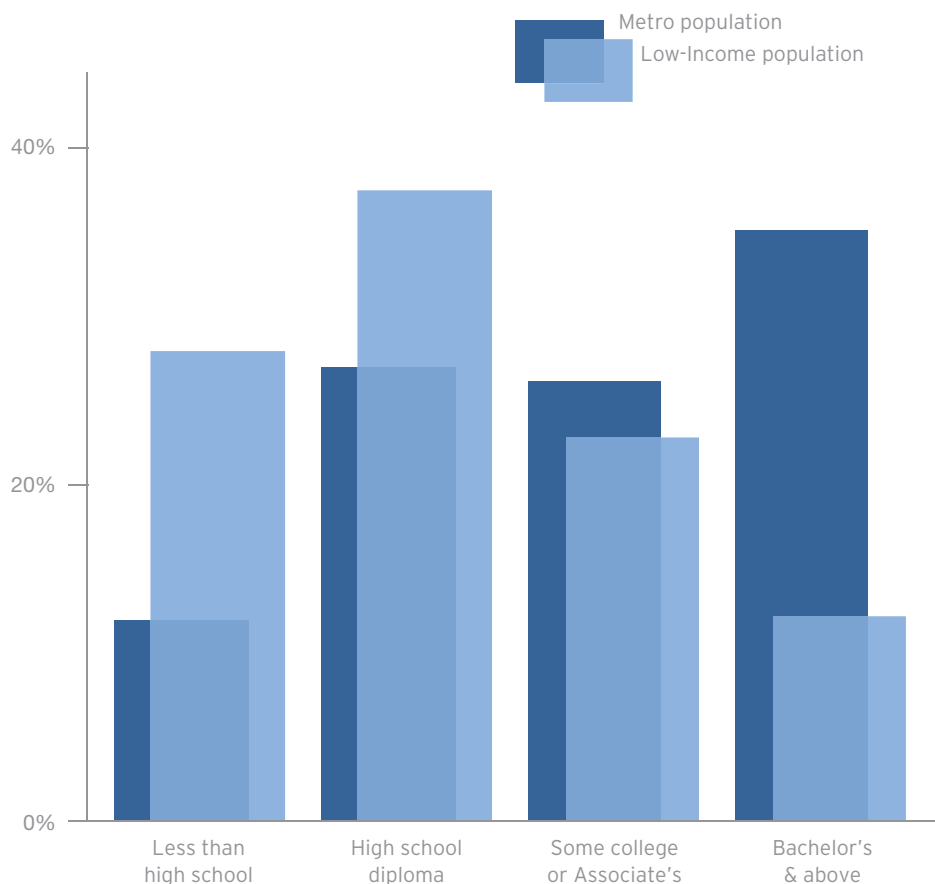
Many low-income residents simply do not have the basic reading and math skills necessary for work or additional training. Almost 28 percent of these residents do not have even a high school degree, compared with fewer than 12 percent of metro area residents overall. In addition, only about 15 percent of low-income residents have an associate's degree or higher. Educational attainment rates are particularly low for blacks. Seventeen percent of the metro area's black residents do not have a high school degree, while only about 26 percent have an associate's degree or higher. This compares with 10 percent and 45 percent of white residents, respectively. Given that nearly one-half of Greater Baltimore's low-income population is

black, this raises serious questions about how race-specific barriers to educational attainment impact economic mobility.<sup>116</sup>

The challenge begins with a K-12 education system—particularly in Baltimore City, and pockets of Anne Arundel and Baltimore counties—that has struggled to keep students in school while not being able to provide those who do attend with the skills they need to move forward after they graduate. Although graduation rates in the city have improved dramatically in recent years, as of 2009 there were approximately 83,450 adults in the city who did not have a high school degree, and more than 70 percent of these were black.<sup>117</sup> Continuing to help more students complete high school while

---

### **GREATER BALTIMORE'S LOW-INCOME RESIDENTS HAVE LOW EDUCATIONAL ATTAINMENT LEVELS.**



they are still enrolled is vital to improving these numbers over the long term. In the meantime, though, low state funding is forcing older workers wishing to attain a high school credential to compete for a too-limited supply of Adult Education and GED services.<sup>118</sup> Without that requisite piece of paper, many training programs are inaccessible.

That said, interviewees for this report confirmed that even many high school graduates lack the basic reading and math skills necessary to successfully complete community college or other skill-based training courses that could help these individuals to advance their career prospects. At Baltimore City Community College, for example, fewer than 9 percent of entering students in 2005 were deemed college ready; the same is true of only about one-quarter of all students at both Baltimore County Community College and Anne Arundel County Community College.<sup>119</sup> When students are forced to complete time-consuming remedial coursework, they can lose sight of the route forward and burn through the financial and other resources needed to stay the full course. Only about 35 percent of Maryland's community college students—and only 21.5 percent of black students—either transfer to a four-year college or go on to receive an associate's degree or certificate.<sup>120</sup>

### ***A Flawed Workforce Delivery System***

A lack of basic skills is not the only thing impeding low-income workers from starting and completing postsecondary education and training programs, however. A number of those interviewed stressed that weaknesses in the workforce delivery system often frustrate the ability of workers to successfully negotiate available opportunities.

The type of training offered is part of the issue. Research by the Maryland Life Sciences Board, for example, revealed that, while the state has a high concentration of highly skilled bioscience research workers, many industry leaders are concerned about the insufficient supply of production and

technician workers and concomitant deficiencies in bioscience workforce development across the state.<sup>121</sup> Interviewees from the manufacturing community in particular cited difficulties in finding middle-skill workers with the necessary technical prowess, and they noted that few local programs exist to teach requisite skills (see sidebar). Furthermore, several recent reports cite an overall shortage in Maryland of high-quality science, technology, and engineering education and workforce programs despite projected growth in many of these fields.<sup>122</sup>

For many low-income workers, however, it is not necessarily the number and type of individual offerings per se that is the biggest problem. The choice of programs in the metro area is in fact extensive. The region's high schools, for instance, are continually working to expand and improve their Career and Technology Education (CTE) curricula, and numerous next-economy-oriented programs do exist, in areas ranging from IT to maritime studies to engineering. The area's community colleges offer a vast array of credit and non-credit educational and training programs. And dozens more public, private, and non-profit providers offer training and job placement services in dozens of different fields, with some specifically focusing on the unique needs of low-income or disenfranchised workers. Second Chance, for example, provides both "green collar" training and employment in construction to hard-to-serve Baltimore City residents, while the BioTechnical Institute of Maryland provides tuition-free training in basic laboratory skills to the unemployed and under-employed.<sup>123</sup>

However, several interviewees noted that although multitudes of educational and training programs and services exist, not all are high quality, and even those that are are not well-coordinated with one another. Guided by different funding streams and different performance measures, the current players in the system—the public workforce development agencies, community colleges, private and non-profit providers, and industry groups—do not

share a unified set of concrete goals against which they can determine their collective effectiveness. The fractured nature of the system in turn makes it difficult for both workers and employers to successfully use it, and many job seekers can end up slipping through the cracks.

This is particularly true for low-income, middle-career workers. Although they might aspire to a better job, many are grappling with numerous and varied issues—such as criminal records, single parenthood, a scattered work history, and multiple part-time jobs—that challenge their ability to set and stay on a straight course to a good career. These barriers are compounded by a disjointed workforce development system, which leaves career pathways in most industries not readily apparent, accessible, or easily navigable. Just knowing about the range of training opportunities, for example, does not help someone decide which one might mesh best with his or her skills, interests, or existing work and family schedule. Nor does having a credential automatically lead

to employment in a firm where new knowledge is valued, rewarded, and built upon. Without sturdy links from education and training to job-placement services to desired employment, workers can get lost along the way and end up either stagnating in low-end jobs or dropping out of the workforce altogether.<sup>124</sup>

### **Spatial Barriers**

An inability to physically access education, training, and jobs, finally, can be another big obstacle for many low-income residents. Although Maryland was early at the forefront of the smart growth movement, the state still lacks a mechanism to require local governments to better plan residential development in proximity to jobs or vice versa. This could help to explain why only just over one-quarter of metro area residents live in a jobs-rich census tract, that is, one where the ratio of jobs to people exceeds that of the metro area as a whole.<sup>127</sup> Low-income Baltimoreans are only slightly more likely to live in such a tract, leaving

## **MANUFACTURING'S WORKFORCE CHALLENGES**

The workforce challenges cited by Baltimore-area manufacturers and related organizations mirror those of manufacturers nationally. A recent report of the Manufacturing Institute (MI) noted that at the peak of the recession, nearly one-third of manufacturers surveyed said they had jobs that were unfilled because they could not find workers who had the right skills. All of those interviewed for this report that are in some way involved in manufacturing expressed fear that this would get worse in the next decade, as many older workers retired. According to those interviewed, at the heart of the problem is the widespread—if erroneous—perception that manufacturing is a dirty, dying industry made up of either boring or backbreaking jobs. This over time has limited the interest in these jobs and ultimately the number of education and training programs in high schools, community colleges, or through other providers that teach the high-tech skills that are needed. Although the TIME Center collaborates with several community colleges and other stakeholders in the region to educate current and future manufacturing workers, such programs remain few and far between.<sup>125</sup> Some seeds of change are being sown, however. The Baltimore City school system, for example, has a growing interest in a collaborative program to develop the next generation of high-tech manufacturing employees, and several regional groups and the mayor's office have voiced their support for this effort.<sup>126</sup>

## Most middle-wage, next-economy occupations demand some level of training or education that can then be advanced through on-the-job training and work experience.

more than 72 percent in neighborhoods with a relatively low density of jobs. Moreover, even those who do live nearer to jobs may not easily be able to get to any given next-economy job that they want, that is available, and for which they are qualified, nor do they necessarily have access to the education and training programs that they might need to earn the right qualifications in the first place.

Having a car helps. The vast majority of Baltimoreans—77 percent, in fact—drive alone to work each day, an option that affords the most flexible range of movement throughout the region and beyond.<sup>128</sup> But for the more than 114,000 households without a vehicle in the metro area (71 percent of which are low-income), mobility can be far more constrained.<sup>129</sup> For these residents, the expense of buying and maintaining a reliable car combined with what have been some of the strictest state driver's license requirements in the nation can be a major impediment to getting and keeping just the type of good-paying job that could make purchasing a car possible.<sup>130</sup>

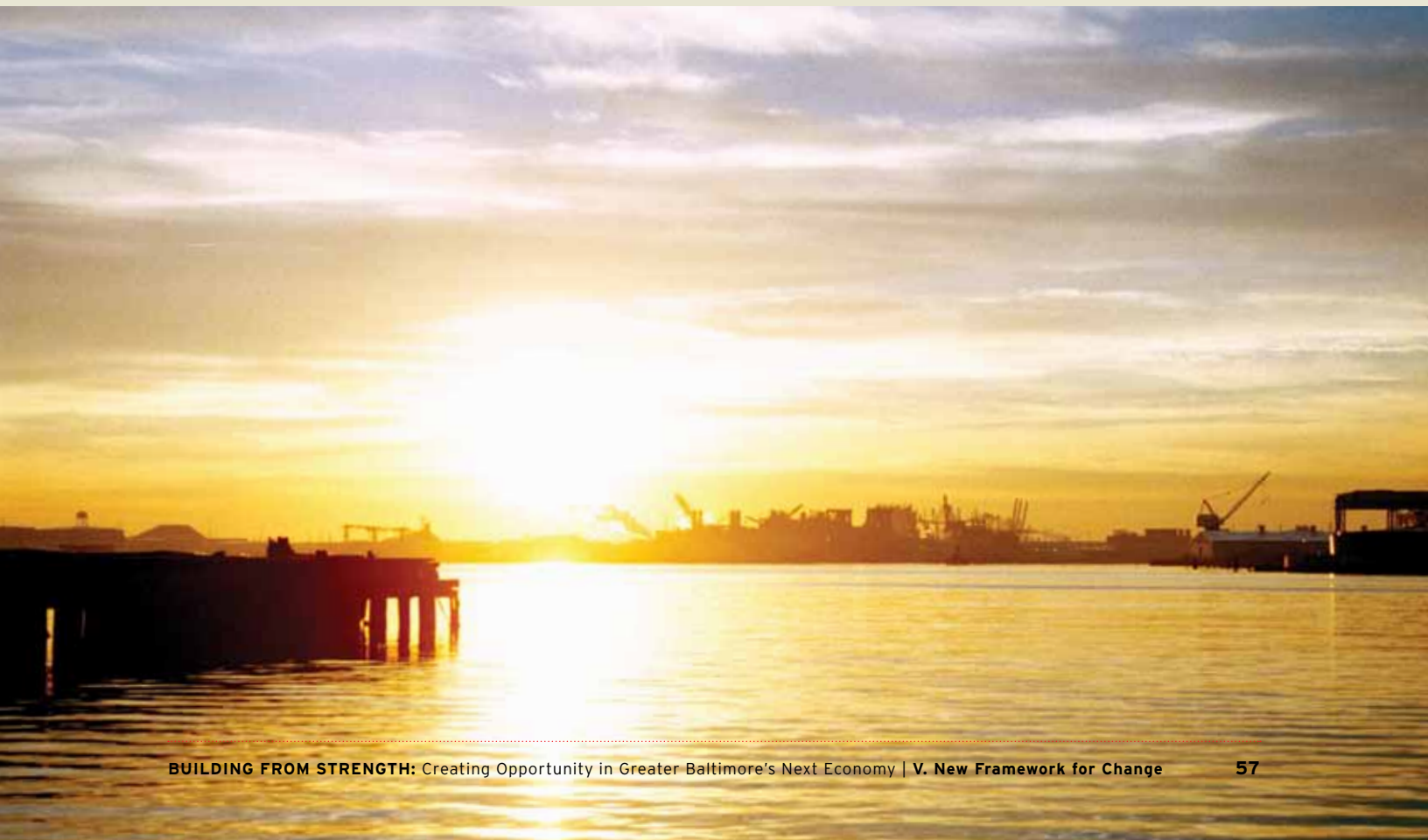
For workers who do not have their own vehicle, public transportation is a crucial but less reliable alternative. Although the region's low-income residents can reach a greater share of metro area jobs using transit than can their higher-income counterparts, getting to work, school, or training on the bus or rail can still be a struggle.<sup>131</sup> For example, while every low-income Baltimore City resident is close to at least one transit stop, public transportation allows them to connect to only about one-half of all jobs in the metro area—and just under one-half of all middle-skill jobs—within a 90-minute time frame. Low-income suburban residents have it far worse, as they can reach less than 28 percent of all metro area jobs within 90 minutes via public transit, and only about 23 percent of middle-skill jobs.<sup>132</sup> What is more, these numbers represent the best-case rush hour scenario.<sup>133</sup> Taking transit at off-peak hours—to, say, a nighttime community college class or an early morning shift at the airport—could take far longer, if services are available at all.

As these statistics make clear, without more careful attention to where jobs are located and how they are served by the region's public transportation system, many training and job opportunities will simply remain geographically off limits to a wide segment of the metro area's low-income population. ■



## V. A New Framework for Change

Perhaps one of the reasons the presentation by the Economic Alliance of Greater Baltimore did not sit quite right with some was that hidden within it were some uncomfortable truths. The first is that a good economy for most does not inevitably create a better economy for all. Indeed, by so many measures, Greater Baltimore has been beating the averages, yet the numbers of low-income people have actually gone up. The second, and most significant, is that a good economy for most can be had even without the participation of many, providing little motivation for regional leaders to seriously evaluate how economic growth impacts regional opportunity.



This certainly does not mean that the plight of low-income residents has been ignored. The public, nonprofit, and philanthropic sectors in Baltimore and throughout the country in fact spend billions of dollars each year trying to plug the holes that the current economy is leaving behind. Many social programs by their very design are intended to help fill the breach between what a person's wage—or lack thereof—allows them to afford and what is actually needed to pay for basic needs. Neighborhood revitalization programs, for their part, focus on bridging the difference between where and in what the private sector will invest and the housing, services, and jobs a healthy community requires. And a range of other programs provide child care or other sources of support that simply stretch workers' resources such that they are able to go to a job each day, even one that does not pay enough to cover all of the expenses associated with having it.

These are vital interventions that have become even more critical during the past several years. And they will always be needed to provide a temporary safety net for individuals and families that fall on hard times, as well as a longer-term catch for those who do not have the intellectual aptitude, emotional stability, good health, or other capacities necessary to move up and out of low-wage work or to hold a job at all. But they are not targeted at expanding opportunity—that is, making greater numbers of middle-wage jobs available and accessible to those who want to get ahead—as much as they try to compensate for that fact that there isn't enough of it.

Creating a better opportunity structure requires a different approach, one focused on investing in the region's next economy and building a workforce that both drives and benefits from its growth.

In the first place, **Greater Baltimore's public, private, and non-profit leaders—along with those of the state—must be far more visionary, far more coordinated, and far more strategic about growing the next-economy industries in which**

**good wage jobs are the norm rather than the exception.** As discussed above, the manufacturing, IT, bioscience, transportation and logistics, and “clean” sectors each hold their own promise for and face their own challenges to growth. But, efforts to strengthen the very next-economy attributes that make these sectors so critical to the region's future will redound to the benefit of them all. To this end, regional leaders, in collaboration with the state, must:

**① Build a stronger export economy.** In an increasingly competitive global economy, Maryland and Greater Baltimore must together invest in the assets that give their companies an edge in the marketplace, and which may in fact be essential to their long term survival. Helping firms to establish the relationships and internal and external infrastructures necessary to export their products or services abroad is one key way to do this.

To increase the region's exports, state and metro area leaders must undertake a rigorous assessment of who is exporting what and to whom, the extent to which existing export promotion activities and organizations are aiding in that process, the major barriers to exporting that companies face, and the kind of additional efforts—from regional infrastructure improvements to targeted technical assistance—that could help to overcome them. Armed with that information, the state and region should then work together to develop a strategy for increasing regional exports, with quantifiable goals and clear measures to evaluate progress. Such a strategy should focus in part on leveraging the resources of existing organizations—of which there are several, as discussed above—such that their impact can be better maximized. For example, through its new Metropolitan Export Initiative, the Brookings Institution Metropolitan Policy Program is working with representatives of several regions around the country, including Los Angeles, Portland, Minneapolis/St. Paul, and Syracuse, to develop metropolitan export plans, the primary goal of which is to improve regional economic performance through strategies aimed

# Creating a better opportunity structure requires a different approach, one focused on investing in the region's next economy and building a workforce that both drives and benefits from its growth.

at spurring export growth.<sup>134</sup> The U.S. Conference of Mayors, meanwhile, is building on this effort by challenging mayors across the country to develop strategies aimed at expanding their cities' export capacity.<sup>135</sup> Greater Baltimore should try to learn from and build on such efforts.

② **Provide greater support for innovation and entrepreneurship.** It is a well-worn fact that that Baltimore must get more ideas out of the laboratory and into the marketplace. At the same time, existing firms—particularly small and middle-sized manufacturers—must constantly be working to harness technologies and innovations that will expand their business opportunities here and abroad.

- **Help new ideas become new businesses.** For budding entrepreneurs, converting research into an innovation requires both a good invention and a good model for ensuring that it reaches the hands of real consumers.

First, Greater Baltimore needs more capital for early-stage technologies that might still be years away from being commercialized.

According to several people interviewed for this report, angel investors in the region are very risk averse and not well coordinated, particularly when compared with their California peers. To change this, the public, non-profit, and private sectors must continue to work together to grow and organize the metro area's angel community and then mobilize it to make the small but crucial early investments that traditional venture capitalists will not. In the meantime, Maryland should look for ways to increase the support for TEDCO and other similar state programs, including new initiatives such as InvestMaryland, which can help to fill funding gaps along the research-to-commercialization continuum. Sometimes even relatively small amounts of funding, when combined with customized support and coaching, can be essential in helping fledgling firms develop a workable business model and then traverse the rocky terrain that exists between developing a proof-of-principal, having a sellable product, growing a customer base, and ultimately, turning a profit.<sup>136</sup>

Second, regional leaders should consider how financial and organizational support for innovation and entrepreneurship can be brought together in one geographic space. Spain's 22@Barcelona innovation district, for instance, focuses on three mutually reinforcing efforts: dedication to advancing innovation-driven clusters in areas such as medical technologies and information and communication technology, entrepreneurship development, and a strong physical plan for creating a high-quality, walkable space to entice businesses and families to locate there. The intentional connections between anchor institutions like universities, incubators, educational and entrepreneurial coaching services, housing, and other amenities are key to the district's success, and they provide a model that Baltimore is well positioned to emulate.<sup>137</sup>

- **Help manufacturers stay on the cutting edge.** To remain competitive, small and middle-sized manufacturers (SMMs) must implement new technologies and the changes in management processes, work organization, and supply-chain relationships that often accompany them. Yet, these firms typically have weak in-house innovation capacity and limited ability to connect to innovations in universities and elsewhere.<sup>138</sup>

To help to fill these gaps, state and regional leaders must better understand and engage with the sector. To this end, they could in the short term incent SMMs to form a consortium focused on promoting manufacturing innovation and helping workforce providers design training programs that meet their needs. Over the longer term, leaders should work with universities—and programs within them such as MTech—the Regional Manufacturing Institute, the Baltimore Industrial Group, and the Manufacturer’s Alliance of Maryland to establish an advanced manufacturing research center in the region. Such a center would assist manufacturers with research commercialization, technology transfer, incubation services, and production innovation and thus help to bridge the gaps between innovation and application that now limit SMMs’ abilities to embrace the latest technological advances.<sup>139</sup> The Center for Integrated Manufacturing Studies at Rochester Institute of Technology and the Connecticut Center for Advanced Technology are two of several domestic institutions that employ elements of such a model, although the 59 Fraunhofer Institutes in Germany are perhaps the best current example of how the combination of such efforts can help to retain high-wage manufacturing jobs.<sup>140</sup>

- ③ **Build on the region’s clean economy strengths.** To compete in the next economy, finally, regional leaders should engage in efforts to advance stronger, faster growth in Greater Baltimore’s emerging clean economy.

The region, aided by the state, should use the data presented here as a platform for more rigorously assessing the metro area’s clean economy strengths and opportunities and any impediments to future growth and development. For example, what is driving the region’s specialization in professional and environmental services? What are the segment’s major markets, and what policy reforms or investments would help to strengthen these? In the Seattle region, for instance, this type of analysis was performed to reveal and then devise a strategy to exploit the strengths of its energy efficiency technologies cluster.<sup>141</sup>

State and local leaders should then use the answers to these types of questions to better target efforts to grow green firms and jobs and to help break down existing regulatory, financial, and other barriers. Such efforts might include, at one end the spectrum, a revamping of government procurement processes to stimulate demand for local green products and services, and at the other, marketing Maryland firms to countries and companies abroad. Over the long term, more fine-grained information about the state’s and the region’s own green assets and challenges could also give Maryland a louder voice in advocating for stronger, more coherent federal policies regarding carbon pricing, renewable energy standards, and other areas that affect local clean economy growth.

These and other strategies aimed at promoting the growth of Greater Baltimore’s next-economy industries are of course only part of the solution. **Growing an opportunity-rich next economy also means ensuring that regional workers have the information, skills, and connections needed to participate in it and that next-economy employers thus have the labor force they need to expand and succeed.** To this end, regional leaders must:

- ④ **Help young and incumbent workers get the skills and education next-economy employers require.** In a rapidly changing economy with



rapidly changing technologies, Greater Baltimore's education and training providers must constantly stay abreast of the specific skills next-economy employers require in their workers, and they must be able to nimbly adapt their curricula to accommodate these needs. More low-income workers then must be able to access these programs and will require support to successfully complete them.

First, the state, together with local school districts, community colleges, and other providers, must continue to develop career and technical education programs in next-economy fields as well as establish strong links between high school and post-secondary schools so that students can seamlessly continue to advance their skills. Research has shown that successful programs provide personalized attention and opportunities for interpersonal collaboration as well as combine a strong academic curriculum with coherent sequences of career-related courses.<sup>142</sup> Perhaps most important, successful programs ensure that formal schooling is accompanied by real-world experience. As several of those who were interviewed for this report emphasized, the public schools, community colleges, and training providers in the area must work much more closely with employers to increase the availability of internships, apprenticeships, mentoring programs, and on-the-job training opportunities. Doing so would provide youth and adults a greater chance to broaden their work horizons, hone their skills, build their resumes, and make connections that could lead to permanent employment.

Second, leaders must also work to ensure that more of those entering community college or other post-secondary training programs—whether straight from high school or after years of work—actually earn a credential. To this end, regional leaders should expand the number of bridge programs, such as the pilot Maryland Integrated Basic Education and Skills Training (MI BEST) program, which allow community college and technical college students to undertake vocational training alongside basic education classes, rather

than requiring that such classes be a prerequisite for any sort of advanced learning. A 2010 analysis of Washington State's I-BEST program, after which MI Best was modeled, found that students who attended community or technical colleges with I-BEST were 7.5 percentage points more likely to earn a certificate within three years and almost 10 percentage points more likely to earn some college credits compared with students who were not exposed to the program.<sup>143</sup>

**5 Build a more coordinated workforce delivery system.** For many low-income workers, the pathway from education and training to a satisfying career is not linear but rather zigs and zags over time and across the various parts of the workforce delivery system. To get more of these residents to participate in the next economy demands that Baltimore create a much more integrated, comprehensive structure to keep them moving forward.

The first step in the process must be to develop an inventory of all the public, private, and nonprofit providers in the workforce development system, the types of programs they offer, the numbers they serve, how successful they are in helping residents secure a decent job, and the industries in which they are landing. Only by doing this can regional leaders begin to identify gaps in the delivery structure—for example, in education and training programs, employer engagement, job-matching services—and then work with providers and employers to help fill them.

Second, and most important, all of the players in the system—businesses, community colleges, government, nonprofit agencies—together must develop a common regional vision and a set of goals against which to measure their joint progress toward not simply serving residents but actually helping them access, maintain, and ultimately create quality employment opportunities in growing sectors.

Although targeted at the “front” end of workforce development spectrum, the Strive Partnership of

Cincinnati and Northern Kentucky offers a good example of how multiple organizations can orient their work around common objectives. Comprising an extensive partnership involving more than 300 civic groups, philanthropies, colleges, public agencies, nonprofits, and businesses, Strive's "cradle-to-career" approach to improving educational outcomes attempts to coordinate every service and support that children and adolescents need at every stage of their education and development. What is unique about this effort is the set of shared goals among the organizations and the joint responsibility for meeting them.<sup>144</sup>

**⑥ Improve low-income workers' ability to get to next-economy jobs.** To broaden participation in the next economy, finally, regional leaders must work to both bring low-income people to jobs and bring jobs to low-income communities. To this end, a regional vision and strategy for economic growth as is outlined in this report must identify not only the types of industries and jobs that

Greater Baltimore must create, but also *where* in the region that growth should occur.

This is not just about preserving environmental and fiscal resources. Such planning is essential to help determine how land use, transportation, and infrastructure investments should be targeted to better align and in some areas help spur residential and business development while also helping to improve physical connectivity between people and jobs. Integrating existing state and local efforts to foster transit-oriented development in the metro area into a next-economy economic development strategy will be critical to this process, as will the continued build-out of transportation infrastructure such as the proposed Red Line. In the meantime, state and local government officials should work to make both existing and planned public transportation systems better connect people to locations where jobs are concentrated and growing.<sup>145</sup> ■

## CHANGE AND EFFECT

So what might the potential outcome be if Maryland's and Baltimore's government, nonprofit, business, university, and philanthropic leaders together stepped up to this challenge?

A 2010 report by Anthony Carnavale of the Georgetown University Center on Education and the Workforce helps to put some numbers on it. According to his analysis, in 2018 Maryland will have approximately 465,000 computer, engineering, life sciences, production, and transportation and material moving jobs. About 290,000 (62 percent) of these will require an associate's degree or less.<sup>146</sup> An additional 5 percent, 10 percent, or 15 percent of these low- to middle-skilled occupations would mean an additional 14,500, 30,000, or 43,500 mostly decent-wage jobs in the region, in just these few next-economy fields alone.

These are rough estimates, to be sure, but they do provide some sense of how efforts to improve the region's export capacity, invest in the growth of innovative firms, and expand the clean economy could have a real impact on the state's and region's opportunity structures, provided that such efforts are matched with those aimed at ensuring that low-income people have the ability to connect to jobs in growing fields.

## VI. Conclusion

For the approximately 77 percent of Greater Baltimore's population that is considered middle and upper class, the region's economic status quo has generally been satisfactory. But for how much longer? With both short- and long-term reductions in defense and other types of federal spending looming, the Baltimore metro area is going to take a hit. The question is just how hard that blow will strike.<sup>147</sup> Meanwhile, the competition to expand and attract innovative, globally oriented, clean technology firms and jobs will only become more intense. If Greater Baltimore does not pull together to better leverage its next-economy strengths, not only will it squander the chance to improve opportunity for low-income Baltimoreans, it may, over the long run, diminish it for everyone.



Improving the opportunity structure of a regional economy will not be realized as a result of isolated interventions of individual people or organizations.



However, it doesn't have to be this way. When four-term Baltimore mayor (and two-term Maryland governor) William Donald Schaefer died last year, the media's retrospectives focused on his vision for transforming what was at the time a city beset with troubles and highlighted the intensity and impatience he had when it came to implementing it. His ideas for creating Harborplace, the National Aquarium, and, as governor, light rail, Camden Yards, and M & T Bank Stadium were bold and ultimately significant contributions to the city's and the region's revitalization. As important as these developments were, however, these projects were discrete and generally well defined, and they were able to come about in part through Schaefer's own authority and tenacity. Improving the opportunity structure of a regional economy, by contrast, is a far bigger and more complicated proposition and will not be realized as a result of isolated interventions of individual people or organizations. Rather, as John Kania and Mark Kramer argue in a recent paper in the *Stanford Social Innovation Review*, "alleviating many of our most serious and complex social problems" demands a "collective impact" strategy—a long-term commitment by a group of important actors from different sectors that have a shared vision for change and a joint approach for reaching it through agreed-upon actions<sup>148</sup>

As Kania and Kramer point out, such efforts do not often take hold, "not because they are impossible, but because [they are] so rarely attempted." Greater Baltimore has the institutional strength and organizational capacity to bring about the type of large-scale social and economic changes suggested in these pages, if it has the will to do so. Will it try, then, to be an exception to the rule? ■



# Endnotes

1. A revised version of the presentation is available at [www.greater-baltimore.org/](http://www.greater-baltimore.org/)
2. Howard Wial and Richard Shearer, "Metro Monitor: Tracking Economic Recession and Recovery in America's 100 Largest Metro Areas" (Washington: Brookings Institution, 2011) ; MetroMonitor is a quarterly publication analyzing economic statistics in the 100 largest U.S. metro areas. It began in 2009.
3. Michael E. Porter and Mark R. Kramer, "Creating Shared Value: How to reinvent capitalism—and unleash a wave of innovation and growth" (Cambridge: *Harvard Business Review*, 2011).
4. American Community Survey 2009, "1-Year Estimate" and Census 2000.
5. "MetroMonitor." (Brookings).
6. American Community Survey 2009, "1-Year Estimate."
7. U.S. Census Bureau. Some research has found that setting the definition of "low income" at twice the federal poverty line more accurately reflects families' ability to afford essentials, including food, housing, transportation, and health care, than the more conservative poverty threshold. See, for example, Sylvia Allegretto, "Basic Family Budgets: Working Families' Budgets Often Fail to Meet Living Expenses Around the U.S." (Washington: Economic Policy Institute, 2005); Jared Bernstein, Chauna Brocht, and Maggie Spade-Aguilar, *How Much Is Enough? Basic Family Budgets For Working Families* (Washington: Economic Policy Institute, 2000); The Working Poor Families Project, "Still Working Hard, Still Falling Short: New Findings on the Challenges Confronting America's Working Families" (2008); Gregory Acs and Pamela Loprest, "Who Are Low-Income Working Families?" (Washington: Urban Institute, 2005).
8. American Community Survey 2009, "1-Year Estimate" and Census 2000.
9. American Community Survey 2009, "1-Year Estimate." The metro area's six suburban counties are home to a larger overall share of the region's low-income residents (54.4 percent) than the city (45.6 percent), but low-income residents make up a far smaller share of the total suburban population (16.5 percent) than the city population (43.9 percent).
10. American Community Survey 2009, "1-Year Estimate." Includes low-income residents aged 16 years or older that were in the labor force but were not necessarily consistently working.
11. Ibid. The remaining 3 percent of low-income residents were either unemployed for the entirety of the past 5 years or had never been employed.
12. Ibid. These numbers are based on the industry in which a worker is currently or was most recently employed during the 2005 to 2009 period.
13. Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics. Low-wage jobs are defined here as those in which the median wage is below 80 percent of the metro area median, or less than \$34,600.
14. Jim Tankersley, "The Phantom 15 Million," *National Journal*, January 21, 2011.
15. Brookings analysis of Moody's Analytics data.
16. Ibid.
17. These numbers effectively mean that Greater Baltimore's relatively sluggish overall job growth in the 1990s came at the expense of jobs in the middle and especially at the higher end of the pay scale. In fact, during the 1990s, the number of jobs in the region's highest wage industries actually declined by 3 percent.
18. Brookings analysis of Moody's Analytics data.
19. Ibid.
20. Ibid.
21. Michael Spence and Sandile Hlatshwayo, "The Evolving Structure of the American Economy and the Employment Challenges." Working Paper. (Council on Foreign Relations, 2011). See also Steven Pearlstein, "Key to job growth, equality is boosting tradable sector of the economy" *Washington Post*, March 12, 2011, and Michael Greenstone and Adam Looney, "A Dozen Economic Facts About Innovation" (Washington: Brookings Institution and The Hamilton Project, 2011).
22. Tankersley, "The Phantom 15 Million" and Greenstone and Looney, "A Dozen Economic Facts About Innovation."

23. Tankersley, "The Phantom 15 Million."
24. Greenstone and Looney, "A Dozen Economy Facts About Innovation."
25. Emilia Istrate and Nicholas Marchio, "Export Nation 2012" (Washington: Brookings Institution, 2012).
26. Anthony P. Carnavale and Stephen J. Rose, "The Undereducated American" (Washington: Georgetown University, 2011).
27. Tankersley, "The Phantom 15 Million."
28. Bureau of Economic Analysis and Bureau of Labor Statistics.
29. Pearlstein, "Key to Job Growth, Equality is Boosting Tradable Sector of the Economy."
30. National Science Foundation, "Academic Research and Development Expenditures: Fiscal Year 2009." In 2009, colleges and universities in Maryland expended over \$3 billion on research and development in science and engineering fields. Expenditures at the Johns Hopkins University, which includes the Applied Physics Laboratory, accounted for \$1.86 billion of that amount, and expenditures at the University of Maryland, Baltimore, accounted for \$359.5 million (ranking it 52<sup>nd</sup> out of over 700 universities). The University of Maryland, Baltimore County (UMBC), part of the University of Maryland Biotechnology Institute, the U.S. Naval Academy, Morgan State University, the University of Baltimore, and Towson University accounted for the most of the additional university research and development expenditures in the metro area.
31. Kauffman Index of Entrepreneurial Activity, 1996 to 2010.
32. Mark Muro, Jonathan Rothwell, and Devashree Saha, "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" (Washington: Brookings Institution, 2011).
33. An export industry is clustered in a metro area if its total export value represents a greater share of the metro economy than it does for the U.S. economy as a whole. Emilia Istrate, Jonathan Rothwell, and Bruce Katz, "Export Nation" (Washington: Brookings Institution, 2010).
34. Innovative industries were identified using a composite ranking of indicators measuring the following: product innovations, research and development, scientists and engineers, productivity, patents, and royalties. Industries at the three-digit North American Industry Classification System (NAICS) level with at least three sources for measurement were ranked against other industries by each indicator. These ranks were then compiled and averaged to develop a composite ranking of the most innovative industries. Data on process innovations were obtained from the National Science Foundation (NSF) Division of Science Resources Statistics' Business Research and Development and Innovation Survey, which measured the number of companies with a product or process innovation from 2006 to 2008 at the national level. The number employed in science and engineering occupations were selected from BLS Occupational Employment Statistics 2009, using the NSF definition of high-tech occupations available at [www.nsf.gov/statistics/seind10/appendix.htm#3](http://www.nsf.gov/statistics/seind10/appendix.htm#3) and allocated to industry. Productivity was calculated as percent change in gross domestic product per job, using Bureau of Economic Analysis from 2001 to 2007. Patent data were obtained from the U.S. Trade and Patent Office (USPTO). The total number of royalties on intellectual property by industry was pulled from U.S. Internal Revenue Service 2007 Data on Research Credits and Royalties. See also Susan Helper, Timothy Krueger, and Howard Wial, "Why Does Manufacturing Matter? Which Manufacturing Matters? A Policy Framework" (Washington: Brookings Institution, 2012).
35. U.S. News Best Hospitals 2011-12, available at <http://health.usnews.com/best-hospitals/rankings> Services rendered to patients who come to Baltimore hospitals are measured as exports.
36. Such growth can occur not only from medical tourism -i.e., the attraction of international patients to area hospitals - but also from medical-related conventions and other meetings. The Baltimore Convention Center, for example, hosted approximately 20 such events in 2011. (Personal communication from Joel Boerger, Administrative Assistant, Baltimore Convention Center, August 4, 2011.)
37. The manufacturing sector as defined here includes all industries in North American Industry Classification System (NAICS) codes 31-33.
38. Brookings analysis of Moody's Analytics data.
39. Brookings analysis of Moody's Analytics and Battelle Technology Partnership Practice and Biotechnology Industry Organization (BIO) data.
40. U.S. Census Bureau, County Business Patterns, 2008.
41. Brookings analysis of Moody's Analytics data.

42. Author's analysis of U.S. Bureau of Economic Analysis data.
43. Hank Robison, "Why We Can't Shun Manufacturing for the Service Sector," [www.newgeography.com](http://www.newgeography.com), March 16, 2011.
44. Ross DeVol and others, "Manufacturing 2.0: A More Prosperous California," The Milken Institute, June 2009, cited in Ezell and Atkinson, "The Case for A National Manufacturing Strategy."
45. Maryland Department of Labor, Licensing, and Regulation, Occupational Projections 2008-2018.
46. Brookings analysis of Moody's Analytics data.
47. Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data.
48. Manufacturers' Alliance of Maryland, "Manufacturing in Maryland: The Cornerstone of Shared Prosperity" (2008).
49. Istrate and Marchio, "Export Nation 2012"; Manufacturers' Alliance of Maryland, "Manufacturing in Maryland: The Cornerstone of Shared Prosperity-And Update" (2011).
50. Istrate and Marchio, "Export Nation 2012."
51. Personal Communication from Elizabeth Hines, Director of Foreign Trade Zone, Enterprise Zone Administrator, Baltimore Development Corporation, July 13, 2011.
52. Personal communication from Mark Rice, President, Maritime Applied Physics Corporation, May 23, 2011; Maryland Department of Transportation, "Maryland Statewide Freight Plan" (2009); Baltimore Industrial Group, available at [www.baltimoreindustrialgroup.org](http://www.baltimoreindustrialgroup.org).
53. The information technology (IT) sector as defined here includes 14 occupations in Bureau of Labor Statistics Occupational Employment Statistics job code 15 (Computer and Mathematical Occupations) and 1 occupation each in codes 11 (Management Occupations), 17 (Architecture and Engineering Occupations), and 43 (Office and Administrative Support Occupations). This definition follows that used in Economic Alliance of Greater Baltimore, "Information Technology in Greater Baltimore," 2008.
54. Economic Alliance of Greater Baltimore, IT Industry Profile, available at [www.greaterbaltimore.org/Publications/Industry-Profiles.aspx](http://www.greaterbaltimore.org/Publications/Industry-Profiles.aspx).
55. Bureau of Labor Statistics Occupational Employment Statistics.
56. Economic Alliance of Greater Baltimore, "Information Technology in Greater Baltimore."
57. Jamie Smith Hopkins, "Phase 1 is Done," *Baltimore Sun*, September 11, 2011; Maryland Department of Labor, Licensing, and Regulation, "Pathways to Cyber Consortium Celebrates First Anniversary of Training Maryland Workers for Cyber Economy," July 20, 2011.
58. Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics.
59. Ibid.
60. Ibid.
61. Maryland Department of Labor, Licensing, and Regulation, Maryland Occupational Projections 2008-2018, available at [www.dllr.state.md.us/Imi/iandoproj/](http://www.dllr.state.md.us/Imi/iandoproj/)
62. Integrated Postsecondary Education Data System State Data Center, 2008-2009.
63. Personal communication from Neil Davis, Vice President for Operations, Emerging Technology Centers, July 5, 2011.
64. Economic Alliance of Greater Baltimore, "Information Technology in Greater Baltimore."
65. For more information, see the ICBN website at <http://onemaryland-icbn.org/>
66. See, for example, Governor's Workforce Investment Board, "Maryland's Health Information Technology Workforce Task Force Report and Findings" (2010).
67. Except where noted, the bioscience sector as defined here follows the definition developed by Battelle and adopted by the Biotechnology Industry Organization (BIO). It includes four major subsectors that engage in core bioscience activity: agricultural feedstock and chemicals (which represents a very small portion of Baltimore's bioscience industry); drugs and pharmaceuticals; medical devices and equipment; and research, testing, and medical laboratories. Each of the four sectors comprises six-digit-level NAICS industries.

68. Data provided by Battelle Technology Partnership Practice and the Biotechnology Industry Organization (BIO).
69. See the Maryland BioStat Map, available at [www.marylandbiocenter.org/Bioscience%20of%20Maryland/Pages/biostatmap.aspx](http://www.marylandbiocenter.org/Bioscience%20of%20Maryland/Pages/biostatmap.aspx), and the Maryland Bio Directory, available at [www.marylandbiocenter.org/Bioscience%20of%20Maryland/Pages/marylandbiodirectory.aspx](http://www.marylandbiocenter.org/Bioscience%20of%20Maryland/Pages/marylandbiodirectory.aspx).
70. Battelle Technology Partnerships Practice and the Biotechnology Industry Organization (BIO).
71. Battelle/Biotechnology Industry Organization (BIO) "State Bioscience Initiatives" (2010).
72. Battelle Technology Partnership Practice, "Maryland Life Sciences Strategic Plan: The Current Competitive Position of Maryland" (2009); author's analysis of Battelle data.
73. National Science Foundation, "Academic Research and Development Expenditures: Fiscal Year 2009," available at [www.nsf.gov/statistics/nsf11313/pdf/nsf11313.pdf](http://www.nsf.gov/statistics/nsf11313/pdf/nsf11313.pdf).
74. Economic Alliance of Greater Baltimore, "Biosciences in Greater Baltimore" (2007).
75. Given data limitations, the definition of bioscience used to determine occupations and wages differs slightly from the Battelle definition employed above. It includes all of those working in the North American Industry Classification System (NAICS) categories 3254 (pharmaceutical and medical manufacturing), 3391 (medical equipment and supplies manufacturing), and 5417 (scientific research and development services); Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data.
76. Ibid.
77. Ibid.
78. See, for example, Maryland Life Sciences Advisory Board, "BioMaryland 2020: A Strategic Plan for the Life Sciences in Maryland" (2009); Greater Baltimore Committee, "The Biotech Report" (2011); Battelle Technology Partnership Practice: "Maryland Life Sciences Strategic Plan;" Economic Alliance of Greater Baltimore, "Bioscience in Greater Baltimore."
79. Battelle Technology Partnerships Practice and the Biotechnology Industry Organization (BIO).
80. Greater Baltimore Committee, "The Biotech Report."
81. Ibid. See also Michael Knapp, "Turn Life Sciences Research into Jobs" *Baltimore Sun*, October 5, 2011.
82. The clean economy is defined here by using the method developed by the Brookings Institution with the Battelle Technology Partnership Practice. See See Mark Muro, Jonathan Rothwell, and Devashree Saha, "Sizing the Clean Economy: A National and Regional Green Jobs Assessment" (Washington: Brookings Institution, 2011).
83. Muro and others, "Sizing the Clean Economy: A National and Regional Green Jobs Assessment."
84. Data derived from the Brookings/Battelle Clean Economy Database.
85. Ibid.
86. Ibid.
87. Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Brookings-Battelle Clean Economy Database.
88. Ibid. Mid- to high-paying jobs are defined here as paying at least 80 percent of the area median.
89. Bloomberg New Energy Finance, cited in Muro, Rothwell, and Saha, "Sizing the Clean Economy."
90. See, for example, [www.baltimoresustainability.org](http://www.baltimoresustainability.org), [www.howard-countymd.gov/Departments.aspx?Id=4294967856](http://www.howard-countymd.gov/Departments.aspx?Id=4294967856), and [www.harfordcountymd.gov/Green/](http://www.harfordcountymd.gov/Green/)
91. [www.mpa.maryland.gov/content/green-port.php](http://www.mpa.maryland.gov/content/green-port.php); Lorraine Mirabella, "Port of Baltimore Goes Green" *Baltimore Sun*, March 7, 2011; [www.bccenter.org/index.php?target=70](http://www.bccenter.org/index.php?target=70); Personal communication from Stuart Fitzgibbon, Refinery Manager, Domino Sugar, and Chairman, Baltimore Industrial Group, July 11, 2011.



92. Walaika Haskins, "Baltimore Medical Systems New Headquarters Receives LEED-Platinum Certification" *BMore Media*, August 3, 2010, available at <http://bmoremedia.com/innovationnews/bmsleedplatinumcertification080310.aspx>
93. "Transportation and logistics" is defined here as all of those industries included in North American Industry Classification System (NAICS) categories 48-49 (transportation and warehousing), except pipeline transportation, scenic and sightseeing transportation, and transit and ground passenger transportation. Many workers in these latter three subsectors are included in the category "clean economy."
94. For a detailed analysis of Maryland's freight system, see the Maryland Department of Transportation, "Maryland Statewide Freight Plan" (2009).
95. Brookings analysis of Moodys Analytics data.
96. Maryland Port Administration, "The Economic Impacts of the Port of Baltimore" (2008); Maryland Aviation Administration and BWI, "The Regional and Local Economic Impact of the Baltimore/Washington International Thurgood Marshall Airport and the Statewide General Aviation Systems" (2007).
97. Brookings analysis of Moody's Analytics data. Documents produced by the Port of Baltimore, for example, show that general cargo moving through the port declined nearly 20 percent between 2008 and 2009.
98. Maryland Port Administration, "The Economic Impacts of the Port of Baltimore" and "Activity at the Port Drives Maryland's Economy," available at <http://port.thinkport.org/allabouttheport/jobs.asp>.
99. Maryland Aviation Administration and BWI, "The Regional and Local Economic Impact of the Baltimore/Washington International Thurgood Marshall Airport and the Statewide General Aviation Systems."
100. Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data; Anne Arundel Community College, "Careers That Are Going Somewhere" fact sheet.
101. Ibid.
102. Donald C. Fry, "Port Surge: Seagirt Improvements Spawn Optimism around Baltimore's Waterfront" *CityBiz Real Estate*, June 19, 2011; the Maryland Port Administration, "Governor O'Malley Announces Port of Baltimore Bounces Back with Strong Recovery in 2010," May 12, 2011.
103. Maryland Port Administration, available at <http://mpa.maryland.gov/>.
104. Maryland Department of Transportation, "Maryland Statewide Freight Plan."
105. Michael Dresser, "Travel at BWI Setting Records" *Baltimore Sun*, August 3, 2011.
106. Brookings analysis of Bureau of Labor Statistics Occupational Employment Statistics and Moody's Analytics data.
107. Ibid.
108. Ibid.
109. Only 4.3 percent of low-income people were employed in manufacturing, for example, and only 4.1 percent were employed in professional, scientific, and management jobs, which include (but are not limited to) research and development and many information technology jobs.
110. See, for example, Biotechnology Industry Organization (BIO), "Enhancing America's Competitive Edge," available at [www.bio.org/content/enhancing-americas-competitive-edge](http://www.bio.org/content/enhancing-americas-competitive-edge).
111. Ezell and Atkinson, "The Case for a National Manufacturing Strategy."
112. CLASP, "Keeping Youth Connected: Focus on Baltimore" (2011); Brookings Institution Concentrated Poverty data set, 2011.
113. See Shayne Spaulding, "Getting Connected: Strategies for Expanding the Employment Networks of Low-Income People" (Philadelphia: Public/Private Ventures, 2005).
114. The Boston Consulting Group, "Realizing the New Agenda for Minority Business Development" (2005); personal communication from Diane Bell-McKoy, President and CEO, Associated Black Charities, March 28, 2011; U.S. Census Bureau, "2007 Survey of Business Owners." Racial data on the ownership of the region's next-economy businesses are not readily available.

115. CLASP, "Keeping Youth Connected."
116. American Community Survey 2009, "1-Year Estimate."
117. Liz Bowie and Erica L. Green, "State Sees Highest Graduation Rate in Past 15 Years" *Baltimore Sun*, September 30, 2011; American Community Survey 2009, "1-Year Estimate."
118. Ibid.
119. Maryland Higher Education Commission, "Retention, Graduation, and Transfer Rates at Maryland's Community Colleges" (2011).
120. Ibid.
121. Maryland Life Sciences Advisory Board, "BioMaryland 2020."
122. See Donald Fry, "Despite Education Acclaim, Maryland Faces Workforce Development Challenges" GBC News, July 22, 2011.
123. See [www.biotechmd.org/](http://www.biotechmd.org/) and [www.secondchanceinc.org/index.aspx](http://www.secondchanceinc.org/index.aspx).
124. Personal communication from Diane Bell-McKoy, President and CEO, Associated Black Charities, March 28, 2011; Jason Perkins-Cohen, Executive Director, Job Opportunities Task Force, May 3, 2011; Eric Seleznow, State Policy Director, National Skills Coalition, August 12, 2011; and others.
125. For more information, see the TIME Center website at <http://time-center.org/index.html>.
126. Personal communication from Mark Rice, President, Maritime Applied Physics Corporation, December 1, 2011.
127. "Jobs rich" is defined as any tract in which the ratio of jobs to population exceeds that of the metro as a whole. Tract-level employment and population data are derived from Brookings Institution analysis of Nielsen Business-Facts data from the 2<sup>nd</sup> quarter of 2010 and the American Community Survey.
128. The Brookings Institution, "State of Metropolitan America Indicator Map" (2011), available at [www.brookings.edu/metro/StateOfMetroAmerica/Map](http://www.brookings.edu/metro/StateOfMetroAmerica/Map).
129. Adie Tomer and Robert Puentes, "Transit Access and Zero Vehicle Households" (Washington: Brookings Institution, 2011).
130. As of this writing, a bill to modify adult driver's licensing requirements is awaiting the governor's signature. Until now, Maryland was the only state that required all new drivers to complete the same driver's education and practice requirements, and all new drivers had to complete 60 hours of supervised practice in addition to 36 hours of driver's education before being eligible for a license. Michael Dresser, "Bill Would Ease Driver License Rules for Adults" *Baltimore Sun*, March 7, 2011.
131. Baltimore ranks 59<sup>th</sup> out of the largest 100 metropolitan areas based on the share of jobs accessible by transit within 90 minutes. Adie Tomer and others, "Missed Opportunity: Transit and Jobs in Metropolitan America" (Washington: Brookings Institution, 2011); Brookings analysis of transit agency, Nielsen Pop-Facts 2010, and Nielsen Business-Facts data.
132. Brookings analysis of transit agency, Nielsen Pop-Facts 2010, and Nielsen Business-Facts data.
133. The analysis examined travel times from 6:00 am to 9:00 am.
134. For more information, see [www.brookings.edu/projects/state-metro-innovation/about\\_MEI.aspx](http://www.brookings.edu/projects/state-metro-innovation/about_MEI.aspx).
135. Dave Gatton, "Mayors Launch Metro Exports, Port Initiative" U.S. Mayor, January 30, 2012.
136. Joseph Patrick Bulko, "Tech Transfer: The Next Great Jobs Generator?" Special Market Report: The Biotech Report (Baltimore: Greater Baltimore Committee, 2010); Newt Fowler, "Incubation: A Conversation with Ann Lansinger of The Emerging Technology Center" *CityBiz Real Estate*, May 8, 2011; Gus G. Sentementes, "New Fund Targets Baltimore Tech Start-Ups" *Baltimore Sun*, March 5, 2012.
137. For more information, see Public Sector Consultants and The Brookings Institution, "Michigan's Urban and Metropolitan Strategy" (2012).
138. Susan Helper and Howard Wial, "Accelerating Advanced Manufacturing with New Research Centers," (Washington: Brookings Institution, 2011).
139. This idea draws directly from Helper and Wial, "Accelerating Advanced Manufacturing with New Research Centers."

140. Ibid. See also [www.ccat.us/](http://www.ccat.us/), [www.rit.edu/gis/research-centers/cims/](http://www.rit.edu/gis/research-centers/cims/), and [www.fraunhofer.de/en/about-fraunhofer.html](http://www.fraunhofer.de/en/about-fraunhofer.html).
141. The Brookings Institution, "Innovation Meets Demonstration: A Prospectus for Catalyzing Growth in the Puget Sound Energy Efficiency Technology Cluster" (2011), available at [www.brookings.edu/~media/Files/rc/papers/2010/12\\_metro\\_business\\_muro/12\\_metro\\_business\\_puget.pdf](http://www.brookings.edu/~media/Files/rc/papers/2010/12_metro_business_muro/12_metro_business_puget.pdf).
142. See, for example, James J. Kemple, "Career Academies: Long-Term Impact on Labor Market Outcomes, Educational Attainment, and Transitions to Adulthood" (New York: MDRC, 2008).
143. Matthew Zeidenberg, Sung-Woo Cho, and Davis Jenkins, "Washington State's Integrated Basic Education and Skills Training Program (I-BEST): New Evidence of Effectiveness" (New York: Community College Research Center, 2010).
144. See [www.strivetoegether.org/](http://www.strivetoegether.org/). See also Kelly Bathgate, Richard Lee Colvin, and Elena Shiva, "Striving for Student Success: A Model of Shared Accountability" (Washington: EDUCATIONSECTOR, 2011).
145. Personal communication from Brian O'Malley, Director of Transportation Policy and Research, Central Maryland Transportation Alliance, March 30, 2012.
146. Anthony P. Carnavale, "Help Wanted: Projections of Jobs and Education Requirements through 2018" (Washington: Georgetown University, 2010). See the State Level Analysis, available at <http://cew.georgetown.edu/jobs2018/states/>.
147. Blueprint Maryland, "Maryland's Business Climate and Vulnerability to Federal Downsizing" (2011); Jay Hancock, "Budget Deal Marks End of Maryland's Federal Spree" *Baltimore Sun*, August 1, 2011. Jamie Smith Hopkins, "Defense Belt-Tightening Costing Maryland Jobs" *Baltimore Sun*, May 18, 2011.
148. John Kania and Mark Kramer, "Collective Impact" *Stanford Social Innovation Review*, Winter 2011.







**B** | Metropolitan Policy Program  
at BROOKINGS

telephone 202.797.6139

fax 202.797.2965

web site [www.brookings.edu/metro](http://www.brookings.edu/metro)

BROOKINGS