THE NEW FACE OF ADVANCED MANUFACTURING
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A MESSAGE FROM WILLIAM P. GETTY

For someone born in Pittsburgh in 1945, whose father, grandfather, and great-grandfather worked in the steel industry, and who practiced law here as the steel industry changed utterly, “The New Face of Advanced Manufacturing” is a topic that triggers mixed memories. It is tempting to imagine a recaptured past, and to write about the extraordinary emotional connection people felt—despite hardships, stresses, and environmental challenges—to a place where things were made, and made with tremendous energy at massive scale. That was our region.

But this year’s report is about the future of manufacturing. For both better and worse, the future of manufacturing will not be its past. For better, modern manufacturing will be cleaner and, of necessity, more nimble, to adapt and survive the inevitable changes to come. But for worse, it seems certain that manufacturing will never be the employment engine that it once was, although if crackers are built and new industries are developed to make innovative products from feedstock made from shale gas, the employment impact will be significant.

People everywhere in the United States are talking about rejuvenating manufacturing. However, the chances to do so in this region are more significant than in most. We are close to more than half of the people in North America, and this proximity will be a major driver in future decisions as to where manufacturing is located. We have strong universities and corporate research to drive innovation; leadership positions in significant areas such as robotics, additive manufacturing, and materials science; a strong and diversified energy sector; a legacy of advanced manufacturing that is still vibrant; and, most basic but certainly not least important, a relative abundance of water. And as you will read in the following pages, we in this region understand that an educated workforce is a factor that is becoming and must remain a competitive advantage.

Whatever the future of manufacturing may look like, and whatever its rates of employment may be relative to production, there is good reason to think that this region will capture a lion’s share. The following report is about this opportunity, and about some of the challenges we face in seizing the opportunity and the many ways in which these challenges are being addressed.

Advanced manufacturing is going to happen. Hopefully, sustained efforts like these will cause it to thrive in this region and, in that respect, take us back to the future.

William P. Getty, President
Chartiers Valley School District is proving that an early introduction to manufacturing creates broader career choices for all youth.
At Chartiers Valley Middle School in suburban Pittsburgh, the end of April brought a deadline for student projects light years away from the lumpy baking-soda volcanoes of past science fairs.

Four sixth-graders manned the school’s 3-D printer to manufacture crush-proof cases for their cell phones. Two sixth-grade teams challenged each other in a hydraulics competition, simulating the transport of hazardous waste. A group of seventh-graders analyzed WiFi feedback from a wind turbine, calculating kilowatt hours produced in varied weather conditions. And eighth-graders displayed the frosty results of their Penguin Project, inventing a device to preserve a 10-gram ice cube surrounded by 160-degree heat for 20 minutes.

“Here, manufacturing is a requirement,” explains Leslie Fields, coordinator of special programs, as she walks briskly through a corridor of the high school’s STEM wing, where students tackle projects in science, technology, engineering, and mathematics.

Chartiers Valley’s plan for early immersion in engineering principles allows hesitant middle schoolers to solve practical problems while meeting national STEM standards. The district’s Gateway to Technology program segues neatly into the high school Engineering Academy, a two-year-old series of electives taught by specially certified teachers. With early exposure in middle school, more ninth-graders are willing to continue engineering studies. In fall 2014, 29 freshmen enrolled in Introduction to Engineering, compared to only one in each of the previous two years.

“We’ve taken the program from wood shop to four advanced placement classes, and tech ed, through design, materials, and creation,” says Andy Poppelreiter, an applied engineering teacher at the high school.
Fifty-eight percent of Chartiers Valley graduates plan to attend four-year colleges; nearly 20 percent select two-year colleges, while 13 percent enter the workforce. The grounding is designed to engage them all; the program doesn’t segregate students between college prep and vo-tech.

Chartiers Valley is proving that an early introduction to manufacturing creates broader career choices for all youth. That theory is being tested across the region, with positive results.

At Pittsburgh’s Children’s Museum, a workshop that engages even preschoolers in designing and making simple products has boosted attendance and gained national interest. High school students at Western Area Career & Technology Center in Washington County, Pennsylvania, are gaining world-class certifications that position them for flexible career paths. And adult learners are taking advantage of West Virginia’s new investment in workplace simulators to train for new careers.

All these ventures are part of a long-term strategy to revive an aging manufacturing sector in western Pennsylvania and West Virginia. Skilled workers are retiring, and younger candidates lack the skills to take their place.

“We need a critical mass of skilled people, or manufacturing will vanish,” says Jeff Kelly, a Westmoreland County precision manufacturer.

The history of manufacturing has been a relentless march toward higher productivity. Since World War II, every recession has eliminated factories and reduced employment. That was especially true of the most recent downturn, when manufacturing payrolls dropped to only 12 million Americans. Although the value of goods produced has since rebounded to 2007 levels, employment has not. The new reality is that contemporary manufacturing, aided by robots, requires fewer, better-trained workers.

Kelly uses the analogy of farming to explain the issue. “One hundred years ago, the country had millions of farmers. Now, with the massive increase in agricultural productivity, only two percent of Americans live on a farm. But clearly, we still need some farmers! The same applies to manufacturing,” he says. After a $250,000 technology investment a few years ago, his company has reduced the worker time needed to produce a complex part from 45 minutes to six minutes.

The region’s 20th-century decline in manufacturing jobs has been well documented. Manufacturing employed 25 percent of all southwestern Pennsylvanians in the 1970s, compared to 8 percent today. However, the slide continues. From 2013
After building paper gliders, students test them against the competition.
The Children’s Museum of Pittsburgh is gaining national attention for its hands-on MAKESHOP®.
to 2014, southwestern Pennsylvania lost 2,100 manufacturing jobs; while jobs in the sector have held relatively steady in West Virginia, it represents only six percent of the state’s economy and is forecast to decline.

To advance manufacturing, the region must proceed on several fronts simultaneously, providing an effective education pipeline, capital, and smart support for manufacturers. The Benedum Foundation is among the organizations encouraging those efforts across the region. Though the verdict on success may be a decade in the future, promising regional experiments are underway.

President Barack Obama acknowledged those efforts during a trip to Community College of Allegheny County in April. “We’ve got to move away from what our Labor Secretary, Tom Perez, calls a ‘train and pray’ approach: We train them and we pray that they can get a job. Students, when they go to a community college or a four-year university, they’re taking out debt. They’re straining their budgets. We’ve got to make sure that it pays off for them. So we need to take a job-driven approach. … That’s what you’re doing here.”

**RESOURCES, TALENT, AND LOCATION**

A confluence of factors is driving the current demand for programs to advance manufacturing in western Pennsylvania and West Virginia: resources, talent, and location.

The energy boom in the region has stimulated demand for job skills that apply equally to manufacturing and shale drilling. That opportunity has prompted employers to collaborate with educators to design flexible curricula and has jump-started workforce development for adults. Another plus is the concentration of innovation talent: The region’s preeminence in the development of robotics holds immediate promise for applications in manufacturing, spurring productivity.

The long-term impact of those trends could accelerate manufacturing growth in energy-intensive industries. Local leaders have forecast that the flow of natural gas from the Marcellus and Utica Shales will provide reliable feed fuel for petrochemical industries. Construction of a major ethane processing facility is still far from certain, but if built, the “cracker” could attract a network of plastics processors and suppliers.

“Right now, 90 percent of the recovery in manufacturing is in processing chemicals and petrochemicals,” observes Greg Babe, CEO of Liquid X Printed Metals
and former president and CEO of Bayer Corp. USA and Bayer MaterialScience LLC, one of the world’s largest chemical manufacturers.

Advances in automation are creating manufacturing opportunities — and a conundrum. Babe’s Pittsburgh start-up is an example: Liquid X is commercializing metallic ink technologies for use in 3-D printing manufacturing. While the potential for the material is vast, the company is unlikely to ever employ the thousands of blue-collar workers who peopled the region’s mines and mills a generation ago.

“It’s unrealistic to expect that manufacturing employment is going to get back to its peak. But the degree of automation now possible with technologies developed in the U.S. and our region enables a return to strength,” Babe argues. He describes the new business model as “innovative, high-tech manufacturing at the upper end of the global value chain,” necessitating additional post-secondary education.

Workforce development remains a primary issue, he notes. “[But] the message needs to be flexibility. It’s not just about earning bachelor’s degrees. We also need skilled workers for advanced manufacturing systems. Without their skills, who’s going to build them, connect them, run their process control systems? That’s critically important.”

The challenge is exacerbated by regional history.

“Parents remember our layoffs in the 1980s. They worry that if their children go into manufacturing, they’ll lose their jobs, they’ll work in a dirty factory,” says Bill Padnos. He heads a program that is changing attitudes among high schoolers and their parents. BotsIQ challenges school robotics teams to design, build, and maneuver robots in three-minute, battery-powered battles. The competition attracted six high school teams from career and technical centers in 2006; eight years later, more than 50 teams compete.

Among those drawing attention to manufacturing’s image problem is a popular television host. Mike Rowe, of the Discovery Channel’s Dirty Jobs, argues, “We celebrate one form of knowledge over the next. We’re still telling kids that this college degree is your only hope for a happy, successful career. In our minds, we see [a worker with a wrench] as a vocational consolation prize. We need to tell folks, ‘Get a different toolbox.’”
Chartiers Valley students design and execute projects using new technologies like 3-D printing.
Young learners at the Children’s Museum of Pittsburgh have full run of simple tools and materials in its innovative MAKESHOP®.
Back in 2011, the Children’s Museum of Pittsburgh began to test a radical theory. What if the museum invited visitors not just to look at exhibits or touch a digital screen, but also to pick up tools and make something that works?

Arriving amid a deluge of digital experiences, the idea to reintroduce skills like circuitry, sewing, and carpentry seemed decidedly retro. But it sparked a response not only in Pittsburgh, but also across the country. Three years later, the museum has become an acknowledged leader in introducing youngsters to practical hands-on learning. The museum’s MAKESHOP® project recently received a $425,000 federal grant to lead a national project, introducing the concept to institutions around the country.

With its entry into the Maker Movement, a trend toward creative do-it-yourself experimentation, the Children’s Museum is bridging the gap between the classroom and community institutions. Leaders of the local MAKESHOP effort believe that informal education can bolster school efforts to ignite curiosity and confidence in designing and creating useful physical objects, and encourage students to carry those skills into their adult careers. It’s a farsighted strategy to create the manufacturing innovators of the future.

In partnership with local researchers at Carnegie Mellon University and the University of Pittsburgh, the museum created prototypes to guide children along the steps from design to completion. Among the first exhibits was a simple array of circuit blocks with LED lights, motors, and buzzers. Attaching the devices to a battery station allowed users to close a circuit through trial and error.

Making [something] highlights relationships. You don’t have to know everything—you use the resources of the community.

LISA BRAHMS, DIRECTOR OF LEARNING AND RESEARCH, CHILDREN’S MUSEUM OF PITTSBURGH

THE MAKER MOVEMENT
The museum began by targeting children age eight and older. But it soon found that the exhibits proved equally popular with four- and five-year-olds and adults. As museum educators worked with their university partners, they realized that visitors of all ages found the hands-on experience compelling.

“We emphasize the family as a learning unit — they’re co-learners, and also teachers,” explains Lisa Brahms. The director of learning and research at the museum, she is also a learning researcher at the University of Pittsburgh’s Center for Learning in Out of School Environments (UPCLOSE). “They all learn how a needle works, how a soldering iron works.” In an era when solitary, online learning is rapidly becoming the norm, MAKESHOP emphasizes collaboration — a skill that both educators and employers predict will be increasingly important in the workplace. “Making [something] highlights relationships,” she says. “You learn from others and with others. You don’t have to know everything — you use the resources of the community.”

Each child’s experience in the exhibit begins with a question: “What would you like to make today?” Children begin by sketching a design of their project. Then, using free tools and materials, such as disassembled electronics gear, felt, handlooms, clamps, sandpaper, and files, they create their design with staff guidance. A sampling of recent activities includes hands-on experiences with computer programming, squishy circuits, 3-D printing, laser cutting, 3-D design challenge collaborations, and MAKESHOP City, a miniature metropolis built from recycled materials.

The visitor response to MAKESHOP showed intense interest. UPCLOSE found that 64 percent of families spent from 30 minutes to two hours there, compared to six to 20 minutes at most other exhibits. Most cultural organizations are struggling to reach new audiences these days, but MAKESHOP has helped the museum expand by demand. In 2013, more than 267,025 children and families visited the museum, marking a third consecutive year of record-setting attendance numbers and a 7.5 percent increase over the previous year.
Melissa Butler spent a school year as teacher in residence at the museum, prototyping K–2 classroom activities for her students at Pittsburgh Allegheny, a nearby public school. She observed how her students and fellow teachers worked as they made weekly visits to the museum and documented the project’s connections with core curricula, such as vocabulary and language development, math, and science.

“For young children, naming and understanding materials—whether they are flexible or sturdy, whether they are attachments or connections—provides real understanding,” she says. “Among second-graders, we saw amazing connections to mathematics. One little girl was proficient in measuring length. But when she worked with wooden dowels, she didn’t realize that some were pushed higher than others—they weren’t all the same length. Students may pass a test, but when you invite them to open-ended problem-solving play, they grasp the concept differently.”

To Brahms, approaching children as makers rather than as passive learners makes old-school sense. “Institutions are looking for ways to engage kids and learning. John Dewey knew a century ago that hands-on learning with real tools and real materials and real-world situations improved productive learning. People are remembering and rethinking [the progressive educator’s] approach,” she says.
Following a rigorous international certification program, mechatronics instructor Tim Angert of Western Area Career & Technology Center coaches students to meet world-class expectations.
As the end of the fall 2013 semester approached, a team of Pennsylvania teachers readied their passports. Representing career high schools, community colleges, and universities, the group was about to begin an immersion in mechatronics education in the place where it arguably was born: Berlin, Germany.

Several had worked the previous summer in Pennsylvania on the program basics. They had already learned how their students could achieve the high levels of proficiency demanded by Siemens, a global powerhouse in automated systems and control technology. Siemens has designed a rigorous three-level mechatronics curriculum that career educators can follow worldwide. At the Technik Akademie Berlin, Siemens’ international education center, the local teachers had an opportunity to learn from the best.

Since the mid-19th century, the German education system has included lengthy apprenticeships in industrial skills—a key reason for the worldwide reputation of German manufacturing. In the United States, especially in the past 50 years, fewer students have been guided toward such training. Complex automated systems in automobiles, wireless communications systems, and advanced manufacturing rely on those skills; but until recently, there was no standard approach to providing comprehensive training. The worldwide Siemens method offered the right model.

“We’re figuring out a good mechatronics pipeline for the region. That means hitting at three levels—in high school, at the community college level, and with four-year degrees. The certification process is an appropriate way to do that,” explains Tim Angert, a teacher at Western Area Career & Technology Center in Canonsburg, Pennsylvania.
With funding from the Benedum Foundation, Angert and four colleagues have achieved Level 2 certification from Siemens; a fifth participant, Jennifer Wilburn of California University of Pennsylvania, is one of only a handful of faculty worldwide to complete Level 3.

Angert expects his students to begin by passing Level 1 certification exams by the end of 12th grade.

“Level 2 training is geared to high school graduates, even those who haven’t attended career technical centers,” he explains. “Then, California University can provide Level 3 through its mechatronics B.S. program. The two-plus-two-plus-two-year structure gives students a career outline. They can jump off wherever they need to, and go back into education.” Interested local firms and the Washington County Manufacturers Association are advising the certification effort and providing internships.

Currently offering programs only for grades 10 to 12, WACTC will soon expand its programs for high school graduates. With funding from Benedum and Chevron Corporation, it will add a fully accredited private technical school to the campus. Beginning in January 2015, Southwest Institute for Technology will become only the third school in Pennsylvania to provide a continuum of career education programs from the tenth to 14th grades. Until now, the county has lacked a degree-conferring community or technical institute; the new technical college will address that need.

Haylee Vujanovich, a recent WACTC graduate, accepted a well-paid post making medical implants with a local manufacturer. The offer was one of ten she’d considered before graduation.
“Vocational students are stereotyped as not smart,” she told a recent energy industry conference. “I’ve been able to learn, and now I have a great opportunity.”

Vujanovich’s confidence contrasts with the skepticism of many adults. Convincing parents and high school counselors that hands-on career training is a viable alternative to bachelor’s degrees has been a hard sell. But when they look at recent regional salary trends, they see proof that well-paid jobs for high school graduates offer a compelling alternative to debt-laden college degrees.

The average salary among regional manufacturing is over $56,000 a year, and more than half of those jobs do not require a four-year degree, although they demand some advanced training. Professional welders are in such short supply, Pennsylvania State Representative Brandon Newman told a recent audience, “I’m told they are making more than some attorneys in Washington County.”

“The jobs are there, but the skills are needed,” agrees Petra Mitchell, president and CEO of Catalyst Connection. Her nonprofit, an economic development organization for small manufacturers, is among those spreading the classroom message that career training is a smart choice.
Based at Carnegie Mellon University, the Girls of Steel robotics team competes in design and build competitions that hone the high schoolers’ tech talents.
Informal robotics competitions that build on team spirit have attracted teams from career and technical centers and traditional high schools. Bill Padnos, executive director of the BotsIQ contest, says that building a reliable battery-powered robot and guiding it through a successful clash with another teaches all the steps of manufacturing.

“Students must professionally document the steps to every process. And we have industry partners who advise and mentor the students.” In a recent survey of 3,000 BotsIQ alumni, 82 percent reported that they were pursuing STEM in college or a manufacturing pathway.

“I call it stealth learning,” says Hamill Manufacturing’s Jeff Kelly, who helped bring BotsIQ to the region. “Manufacturing needs recruiting, training, and retention for success. But this is the fourth leg: awareness.” Programs like BotsIQ and Catalyst Connection’s Explore the New Manufacturing introduce students to the industry as they begin to reconnoiter their choices for education and careers. Internships, job shadowing, and plant tours stimulate interest in careers students may not previously have considered.

The competitions have also cracked the door for young women to build and design alongside young men. The recent recession increased manufacturing’s gender gap, despite the fact that manufacturing salaries top non-manufacturing ones by 17 percent.

Young men are more likely to take engineering and math courses, gaining skills many manufacturers demand. A 2012 survey of first-year U.S. college students showed that about 18 percent of men listed engineering as their probable major. For women, the figure was just 4 percent.

An all-female team in Pittsburgh is changing those percentages and perceptions. The Girls of Steel robotics team, which competes regionally and nationally through FIRST® (For Inspiration and Recognition of Science and Technology), gets inspiration from co-founder and mentor Patti Rote and its institutional home, Carnegie Mellon University’s Field Robotics Center.

Rote says that the student participants from area high schools collectively devote as many as 300 hours a week to prepare for competitions. This year they designed and built a robot to compete in a FIRST Robotics Competition, Aerial Assist, where robots picked up and passed a ball over obstacles at various heights. The Girls of Steel, wearing their signature Rosie the Riveter uniform of blue jeans, plaid shirts, and polka-dot bandanas, took their robot to the FIRST world championships in St. Louis in April.

“It’s a cool scene. We talk about nerdy things,” laughs Katie Shreve. Along with Girls of Steel teammate Rachel Round, she will attend the University of Pittsburgh this fall. Both have declared majors in mechanical engineering.
At Pierpont Community & Technical College, Carl Sigley is earning a degree in mechatronics. West Virginia’s workforce development efforts target the state’s growth industries.
After 21 years of managing the Wonder Hostess Bakery Outlet in Morgantown, West Virginia, Carl Sigley lost his job when the company was liquidated, leaving 18,000 people jobless. Sigley, a 45-year-old husband and father of four, found himself pounding the pavement. “I was looking hard for a job, but things had changed,” he says simply. “You have to have some kind of degree, associate or bachelor’s, to get a job.” Though Sigley’s resume included stints in sales and construction, along with some coursework at West Virginia University, he turned in a new direction: mechatronics. He will graduate in May 2015 with an associate’s degree in a field he hadn’t previously known existed.

Sigley was eligible for free tuition at Pierpont Community and Technical College, which is expanding its programs with a new $20 million Advanced Manufacturing Center to open next year. Under the federal Trade Adjustment Assistance program, those losing jobs because of foreign trade may apply for retraining funds from the state’s workforce agency. As part of a grant consortium, Pierpont receives $2.3 million over four years. The design of the program targets the state’s growth industries—energy, manufacturing, information technology, and construction trades—and bolsters an existing registered apprenticeship program.

Sigley expected that he would renew his accounting studies at Pierpont. Instead, he discovered the mechatronics program, inaugurated in 2011 to meet the demands of northern West Virginia manufacturers.

“Our mechatronics program is probably our best example of how to be agile,” says Pierpont president Doreen Larson. “It combines electronics and mechanical engineering with computer controls and advanced industrial maintenance. Those are skills for any company.”
They’re also skills that immediately clicked for Sigley. “I was always mechanically inclined and felt very comfortable in the new program. I knew this would be a great opportunity and there would be a demand for people with knowledge in the mechatronics field. You used to go to college for one thing. But now, jobs are changing every five or ten years. You’ve got to be more versatile. You have to understand instrumentation and robotics and PLCs” (programmable logic controllers that operate machinery).

Pierpont’s advanced manufacturing center is being built not on the college campus, but on donated land at the I-79 Technology Park in Marion County. Its workplace simulator will immerse both community college and high school students alongside industry partners on real-life projects in aviation manufacturing and health care facilities maintenance. Like the Southwestern Institute for Technology across the Pennsylvania border, it creates “a continuum of career education from high school through adulthood.”

The Pierpont complex is part of a statewide experiment, with Benedum Foundation support, to create training centers tailored to local workforce demands. The John D. Rockefeller IV Career Center in the Northern Panhandle is seeking one or more regional energy companies to sponsor a simulator; others may follow.

Common workplace skills and procedures will underlie the industry-specific coursework. Students will be required to apply and interview for a job, complete time sheets and work orders, comply with random drug tests, and participate in customer service orientation.

Students who successfully complete the simulator requirements will receive a “work ready” certificate along with their high school diplomas.

“The ability to be a good employee and to understand what that means—being invested in your company’s success—will be instilled at the high school level, and reinforced at our level,” says Larson. “These skills do take practice. I think it’s going to be the hallmark of West Virginia workers. We know they are hard workers. They are also employees to be proud of.”

For Carl Sigley, the pride already shows. “Getting familiar with new technology has made me more flexible,” he says. “My son Brett, who just graduated from WVU, jokes with me that before I went to college I didn’t even know what Word, Excel or PowerPoint were, and would have been lucky to name one of the three.” Learning the popular software programs and computing is a plus, he says. As for plans after graduation, he’s wide open: “Whoever offers the best opportunity, that’s what I’ll choose.”
Looking back at his experience in running the U.S. operations of German-owned Bayer AG, Greg Babe says a national education model like Germany’s that funnels students into manufacturing is undoubtedly effective. But he questions whether it can be mandated in the U.S.

“Germans are good at planning and organizing for that continued supply of skilled workers. There are early decisions made on which student goes where. There are plenty of internships. Students learn the skills. Government supports the companies that carry students for a period of time. But bridging the gap between finishing the training and finding the immediate job — I don’t think it’s in our political make-up. It’s not what America is about,” he says. “On the other hand, Europeans say Americans will pick up and move. We’re willing to migrate to where work is. That’s a trademark of the U.S. that needs to continue. It may be a hard lesson for folks around here. A career lasts, but one job is not necessarily permanent.”
AlphaLab Gear gave start-up FreshTemp (founder and CEO Jeff Rieger, center) support to build its wireless temperature sensing service.
We’re generating $12 billion in revenue. We’re the third-largest industry in the region. We employ 96,000 workers at an average salary of $57,000 a year.

RAY YEAGER, PRESIDENT AND CEO, DUCTMATE INDUSTRIES, AND BOARD CHAIRMAN, CATALYST CONNECTION

GIVING SMALL MANUFACTURERS A BOOST

When Ray Yeager spoke recently to supporters of Catalyst Connection, an economic development nonprofit for small manufacturers, he was preaching to the choir. Many of the employers in the room have only a few dozen workers to run plants in rural counties. Though their efficiency has improved, their productivity is high, and the salaries they pay sustain the prosperity of the American middle class, new pressures arise.

New solutions provide an assist. Ways to connect inventors with small manufacturers, free management advice, and reliable access to capital are making the difference between decline and growth across the sector.

AlphaLab, a tech accelerator that has launched dozens of new firms in southwestern Pennsylvania, recently expanded its program to encourage manufacturing innovation with advice and access to investment capital, with help from the Benedum Foundation. AlphaLab Gear encourages physical product development, while its partner aids software, web, and entertainment technology start-ups.

Among the handful of new companies that qualified for AlphaLab Gear assistance in 2014, FreshTemp seems poised for a quantum leap. Major fast-food chains and FedEx are eager to test its service, a wireless Bluetooth temperature monitor that tracks required temperatures during storage or transit. But the young firm, now applying for a U.S. patent, is hesitant to take the plunge into larger-scale manufacturing while it builds out a product line. Right now, the co-founders are also the assembly line, making their sensors in a makeshift space in East Liberty.
“It’s really a question of the capital required,” explains founder and CEO Jeff Rieger. “Should we invest in marketing and engineering or manufacturing?”

Ilana Diamond, managing director for AlphaLab Gear, understands the start-up’s problem. She’s watched FreshTemp’s growth over the past year at the incubator, and likes its prospects. She believes that FreshTemp might be better served by working with a contract manufacturer in the region that can quickly re-tool—or re-program—for an evolving product.

“We have contract manufacturers who have invested in the equipment. Their core competence is in manufacturing. When there’s new methodology, they’re best equipped to implement it,” she argues. “And by supporting them, we enable the new companies to move to the next frontier.”

Women-owned businesses are welcome bidders on many government projects, but may lack the scale to boost R&D and marketing. Catherine Chis founded Power Conversion Technologies in Harmony, Pennsylvania, with her husband, Mihai, in 1991. The pair quickly found defense applications for their electrical devices, which are basically inverters that change one form of power to another, such as alternating current to direct current. The power electronic products that PCTI designs and manufactures meet international specifications for dozens of contracts, such as a current project for the Ecuadorian navy. The 12-person firm recently outgrew its original headquarters, an addition to Chis’s home, and has steadily increased its sales volume. An average annual order of $25,000 in 2005 has risen to $190,000 today. But now Chis worries about the customers she’s missing.

“I should have an outside sales person, but I don’t,” she says. “I need fresh ideas from someone else.”
Chis connected with the Center for Women Entrepreneurs at Chatham University, where director Rebecca Harris offered to assign M.B.A. students to study PCTI’s online presence and create an international marketing strategy based on search engine optimization and other factors. The students will tackle the case for credit this fall.

Other small firms get caught between opportunities for new contracts and costs associated with previous commitments. Without access to credit, they may not be able to afford to expand. BICO Machine & Tool in rural Marianna, Pennsylvania, was caught in a cash flow crunch last year. After purchasing a central Pennsylvania firm, its new owners were forced to repay a state loan after relocating to Washington County. The firm’s revenue took a hit when two customers closed, and conventional lenders had refused the company’s request for a new commercial loan. As co-owner Adam Johnston describes it, the precision small parts manufacturer couldn’t grow its way out of debt without help.

Bridgeway Capital, a nonprofit western Pennsylvania lender, provided a solution. Capitalized by foundations, government, banks, and other contributors, Bridgeway focuses on small manufacturers; it has made more than 870 loans totaling $100 million, and has leveraged $400 million in additional investment. Bridgeway’s success in the Pittsburgh region allowed it to open an Erie branch in 2012. In 2014, support from the Benedum Foundation brought Bridgeway’s third branch to Uniontown, Fayette County. The office services rural southwestern Pennsylvania, where it rewrote BICO’s loan and stabilized the three-person operation. Johnston expects a net increase in sales by the first quarter of 2015.

“We have 4,000 small manufacturing firms in western Pennsylvania. There are a lot of opportunities,” says Mark Peterson, Bridgeway’s president and CEO. “The success of these businesses is vital to economic growth in our region.”
ABOUT THE FOUNDATION

The Claude Worthington Benedum Foundation is an independent foundation established in 1944 by Michael and Sarah Benedum, natives respectively of Bridgeport and Blacksville, West Virginia. The Foundation’s assets at year-end 2013 were just under $377,250,000. Since its inception in 1944, the Foundation has made more than 7,900 grants totaling over $426,350,000.

During his lifetime in the oil and gas business, Michael Benedum amassed a fortune, ranking him in his day among the 100 wealthiest Americans. Michael Benedum operated his worldwide business from corporate headquarters in Pittsburgh, Pennsylvania. Mr. and Mrs. Benedum established residence in Pittsburgh in 1907 and lived here for over 50 years. They named the Foundation in memory of their only child, Claude Worthington Benedum, who died in 1918 at age 20. In creating the Foundation, Mr. and Mrs. Benedum expressed the wish that grantmaking be focused in West Virginia and Pittsburgh, their native and adopted homes.

MISSION

To encourage human development in West Virginia and Southwestern Pennsylvania through strategically placed charitable resources.

GUIDING PRINCIPLES

The following principles guide the Foundation’s grants programs in those regions:

- We honor Michael and Sarah Benedum’s belief in “helping people help themselves,” and we seek opportunities to cultivate the creativity of people and communities.
- We nurture leadership within the communities we serve, and we participate in leadership when it adds value.
- We encourage planning, projects, and programs that cross geographic and political boundaries so that access to services and economic growth is maximized.
- We expect collaboration among the public, private, and nonprofit sectors in order to leverage the resources that each can bring to common concerns.
- We strive to advance innovative practices that demonstrate measurable and sustainable benefit.
- We seek projects that contribute to advancement in public policy.

THE FOUNDATION’S ROLE

In seeking to achieve our mission and acknowledging lessons learned in almost 70 years of grantmaking, the Foundation has identified its role as follows:

“The Foundation largely takes on the agenda of the people we serve. Our business is to help people help themselves. This is not intended to suggest that the Foundation’s role is passive. To the contrary, we go out into the field and listen closely. We build strong and supportive relationships with grantees. We provide technical assistance. We broker ideas and institutions. We create partnerships. We undertake analyses of issues and problems, and we promote public awareness of them. We help to build broad consensus for change. We seek to empower people to develop their own capacity and the capacity of their institutions to succeed. We leverage not only funds but interest, involvement, and commitment.”

Excerpted from In the Company of Extraordinary People: A Special Report upon the Occasion of the 50th Anniversary of the Benedum Foundation, 1994

GRANTS PROGRAMS

In keeping with the wishes of Michael and Sarah Benedum, the Claude Worthington Benedum Foundation is a regional philanthropy focusing on West Virginia and Southwestern Pennsylvania. The Foundation generally invests two-thirds of its grant dollars in West Virginia and one-third in Southwestern Pennsylvania.

The Foundation serves the entire state of West Virginia. In Southwestern Pennsylvania, the service area includes Allegheny, Washington, Greene, and Fayette Counties. This four-county area is a natural connector between Pittsburgh and West Virginia and contains rural communities that may benefit from the Benedum Foundation’s experiences in West Virginia. However, the Foundation recognizes that economic regions do not follow political boundaries, and, therefore, the Foundation both encourages projects that cross state lines and supports economic and education initiatives that benefit the multi-state region centered on Pittsburgh.

The Foundation makes grants in two program areas that span both states: Education and Economic Development. In addition, the Foundation supports Community Development and Health & Human Services grants programs in West Virginia and, in Southwestern Pennsylvania, supports the major performing arts organizations within the Cultural District.
From time to time, the Foundation revises specific areas of interest within its grants programs, and grant seekers are encouraged to view the Foundation’s website for the most current descriptions.

EDUCATION
The Benedum Foundation seeks to promote successful learning through the formal education system. Academic achievement and preparation for the 21st-century workforce are the ultimate objectives of this program.

The Foundation places a high priority on teacher quality and the most advanced instructional tools. Because schools do not function in isolation, the Foundation also looks to the resources of community organizations, business, and higher education to reinforce the learning objectives of the classroom. In preparation for the rising demands of the workplace, the Foundation recognizes the need for all students to be prepared, without remediation, to pursue some form of post-secondary education.

Although the Foundation is interested in any significant opportunity to improve the education system, specific areas of interest include:

- Programs that improve teacher quality through professional development and innovative instructional strategies.
- Arts education, the integration of arts into other disciplines, and the partnership of community arts groups and higher education with the PreK–12 education system.
- Career education that aligns secondary and post-secondary programs to high-demand, high-wage occupations.

ECONOMIC DEVELOPMENT
Innovation will be the cornerstone of the future success of the economy in West Virginia and Southwestern Pennsylvania. The Foundation supports economic development activities based upon the region’s strengths in research, technology, and advanced manufacturing. The Foundation’s agenda seeks to promote regional planning and cooperation, recognizing that, with respect to any endeavor, “region” should mean whatever area is most appropriate to optimize the available opportunity, without reference to historic, geographic, or political boundaries.

The expected outcomes of the Foundation’s Economic Development grants are the creation and growth of innovative, wealth-producing businesses and high-quality jobs.

WEST VIRGINIA GRANTS PROGRAM
In addition to the areas of interest discussed above, in West Virginia the Foundation also makes grants in Health & Human Services and Community Development.

HEALTH & HUMAN SERVICES
West Virginia’s best future requires that all families have access to high-quality health care and human services, and to the resources that enable them to raise their children to be productive members of their communities.

Emphasis in this program area is placed on innovations in health care delivery systems, a strengthening of the public health infrastructure, and community-based health promotion, especially with regard to chronic disease prevention and patient care management. Collaborative efforts are encouraged that provide technical assistance, develop programs, document effectiveness, and improve public policy. Specific areas of interest include:

- Support for a healthier quality of life for West Virginians through access to affordable health care, preventive health services, state-level policy development, provision of a medical home, and the delivery of quality patient care.
- Ensuring a system of accessible and affordable health care for children, early intervention services that lead to school success, and the promotion of child-focused public policy designed to prepare children to grow, learn, and prosper.
- Public oral health education, implementation of preventive strategies and programs, connecting people to a dental home, and achievement of the goals of the state oral health plan.
COMMUNITY DEVELOPMENT
Improving capabilities of leaders, organizations, and interested citizens to address challenges and opportunities will help communities be more prosperous through their own efforts.

The Benedum Foundation promotes the economic well-being and quality of life of West Virginia communities. Specific areas of interest include:

- Activities that engage diverse groups of citizens in the life of the community.
- Helping communities organize, plan, and implement ambitious but achievable improvement strategies.
- Leadership development.
- Programs that improve the effectiveness and accountability of nonprofit and public organizations.
- Efforts to expand technology access, affordability, and utilization.
- Activities that provide decent, safe, and affordable housing through home construction, repair, and financing and homeowner education programs.

SOUTHWESTERN PENNSYLVANIA GRANTS PROGRAM
In addition to the Education and Economic Development program areas described above, the Foundation believes that the arts play a significant role in economic development, and that Pittsburgh’s exceptional arts community, and the Pittsburgh Cultural District, provides a competitive advantage to the region’s economy. The Foundation supports the major performing organizations within the Cultural District, as well as specific projects that add value to the Cultural District, especially through cooperative ventures among resident organizations.

HOW TO APPLY FOR A GRANT
Before applying for a grant, applicants should carefully review the Foundation’s Mission and Guiding Principles, and our grants program descriptions. Seeking a grant from the Benedum Foundation is a highly competitive process. As you might expect, the Foundation receives more applications each year than we are able to fund, which means that even some proposals that fit within the description of the Foundation’s grants program may not be selected for funding.

RESTRICTIONS
The Foundation generally does not make grants in support of:

- Organizations located outside West Virginia or Southwestern Pennsylvania
- Individuals
- Organizations not exempt from taxation under Internal Revenue Code Section 501(c)(3)
- Student aid, fellowships, or travel
- Construction or equipment
- Endowment
- Ongoing operating expenses
- National organizations
- Biomedical research
- Religious organizations for religious purposes
- Individual elementary and secondary schools
- Annual appeals or membership drives
- Conferences, films, books, and audio-visual productions, unless an integral part of a Foundation-supported program

APPLICATION PROCESS: WHAT TO EXPECT
After reviewing the information listed above, submit your application using the Foundation’s online grant application process found on our website (www.benedum.org).

The Foundation does not have submission deadlines, and applications are accepted throughout the year. Once we receive your completed online application, an automated response will be sent to you acknowledging receipt. You should receive a response to your application within 60 days, at which time you will be notified if your project is not one the Foundation can consider, or if you should submit additional information.
Although some of our grants have impact in both West Virginia and Southwestern Pennsylvania, for ease of reference, grants authorized in 2013 are listed below alphabetically by region of primary benefit.

Readers, especially grant seekers, should be aware that the emphasis of the Foundation’s grants program evolves over time and that grants as reported may not be indicative of the Foundation’s future program emphasis.

WEST VIRGINIA

EDUCATION

Alliance for Excellent Education
Washington, DC
To develop a statewide plan for student-centered digital learning
$136,000

Carnegie Mellon University
Pittsburgh, PA
For entertainment technology student teams to design educational products for West Virginia University professional development schools (over two years)
$200,000

To advance the use of robotic educational tools through a network of professional development programs at Marshall, West Liberty, West Virginia, and Carlow Universities
$90,000

Carnegie Museums of Pittsburgh
Pittsburgh, PA
To develop art and science classroom modules and family engagement resources for West Virginia’s Pre-Kindergarten program
$160,000

Clay Center for the Arts & Sciences of West Virginia Inc.
Charleston, WV
For an educational outreach program that integrates art, science, technology, and energy (over two years)
$194,000

Common Sense Media
San Francisco, CA
To assist educators in the best use of digital learning tools (over two years)
$200,000

Regional Education Service Agency 6 (RESA 6)
Wheeling, WV
To provide self-paced mathematics software aligned to Common Core Standards
$125,000

The Education Alliance — Business and Community For Public Schools, Inc.
Charleston, WV
For AmeriCorps mentors to help seven school districts implement drop-out prevention plans
$85,000

The Mattress Factory, LTD
Pittsburgh, PA
To expand a professional development program that incorporates installation art in Math and Science classes, in partnership with West Liberty University
$100,000

West Virginia Board of Education
Charleston, WV
To develop a statewide professional development plan, in partnership with the National Commission on Teaching & America’s Future
$125,000

To develop a plan for raising the standards of teacher preparation programs
$70,000

West Virginia Council for Community and Technical College Education
Charleston, WV
To launch an oil and gas technology training program (over two years)
$250,000

West Virginia Department of Education
Charleston, WV
To establish a network of industry-sponsored workplace simulators in career and technical high schools
$108,000

West Virginia Symphony Orchestra, Inc.
Charleston, WV
For an arts integration project that uses musical theater to teach reading, math, social studies, and visual art
$50,000

West Virginia Board of Education
Charleston, WV
To develop a statewide professional development plan, in partnership with the National Commission on Teaching & America’s Future
$125,000

To develop a plan for raising the standards of teacher preparation programs
$70,000

West Virginia University Foundation, Inc.
Morgantown, WV
To establish a Carnegie Mellon University robotics and design lab at West Virginia University to test educational technologies in rural schools (over two years)
$207,000

HEALTH & HUMAN SERVICES

American Heart Association West Virginia
Charleston, WV
For Mission: Lifeline, a community-based initiative to improve both the quality of care and outcomes for heart attack patients and the health care system (over two years)
$200,000

Cabin Creek Health Center Inc.
Dawes, WV
For a primary care and pulmonary rehabilitation project to improve Chronic Obstructive Pulmonary Disease care in southern West Virginia
$100,000

For a health care coordination model for patients who are eligible for both Medicaid and Medicare
$50,000

CAMC Health Education and Research Institute Inc. dba CAMC Institute
Charleston, WV
To implement telehealth programs to provide mental health services to youth, and diagnostic assistance to seniors, who live in rural areas (over three years)
$150,000

To expand the KEYS 4 HealthyKids Community Toolkit across the state, and develop a “farm to preschool” local food project in Kanawha County
$25,000

Eastern Area Health Education Center Inc.
Martinsburg, WV
To promote the preventive health aspects of physical activity
$25,000

FMRS Health Systems Inc.
Beckley, WV
To create patient-centered medical homes to reduce early deaths for those with mental and chronic illnesses
$21,850
Greater Kanawha Valley Foundation
Charleston, WV
To support a collaborative grantmaking project focused on economic development and health in the Kanawha Valley
$60,000

Huntington Area Food Bank Inc.
Huntington, WV
To support distribution of healthy food products in the counties served by the Food Bank
$75,000

Kids in Distressed Situations, Inc.
New York, NY
To provide, in partnership with West Virginia’s food banks, clothing, shoes, books, educational materials, and baby products to families in need
$40,000

Lily’s Place, Inc.
Huntington, WV
To develop a care model to treat neonatal abstinence syndrome infants in a non-hospital environment
$100,000

Marshall University Research Corporation
Huntington, WV
To promote an adolescent healthy lifestyles self-management program through West Virginia school-based health centers
$175,000
To provide oral health resources and training to in-home early childhood workers; support community–school partnerships' preventive oral health programs; and strengthen the adult oral health direct service model
$225,000

Mid-Ohio Valley Health Department
Parkersburg, WV
For the Mid-Ohio Valley Smiles for Life program, an adult dental screening and referral program partnering with volunteer dentists to increase access and improve oral health
$100,000

Mid-Ohio Valley Rural Health Alliance
Harrisville, WV
To conduct a regional capacity assessment of the existing care system for seniors
$28,000

Northern Panhandle Headstart, Inc.
Wheeling, WV
For HealthyINFANTS, a community–university partnership model for Early Head Start in the Appalachian Region (over two years)
$172,000

Partnership of African American Churches Institute, WV
For training recovery coaches to work with individuals being treated for, or recovering from, addiction
$75,000

Team for West Virginia Children, Inc.
Huntington, WV
To build the capacity of in-home family education programs to improve the health and well-being of young children and their families
$100,000
To support the Early Childhood Initiative, to cover meeting, printing, mileage, and administrative expenses to support the development of a comprehensive plan for early childhood in West Virginia
$58,400

University of Charleston
Charleston, WV
Establish site rotations for physician assistant students in rural areas in an effort to increase the medical workforce in southern West Virginia, payable over two years
$100,000

West Virginia Association of Free Clinics Inc.
Charleston, WV
To support the West Virginia Association of Free Clinics’ transition to a new electronic health record system
$52,500

West Virginia Community Voices Inc.
Charleston, WV
To provide treatment and support services to pregnant women who use drugs and alcohol while pregnant, and their babies
$100,000
For the West Virginia Partnership for Elder Living, to improve the ability of West Virginians to age in settings of their choice
$126,800

West Virginia Council of Churches
Charleston, WV
For a pilot project to research and test best strategies for providing electricity to food pantries during power outages
$65,000

West Virginia Development Office
Charleston, WV
To support programs for community wellness, healthy food, and active living in Main Street and ON TRAC communities
$100,000

West Virginia Healthy Kids and Families Coalition
Charleston, WV
To provide education to West Virginians to promote better child health in the state
$108,500

West Virginia Higher Education Policy Commission
Charleston, WV
To plan and establish a community-based, practice-based research network of interdisciplinary clinical providers, to advance research endeavors at West Virginia’s academic health centers
$120,000

West Virginia Medical Institute, Inc.
Charleston, WV
To assist rural medical practices in developing capacity as patient-centered medical homes (over two years)
$300,000

West Virginia University Foundation, Inc.
Morgantown, WV
For a lay/interprofessional capacity-building collaborative focused on palliative care (over two years)
$122,000
For the WVU Schools of Dentistry, Medicine, Nursing, Pharmacy, and Public Health to work in interprofessional teams to implement community-based care projects
$125,000
For the My First Patient program, enabling Health Sciences & Technology Academy (HSTA) students to partner with the West Virginia University Schools of Pharmacy, Medicine, and Dentistry to develop patient care plans (over two years)
$143,000
<table>
<thead>
<tr>
<th>Organization</th>
<th>Location</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Virginia University Foundation, Inc.</td>
<td>Morgantown, WV</td>
<td>To support planning and piloting dental school rural rotations, and emergency room utilization for dental health needs (over two years)                                                                ní</td>
<td>$200,000</td>
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<tr>
<td></td>
<td></td>
<td>To provide vision screenings and specialist services to low-income individuals in West Virginia</td>
<td>$115,000</td>
</tr>
<tr>
<td>West Virginia University Research Corporation</td>
<td>Morgantown, WV</td>
<td>To establish a health services, outcomes, and policy center that will support policy development and seek solutions to health care problems in local communities</td>
<td>$150,000</td>
</tr>
<tr>
<td>West Virginians for Affordable Health Care</td>
<td>Charleston, WV</td>
<td>To strengthen the role of nonprofits in the enrollment of citizens in the Affordable Care Act health insurance marketplace</td>
<td>$170,000</td>
</tr>
<tr>
<td>Citizens Conservation Corps of West Virginia</td>
<td>Beckley, WV</td>
<td>For the Reaching the Summit community service initiative, to provide last-dollar mini-grant funding for volunteer service projects in a nine-county area of southern West Virginia</td>
<td>$170,000</td>
</tr>
<tr>
<td>Coalfield Development Corporation</td>
<td>Wayne, WV</td>
<td>To expand a housing-related social enterprise that produces income through the sale of reclaimed materials resulting from the deconstruction of dilapidated structures</td>
<td>$100,000</td>
</tr>
<tr>
<td>Community Foundation for the Ohio Valley, Inc.</td>
<td>Wheeling, WV</td>
<td>To engage landowners and businesses benefiting from oil and gas development in philanthropic giving</td>
<td>$29,000</td>
</tr>
<tr>
<td>CommunityWorks in West Virginia Inc.</td>
<td>Charleston, WV</td>
<td>To provide support for volunteer-based programs that construct and rehabilitate housing</td>
<td>$200,000</td>
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<td>For the 2013 Summer Internship Program, to engage young professionals in the field of affordable housing by placing college-level interns in housing organizations throughout West Virginia</td>
<td>$70,500</td>
</tr>
<tr>
<td>Fairmont Morgantown Housing Authority</td>
<td>Fairmont, WV</td>
<td>To expand a model of affordable workforce housing and neighborhood revitalization through partnerships among public, private, and academic entities (over three years)</td>
<td>$210,000</td>
</tr>
<tr>
<td>Greenbrier Military School Alumni Association Inc.</td>
<td>Lewisburg, WV</td>
<td>To enhance the Greenbrier Military Institute’s leadership development program and its expansion to Barbour and Randolph Counties</td>
<td>$20,000</td>
</tr>
<tr>
<td>Habitat for Humanity of West Virginia, Inc.</td>
<td>Charleston, WV</td>
<td>To build organizational and production capacity among Habitat for Humanity affiliates throughout West Virginia</td>
<td>$110,000</td>
</tr>
<tr>
<td>Highlander Research and Education Center, Inc.</td>
<td>New Market, TN</td>
<td>To support a program to engage 15 fellows across Central Appalachia focused on building individual, organizational, and community capacity to advance economic transition (over three years)</td>
<td>$100,000</td>
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<tr>
<td></td>
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<td>Exploration and planning for an Appalachian Transition Fellowship Program</td>
<td>$5,000</td>
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<tr>
<td>Leadership West Virginia Inc.</td>
<td>Charleston, WV</td>
<td>To support the engagement of Leadership West Virginia program alumni in activities focused on critical issues affecting the state</td>
<td>$80,000</td>
</tr>
<tr>
<td>Ohio-West Virginia YMCA dba Ohio West Virginia Youth Leadership Association</td>
<td>Parsons, WV</td>
<td>To support a successful leadership and organizational transition for the Ohio West Virginia Youth Leadership Association, a statewide youth leadership development organization</td>
<td>$80,000</td>
</tr>
<tr>
<td>Parkersburg Area Community Foundation</td>
<td>Parkersburg, WV</td>
<td>To expand the Civic Leaders Fellowship Initiative, a community leadership development program</td>
<td>$62,000</td>
</tr>
<tr>
<td>West Virginia Affordable Housing Trust Fund</td>
<td>Charleston, WV</td>
<td>To develop online tools and federal funding capture strategies in support of affordable housing development in West Virginia</td>
<td>$100,000</td>
</tr>
<tr>
<td>West Virginia Community Development Hub, Inc.</td>
<td>Fairmont, WV</td>
<td>To support implementation of various community development initiatives</td>
<td>$250,000</td>
</tr>
<tr>
<td>West Virginia Development Office</td>
<td>Charleston, WV</td>
<td>Matching funds for the 2013–2014 West Virginia Flex-E-Grant program</td>
<td>$95,000</td>
</tr>
<tr>
<td>West Virginia Grant Makers Association Inc. dba Philanthropy West Virginia</td>
<td>Morgantown, WV</td>
<td>For programming delivered through the West Virginia Nonprofit Association to build nonprofit organizational capacity, effectiveness, and accountability (over 15 months)</td>
<td>$115,000</td>
</tr>
<tr>
<td>West Virginia University Foundation, Inc.</td>
<td>Morgantown, WV</td>
<td>To establish the West Virginia Land Stewardship Corporation, a nonprofit organization facilitating redevelopment of post-industrial sites</td>
<td>$147,000</td>
</tr>
</tbody>
</table>
ECONOMIC DEVELOPMENT

Ben Franklin Technology Center of Central & Northern Pa. Inc.
University Park, PA
To expand the Shale Gas Innovation Contest, which identifies, vets, and rewards outstanding new shale gas technologies, to West Virginia in addition to Pennsylvania in 2013–2014
$96,000

Collaborative for the 21st Century Appalachia Inc.
Charleston, WV
To support student-led food businesses and assistance to communities to promote culinary tourism
$105,000

Greater Kanawha Valley Foundation
Charleston, WV
Support for the Appalachian Regional Commission’s (ARC) fall conference featuring a focus on entrepreneurship in Appalachia based on local investment and ownership
$6,000

Kanawha Institute for Social Research & Action Inc.
Dunbar, WV
To provide access to capital for disadvantaged small businesses in West Virginia (over two years)
$140,000

Marshall University Research Corporation
Huntington, WV
To enhance local food system supply chain productivity through advanced technology applications (over two years)
$220,000

Natural Capital Investment Fund Inc.
Shepherdstown, WV
To support loans to businesses for energy efficiency improvements and update of organizational strategic plan (over two years)
$186,000

New Appalachian Farm and Research Center Inc.
Rock Cave, WV
To support strategies to increase the supply of West Virginia food products to schools, and to promote a food hub for regional product aggregation and distribution
$160,000

University Economic Development Association Inc.
Pittsburgh, PA
Project to support participation of West Virginians in the 2013 University Economic Development Association annual summit in Pittsburgh
$10,000

Vision Shared Inc.
Huntington, WV
To support the statewide implementation of the Lemonade Day entrepreneurship education program (over three years)
$132,000

West Virginia Coalition for Technology-Based Economic Development, Inc.
dba TechConnectWV
Charleston, WV
To support implementation of the West Virginia Blueprint for Technology-Based Economic Development, including expansion of the Innovation Adoption Program for small manufacturers (over two years)
$226,000

West Virginia Community Development Hub, Inc.
Fairmont, WV
To expand the Farmers Market Training Program to provide training and technical assistance to farmers and related small businesses (over two years)
$99,000

To support the West Virginia Food and Farm Coalition as a facilitator for multiple local food–related economic development initiatives (over 18 months)
$150,000

West Virginia Department of Education
Charleston, WV
To expand the West Virginia Farm to School Initiative to increase purchasing of West Virginia farm products
$150,000

West Virginia High Technology Consortium Foundation
Fairmont, WV
To support new business formation and growth through technical assistance and early-stage capital investment (over 18 months)
$250,000

West Virginia University Foundation, Inc.
Morgantown, WV
To re-launch the West Virginia Statewide High School Business Plan Competition to promote entrepreneurship (over two years)
$89,000

For a student intellectual property patent services pilot project, to support provisional patent applications by the WVU Entrepreneurship and Innovation Law Clinic in support of student innovations
$80,000

SOUTHWESTERN PENNSYLVANIA

EDUCATION

Allegheny Intermediate Unit
Homestead, PA
For a mini-grant program that advances STEAM (STEM & Arts) education
$175,000

Bricolage
Pittsburgh, PA
For a student-designed theater production and cross-curricular instructional strategy in partnership with the Intermediate Unit 1 Center for Professional Development (over two years)
$200,000

Carlow University
Pittsburgh, PA
To establish a CREATE Lab satellite at Carlow University Campus School to test and share instructional methods that incorporate robotics and design (over two years)
$205,000
Carnegie Mellon University
Pittsburgh, PA
To host a summit of STEAM educators and researchers
$10,000

Catalyst Connection
Pittsburgh, PA
To develop and test a high school manufacturing curriculum in partnership with local companies (over two years)
$140,000

Children’s Museum of Pittsburgh
Pittsburgh, PA
To establish hands-on learning laboratories in museums, libraries, and classrooms in West Virginia and Southwestern Pennsylvania
$100,000

City Theatre Company, Inc.
Pittsburgh, PA
To introduce playwriting to language arts classes in West Virginia and Southwestern Pennsylvania
$118,500

Intermediate Unit 1
Coal Center, PA
For a post-secondary transition program for career and technical education high schools
$190,000

To establish professional development learning laboratories in partnership with West Liberty University and Marshall University’s Harless Center for Rural Education Research and Development
$177,000

Junior Achievement of Western Pennsylvania
Pittsburgh, PA
For a middle school outreach program that encourages careers in the energy sector
$50,000

Sprout Fund
Pittsburgh, PA
To support the Kids+Creativity Network, a regional consortium of educators, artists, and researchers committed to the integration of arts and technology in learning
$150,000

Western Area Career & Technology Center
Canonsburg, PA
To create an accredited technical college in partnership with an energy company (over two years)
$280,000

Westmoreland County Community College Educational Foundation, Inc.
Youngwood, PA
To launch an integrated high school/post-secondary technology program at an industrial park (over two years)
$200,000

ECONOMIC DEVELOPMENT

AIA Legacy Inc.
Washington, DC
Sponsor Remaking Cities Congress held in Pittsburgh in October 2013
$15,000

Allegheny Conference on Community Development
Pittsburgh, PA
To assist site selection for the Power of 32 Site Development Fund through a contract with IDC Architects/CH2M HILL
$50,000

To link Pittsburgh business investment to community development organizations in small towns and rural communities
$50,000

For the 2013 plan of work
$220,000

Almono LP
Pittsburgh, PA
Program-related investment loan to support continued development of a brownfield site and related expenses
$1,000,000

Bridgeway Capital Inc.
Pittsburgh, PA
To establish a lending program for small manufacturers in Washington, Greene, Fayette, and Westmoreland Counties
$150,000

Center For Sustainable Shale Development Inc.
Pittsburgh, PA
To support the launch of an audit certification program for participating shale gas operators in the Appalachian Basin
$25,000

Chatham University
Pittsburgh, PA
To expand a women’s entrepreneurship program to include a customized training course and a clinic for students to work with business owners (over two years)
$200,000

Housing Alliance of Pennsylvania
Jenkintown, PA
To create a curriculum for municipal officials and community leaders on new approaches to blighted and abandoned properties, in partnership with the Local Government Academy
$98,000

Idea Foundry
Pittsburgh, PA
For business assistance to the educational technology sector (over two years)
$100,000

To support an innovation challenge program of the Water Economy Network to identify and accelerate new technologies and solutions that address water challenges in the Power of 32 region
$75,000

Innovation Works, Inc.
Pittsburgh, PA
For technology commercialization, company creation, and company growth in the manufacturing sector
$200,000

Local Government Academy
Pittsburgh, PA
To evaluate the best methods of delivering online education to Southwestern Pennsylvania municipal leaders
$32,000

Pennsylvania Environmental Council Inc.
Pittsburgh, PA
To expand the River Town Program, an outdoor recreation economic development project, to include additional communities in Southwestern Pennsylvania and West Virginia (over two years)
$175,000

To develop a regional trail network and advance trail town economic development
$181,500
Pittsburgh Ballet Theatre, Inc.
Pittsburgh, PA
For operating support for the 2013–2014 Season
$75,000

Pittsburgh Opera, Inc.
Pittsburgh, PA
For operating support for the 2013–2014 Season
$75,000

Pittsburgh Public Theater Corporation
Pittsburgh, PA
For operating support for the 2013–2014 Season
$75,000

Pittsburgh Symphony, Inc.
Pittsburgh, PA
For operating support for the 2013–2014 Season
$100,000

Renewable Manufacturing Gateway
Pittsburgh, PA
To stimulate growth in manufacturing related to renewable energy and clean technology
$150,000

Sustainable Pittsburgh
Pittsburgh, PA
To train business and municipal leaders in sustainability practices that improve performance and reduce costs
$164,000

The Forbes Funds
Pittsburgh, PA
To staff a regional nonprofit association (over two years)
$50,000
Support for the 2013 Nonprofit Summit
$6,000

The Pittsburgh Foundation
Pittsburgh, PA
To create a senior staff recruitment and civic review process for the City of Pittsburgh’s new mayor
$16,000

The Pittsburgh Trust for Cultural Resources
Pittsburgh, PA
For operating support for the 2013–2014 season of the Pittsburgh Dance Council
$35,000
Support for the 2013 Pittsburgh International Festival of Firsts
$75,000
Support for the 2013 Three Rivers Arts Festival
$15,000

The Progress Fund
Greensburg, PA
For regional expansion of the Trail Town Program®, an economic development initiative based on outdoor recreation assets
$150,000

Washington & Jefferson College
Washington, PA
To launch a business incubator in downtown Washington, Pennsylvania, in partnership with the Washington County Council on Economic Development and the University of Pittsburgh Small Business Development Center
$186,000

Washington County Community Foundation Inc.
Charleston, WV
Toward a $100,000 challenge to increase charitable giving
$25,000

Other
The Foundation Center
New York, NY
For 2013 program support
$9,000

The Grantmakers of Western Pennsylvania
Pittsburgh, PA
For operating and program support in 2013
$20,300

Greater Kanawha Valley Foundation
Charleston, WV
For membership dues for the Appalachia Funders Network, a group of more than 70 public and private grantmakers working collaboratively to improve the economy of Central Appalachia
$5,000

Project HOPE — The People-to-People Health Foundation, Inc.
Millwood, VA
Emergency funding to provide medical treatment and supplies for the victims of the typhoon in the Philippines
$100,000

West Virginia Grant Makers Association Inc.
dba Philanthropy West Virginia
Morgantown, WV
For operating and program support in 2013
$17,900
2013 Financial Information

The Foundation’s fiscal year corresponds to the calendar year. At the end of 2013, the market value of the Foundation’s investments, including cash, was $376,498,558. Grants authorized during the year totaled $16,301,750. The Foundation makes multi-year commitments, with payments scheduled over as many as three years. At year-end 2013, outstanding grant commitments totaled $2,578,000.

The following indicates invested assets, and authorizations and payments of grants and program-related investments over the last five years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Investments Including Cash</th>
<th>Grants Authorized and Program-Related Investments*</th>
<th>Grant and Program-Related Investment Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>$340,177,241</td>
<td>$9,642,700</td>
<td>$13,724,700</td>
</tr>
<tr>
<td>2010</td>
<td>$364,946,789</td>
<td>$15,636,550</td>
<td>$15,222,050</td>
</tr>
<tr>
<td>2011</td>
<td>$320,871,945</td>
<td>$15,102,393</td>
<td>$15,710,050</td>
</tr>
<tr>
<td>2012</td>
<td>$343,549,325</td>
<td>$14,770,058</td>
<td>$14,587,325</td>
</tr>
<tr>
<td>2013</td>
<td>$376,498,568</td>
<td>$16,301,750</td>
<td>$15,926,350</td>
</tr>
</tbody>
</table>

*Includes contingent grants

The Foundation maintains a diverse portfolio. The following table summarizes the cost and fair value of the Foundation’s investments as of December 31, 2013. In its audited financial statements and for the federal tax return, the Foundation reports investments at fair value:

<table>
<thead>
<tr>
<th>Investments</th>
<th>2013 Cost</th>
<th>Fair Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term investments</td>
<td>$827,492</td>
<td>$827,492</td>
</tr>
<tr>
<td>Domestic</td>
<td>48,962,044</td>
<td>58,985,281</td>
</tr>
<tr>
<td>International</td>
<td>40,960,122</td>
<td>67,426,172</td>
</tr>
<tr>
<td>Tactical asset allocation</td>
<td>11,391,235</td>
<td>15,154,858</td>
</tr>
<tr>
<td>Fixed income</td>
<td>28,467,471</td>
<td>27,396,474</td>
</tr>
<tr>
<td>Hedge funds</td>
<td>64,929,185</td>
<td>81,327,767</td>
</tr>
<tr>
<td>Real assets</td>
<td>39,020,330</td>
<td>41,889,326</td>
</tr>
<tr>
<td>Private limited partnerships</td>
<td>66,893,132</td>
<td>75,105,693</td>
</tr>
</tbody>
</table>

Program-related investments | 301,451,011 | 368,113,063 |

Cash | 306,587,613 | 373,249,665 |

<table>
<thead>
<tr>
<th>2013</th>
<th>Cost</th>
<th>Fair Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>3,248,903</td>
<td>3,248,903</td>
</tr>
</tbody>
</table>

Total | $309,836,516 | $376,498,568 |
### SUMMARIZED FINANCIAL INFORMATION

#### ASSETS, LIABILITIES, AND UNRESTRICTED NET ASSETS

**December 31, 2013**  
**2012**

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investments</td>
<td>$373,249,665</td>
<td>$340,127,035</td>
</tr>
<tr>
<td>Cash and equivalents</td>
<td>3,248,903</td>
<td>3,422,290</td>
</tr>
<tr>
<td>Accrued investment income and other assets</td>
<td>50,318</td>
<td>400,055</td>
</tr>
<tr>
<td>Receivables from private limited partnerships and hedge funds</td>
<td>229,196</td>
<td>3,811,929</td>
</tr>
<tr>
<td>Property and equipment, net of depreciation</td>
<td>471,786</td>
<td>519,198</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$377,249,868</td>
<td>$348,280,507</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liabilities and Unrestricted Net Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants payable</td>
<td>$2,578,000</td>
<td>$2,893,300</td>
</tr>
<tr>
<td>Unrestricted net assets</td>
<td>374,671,868</td>
<td>345,387,207</td>
</tr>
<tr>
<td><strong>Total liabilities and unrestricted net assets</strong></td>
<td>$377,249,868</td>
<td>$348,280,507</td>
</tr>
</tbody>
</table>

#### CHANGE IN UNRESTRICTED NET ASSETS

**Year ended December 31, 2013**  
**2012**

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividends</td>
<td>$1,450,129</td>
<td>$1,394,217</td>
</tr>
<tr>
<td>Interest</td>
<td>812,792</td>
<td>1,707,647</td>
</tr>
<tr>
<td>Net gain on investments</td>
<td>38,262,812</td>
<td>26,935,280</td>
</tr>
<tr>
<td>Partnership income</td>
<td>8,966,893</td>
<td>6,111,787</td>
</tr>
<tr>
<td><strong>Total income</strong></td>
<td>$49,492,626</td>
<td>36,148,931</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grants and Expenses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants (net of refunds)</td>
<td>$14,912,038</td>
<td>$14,267,024</td>
</tr>
<tr>
<td>Investment management and custodial fees</td>
<td>2,382,019</td>
<td>2,169,847</td>
</tr>
<tr>
<td>Grant administration</td>
<td>1,600,411</td>
<td>1,481,886</td>
</tr>
<tr>
<td>Other administration</td>
<td>663,931</td>
<td>572,265</td>
</tr>
<tr>
<td>Federal excise tax (benefit)</td>
<td>649,566</td>
<td>(85,163)</td>
</tr>
<tr>
<td><strong>Total grants and expenses</strong></td>
<td>$20,207,965</td>
<td>18,405,859</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase in Unrestricted Net Assets</strong></td>
<td>$29,284,661</td>
<td>$17,743,072</td>
</tr>
</tbody>
</table>

*This information is summarized from the books and records of the Foundation.  
Copies of audited financial statements are available upon request.*
The disposition of a not inconsiderable estate is never an easy assignment.

It has been a thorny & laborious problem for me because, recognizing my frailty & inadequacy, I have not been able to lose sight of the awesome responsibility involved.

If I could have looked upon my material goods as personal property, belonging to me alone, my task would have been immeasurably lighter. But I have never regarded my possessions in that light. Providence gives no fee simple title to such possessions. As I have seen it, all of the elements of the earth belong to the Creator of all things, and He has, as a part of the Divine Purpose, distributed them unevenly among His children, holding each relatively accountable for their wise use and disposition.

I have always felt that I have been only a trustee for such material wealth as Providence has placed in my hands. This trusteeship has weighed heavily upon me. In carrying out this final responsibility of my stewardship, I have sought to utilize such wisdom and understanding of equity as the Creator has given me. No one with any regard for his responsibility to his God and his fellow man should do less. No one can do more.

As I have seen it, life is but a proving ground where Providence tests the character and mettle of those He places upon the earth. The whole course of mortal existence is a series of problems, sorrows & difficulties. If that existence be rightly conducted, it becomes a progress towards the fulfillment of human destiny. We must pass through darkness to reach the light.

Throughout my adult life, day by day & year by year, I have been instilled with the conviction that wealth cannot be measured in terms of money, stocks, bonds, broad acres or by ownership of mine and mill. These cannot bear testimony to the staple of real excellence of man or woman. Those who use a material yardstick to appraise their wealth and foolishly imagine themselves to be rich are objects of pity. In their ignorance and misanthropic isolation, they suffer from shrinkage of the soul.

All of us aspire to a higher and better life beyond this, but I feel that the individual who seeks to climb the ladder alone will never find the way to Paradise. Only those who sustain the faltering ones on the rungs above and extend a helping hand to the less fortunate on the rungs below, can approach the end with the strength of sublime faith and confidence.

**EXCERPTS FROM THE FIFTH CODICIL TO THE LAST WILL & TESTAMENT OF MICHAEL L. BENEDUM**
At the end of life each of us must face the great teacher that we call death. Stern, cold & irresistible, it walks the earth in dread mystery and lays its hands upon all. The wealth of empires cannot stay its approach. As I near my rendezvous with this common leveler of mankind, which takes prince and pauper alike to the democracy of the grave, I do so with resignation to the will of God, and with faith in His eternal justice.

Life has been sweet to me … sweet in the loved ones that have been mine, sweet in the friends who have surrounded me & rewarding in the opportunities that have come my way. I could not leave this earth with any degree of happiness and satisfaction if I felt that I had not tried to bring some of these joys to those less fortunate than I have been.

We know not where seed may sprout. In the poorest and most unregarded child who seems to be abandoned to ignorance and evil, there may slumber virtue, intellect and genius. It is our duty to sow and to nurture, leaving it to others to harvest the fruits of our efforts.

While I am conscious that my love for the land that gave me birth has been an influence in guiding the disposition of my estate, there are other practical reasons why I have favored my native state of West Virginia. It is not that I am unmindful or unappreciative of my adopted home of Pennsylvania, but rather that I have sought to appraise and balance the needs of each and the available potential for supplying those needs.

I cannot close my eyes to the realistic consideration that Pittsburgh and Pennsylvania abound in riches, having a citizenship in which men of great wealth are more common than rare. West Virginia is in a less fortunate position. There can be no question but that its needs are much greater than those of my adopted home. Consequently, in making specific provisions for West Virginia institutions, I have done so in good conscience, with a sense of equity & with recognition of a responsibility to distribute my estate in a way that will bring the greatest good to the greatest number. This decision was not made lightly or impetuously.

Conscious that in this Codicil to my Last Will & Testament, I am figuratively speaking from the grave, and that the great book of my account with the Creator has been closed beyond change or amendment, I submit my soul to His tender mercy, and my memory to the generosity & compassion of my fellow man.

Signed by Michael L. Benedum on the 15th day of June 1957
TRUSTEES, OFFICERS, AND STAFF

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Hamlin, West Virginia

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Pittsburgh, Pennsylvania

Esther L. Barazzone
Pittsburgh, Pennsylvania

G. Nicholas Beckwith III
Pittsburgh, Pennsylvania

Paul G. Benedum, Jr.
Pittsburgh, Pennsylvania

William P. Getty
Pittsburgh, Pennsylvania

Thomas A. Heywood
Charleston, West Virginia

Parween S. Mascari
Morgantown, West Virginia

Robert B. Walker
Huntington, West Virginia

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Bridgeport, West Virginia

L. Newton Thomas
Charleston, West Virginia

G. Randolph Worls
Wheeling, West Virginia

HONORARY TRUSTEE
Governor Gaston Caperton
Charleston, West Virginia

STAFF
Marcie G. Berry
Director of Investments

Catherine M. Budash
Assistant to Dwight Keating
and Accounting Assistant

James V. Denova
Vice President

William P. Getty
President

Sandy Harvey
Administrative Assistant to
William Getty and Mary Hunt

Mary M. Hunt
Senior Program Officer

Lori A. Lordo
Treasurer

Dwight M. Keating
Vice President
and Chief Investment Officer

Margaret M. Martin
Grants Administrator

Rose A. McKee
Secretary and Director of Administration

Kimberly Barber Tieman
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Maureen D. Yock
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Kimberly Tieman and James Denova

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