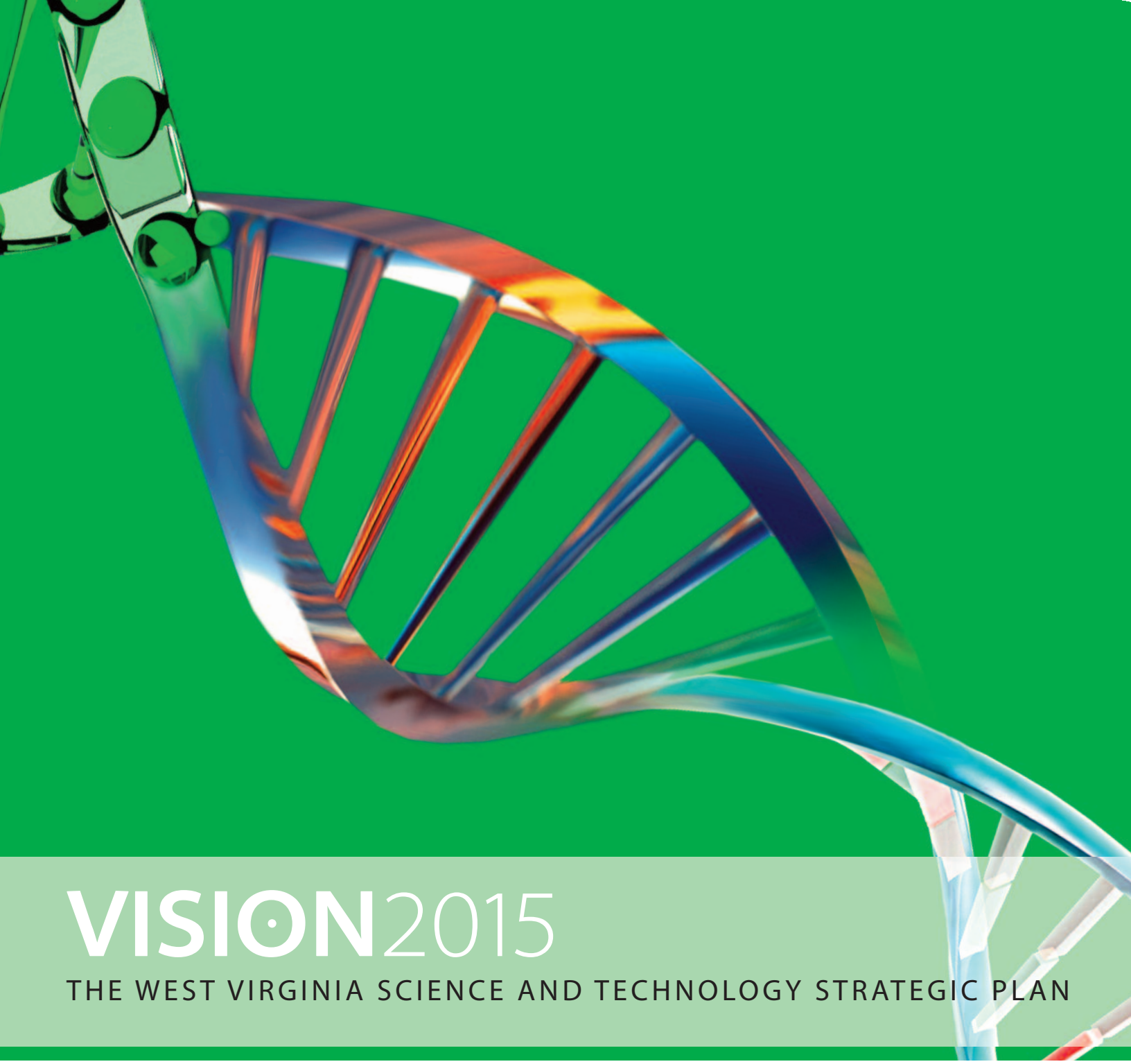


VISION2015

THE WEST VIRGINIA SCIENCE AND TECHNOLOGY STRATEGIC PLAN

Progress Report

West Virginia Higher Education Policy Commission -
Division of Science and Research

2014


VISION2015
A Progress Report
West Virginia
Science & Research
HIGHER EDUCATION POLICY COMMISSION

VISION2015 WEST VIRGINIA SCIENCE AND TECHNOLOGY STRATEGIC PLAN
PROGRESS REPORT

In 2005 West Virginia science and education leaders developed a strategic plan entitled: "Vision 2015: The West Virginia Science and Technology Strategic Plan." This document was endorsed by the State's research officials, the Governor and, ultimately, was recognized in State Code (18-18B *et. seq.*) by the Legislature. The plan is comprised of five (5) target areas for infrastructure development with 14 goals for action by designated leaders from higher education, state government and industry.

Upon completion of the fifth year of implementation, the West Virginia Science and Research Council commissioned a review of the plan, its outcomes and progress indicators. With the assistance of diverse group of stakeholders, Vision 2015 was updated in 2012. Stakeholders will be brought together in the Fall of 2014 to begin to develop the successor to Vision 2015.

Vision

By 2015, research and innovation will be the number one driver of West Virginia's new, diverse and prosperous economy

Overview and Impact

- More than tripled competitive funding from federal agencies since 2005.
- New science and engineering facilities at Marshall University (MU) and West Virginia University (WVU) and more being built.
- Small and medium-sized high performance computing clusters have been installed and are in use by faculty, post docs, graduate students and undergraduate students at MU, WVU and West Virginia State University (WVSU).
- The enrollment and graduation of minority STEM students have been very successful with enrollment percentage more than triple the percentage of minorities in WV and graduation numbers nearly doubling from 2010.
- TechConnect worked with partner organizations to establish ChemCeption, the only business incubator in the nation focused solely on commercializing chemistry-based technology, and the Chemicals and Advanced Materials Commercialization Fund.

Human and Physical Infrastructure

GOAL 1 Increase the number of critical STEM researchers at WVU and MU by 15% by 2015

- 2005 Baseline: 444 (130 at MU and 314 at WVU)
- 2010 Goal: 533 (156 at MU and 377 at WVU)
- 2015 Goal: 613 (179 at MU and 434 at WVU)
- Actual in Spring 2014: 897 (253 at MU and 644 at WVU)
- Accomplished (STEM researchers have exceeded goal)

GOAL 2 Increase the space allocated to externally funded STEM researchers to achieve levels comparable to similar institutions on a per researcher basis by 2015

- MU and WVU have both constructed new science facilities and construction is continuing
- Campus Master Plans for construction have been developed

GOAL 3 Continue to invest in and nurture four nationally competitive research clusters (Advanced Energy, Chemicals and Advanced Materials, Biometrics and Biotechnology) and identify other emerging clusters for support

- The Research Challenge Fund provides funding for Research Challenge Grants. In 2012, Research Challenge Grants were awarded that support energy, advanced materials and biotechnology. These grants will provide support of up to $1.35 million over 5 years, although the annual increment provided for FY15 was reduced by $100K each due to reductions in the Research Challenge Fund.

GOAL 4 Establish statewide or regional infrastructure to provide 21st-century library resources to all institutions

- Research Trust Fund endowments have been created for library enhancements at WVU and MU which will provide for some digital journal subscriptions.

GOAL 5 Implement a Cyberinfrastructure Strategic Plan, recognizing its strategic importance to Science and Technology

- MU, WVU and WVSU have small to medium high performance computing centers installed and in use on their campuses. WVU's shared HPC system is located in a dedicated space with sufficient space, power, backup and cooling capacity for many years of growth. With the guidance of Dr. John Campbell, Chief Information Officer at WVU, a new high performance cluster (Spruce Nob) was created using a condominium style investment. Researchers can purchase direct access to nodes on the cluster making them part owners of the cluster. Cluster owners are guaranteed access to their nodes within 4 hours of job submission to their respective queue on the cluster and can borrow up to 4 hours on idle nodes. The condo model provides sustainability by allowing for cluster growth with investments from individual researchers, departments or other groups. The maintenance and support costs are covered by the institution. Spruce Knob also features 25 nodes that are freely available to the research community within the state. These nodes have a 24 hour wait time and require fair share queuing. By adding Spruce Knob to the high performance computing cyberinfrastructure, the number of compute nodes have increased from 32 (384 cores) in year 3 to over 110 nodes (1792 cores) in Year 4 between the two clusters. At present, the MU HPC has 8 heavy users and several more intermittent users, and several professors are having their students trained and are using resources for class work. At WVSU, the HPC has 10 cores and 29TB of storage with only 10TB of free space. The system is estimated to operate already at more than half its operating and memory capacity. Recently, WVSU has added 64TB of backup storage and two dedicated servers for bioinformatics and database work.
- All three institutions' HPCs were started by investment of the National Science Foundation (NSF) and are supported by the institutions.

GOAL 6 Develop innovation ecosystems to enable the start-up of new technology-based businesses

Research and Innovation

- **TechConnect** has created the Innovation Transfer Consortium (ITC), a program that provides funds to forge connections between researchers at work in West Virginia's innovative institutions of higher education and the potential private sector partners who can help turn their work into viable products, services, technologies and, ultimately, jobs. Grants have been awarded to Wheeling's Polyhedron Learning Media (PLM) and West Liberty University to develop two online physics lab simulations and

to Wheeling's PLANTS LLC and Wheeling Jesuit University's Appalachian Institute to develop and commercialize educational programming about simple, inexpensive and easy to implement hydroponic vegetable production systems to address the Appalachian area need for higher nutritional food accessible to low income populations. The ITC is funded by the Benendum Foundation and supported by Higher Education Policy Commission, Division of Science and Research.

Another TechConnect program is StartUp West Virginia Venture. The Startup West Virginia Venture program provides commercialization services to six selected small businesses and entrepreneurs. The services concentrate on Consultation and Professional Assistance. In a regional collaboration, Tech ConnectWV has partnered with Innovation Works (IW) of Pittsburgh to launch a pilot project of IW's Innovation Adoption Program (IAP) in West Virginia. The objective of IAP is to help manufacturers located in West Virginia develop cutting-edge technologies that will accelerate their business development and growth and enable them to gain a competitive advantage in local and global markets.

In addition, TechConnect worked with partner organizations to establish ChemCeption, the only business incubator in the nation focused solely on commercializing chemistry-based technology; the Chemicals and Advanced Materials Commercialization Fund; the annual TransTech Energy Business Development Conference; and the annual West Virginia Biosciences Summit. TechConnect also maintains ongoing partnerships with state and regional organizations to promote a number of initiatives aimed at empowering entrepreneurs and their communities, including the Shale Gas Innovation Contest; the WVU Tech Entrepreneurship Business Plan Competition; and the Teaming to Win Conference.

GOAL 7 Increase competitive external funding to reach at least $240 million by 2015 and grow annual public and private R&D expenditures

- R&D expenditures dropped between 2011 and 2012. Much of this drop is related to the increased pressure of competition for limited resources both at the state and national level where funding for research has been level or reduced.

ALL R & D Expenditures			
	2005 Baseline	2012 R&D Expenditures	2015 Goal
MU	$7.4M	$19.0M*	$29.6M
WVU	$52.7M	$163.5M*	$210.8M
STATE	$60.1M	$196.3M*	$240M

** Data from the most recent National Science Foundation R & D expenditures report (2012).*

Policy

GOAL 8 WVU and MU to create an environment to encourage innovation, commercialization, economic development and entrepreneurism among faculty and students

- WVU's LIINC (Linking Innovation Industry & Commercialization) project is designed to accelerate the commercialization of research results and strengthen its regional economic impact by creating new and improving traditional ties to industry and other regional entrepreneurial universities. The LIINC events are continuing in FY15.

- MU has revitalized its Technology Transfer Office. The office provides resources for faculty by facilitating invention disclosures; obtaining patents, copyrights and trademarks; collecting and distributing royalties; developing technical and market assessments; marketing university technologies to industry partners and providing business assistance to university-created startup companies.

GOAL 9 Double state-based, long-term, dedicated funding for research and innovation throughout West Virginia

- To date, the Division of Science and Research has been unable to increase the dedicated funding to the Research Challenge Fund. In fact, funding for seeding research via the Research Challenge Fund has decreased over the period of its existence. State budget challenges make more funds by 2015 unlikely.

Education and Outreach

GOAL 10 Strengthen current regional alliances and create new active regional or global alliances among research universities, the private sector and government agencies by 2015

- WVU is currently engaged in one such partnership with the Regional University Alliance. This alliance seeks to be self-sustaining via external funding by 2015. WVU has an ongoing collaboration with National Radio Astronomy Observatory and international universities funded by an NSF Partnership for International Research and Education Award. An additional such award will be sought in the area of energy. MU has a partnership in biotechnology and clinical/translational medicine with the University of Kentucky. WVU is partnering with the West Virginia School of Osteopathic Medicine and Charleston Area Medical Centers in a second clinical/translational medicine grant from NIH. WVU, MU, WVSU, Shepherd University and West Virginia Wesleyan College have partnered to develop a $20M proposal to NSF for an EPSCoR Research Infrastructure Improvement grant.

GOAL 11 Increase the graduation of STEM students by 3% per year with an emphasis on broadening participation. Maintain minority participation at least in ratio to growth.

- The number of students majoring in STEM is edging toward reaching the 2015 goal. However, the number of students completing STEM bachelor's degrees has dropped below the 2010 basis. This is a clear sign that the HEPC Master Plan focusing on completion is on target for STEM majors as well as for the general student population. A bright spot is the strong increase in underrepresented minority (URM) STEM enrollment and completion. Fully 18% of STEM majors are URM students and has far exceeded the 2015 goal, and the number of URM STEM graduates has almost doubled since 2010.

STEM Student Data				
	2004 Baseline	2010 New Basis	2013 Actual	2015 Goal
# of students majoring in STEM	7,730	11,058	12,803	13,010
# of students completing STEM bachelor's degree	1,177	2,411	2,307	2,836
# of UREP students majoring in STEM	499	847	2,325	996
# of UREP students completing STEM bachelor's degree	55	184	321	216

Data from the West Virginia Higher Education Policy Commission. Numbers in orange reflect actual 2010 data.

GOAL 12 Increase the number of Ph.D.s awarded in science and engineering fields by 20% in five years, with additional focus on U.S. nationals and diversity

- Not Accomplished, increased by 31% over the last five years, and remained static from 2013.
- 2010 Baseline: 99
- 2015 Goal: 119
- 2014 Actual: 94

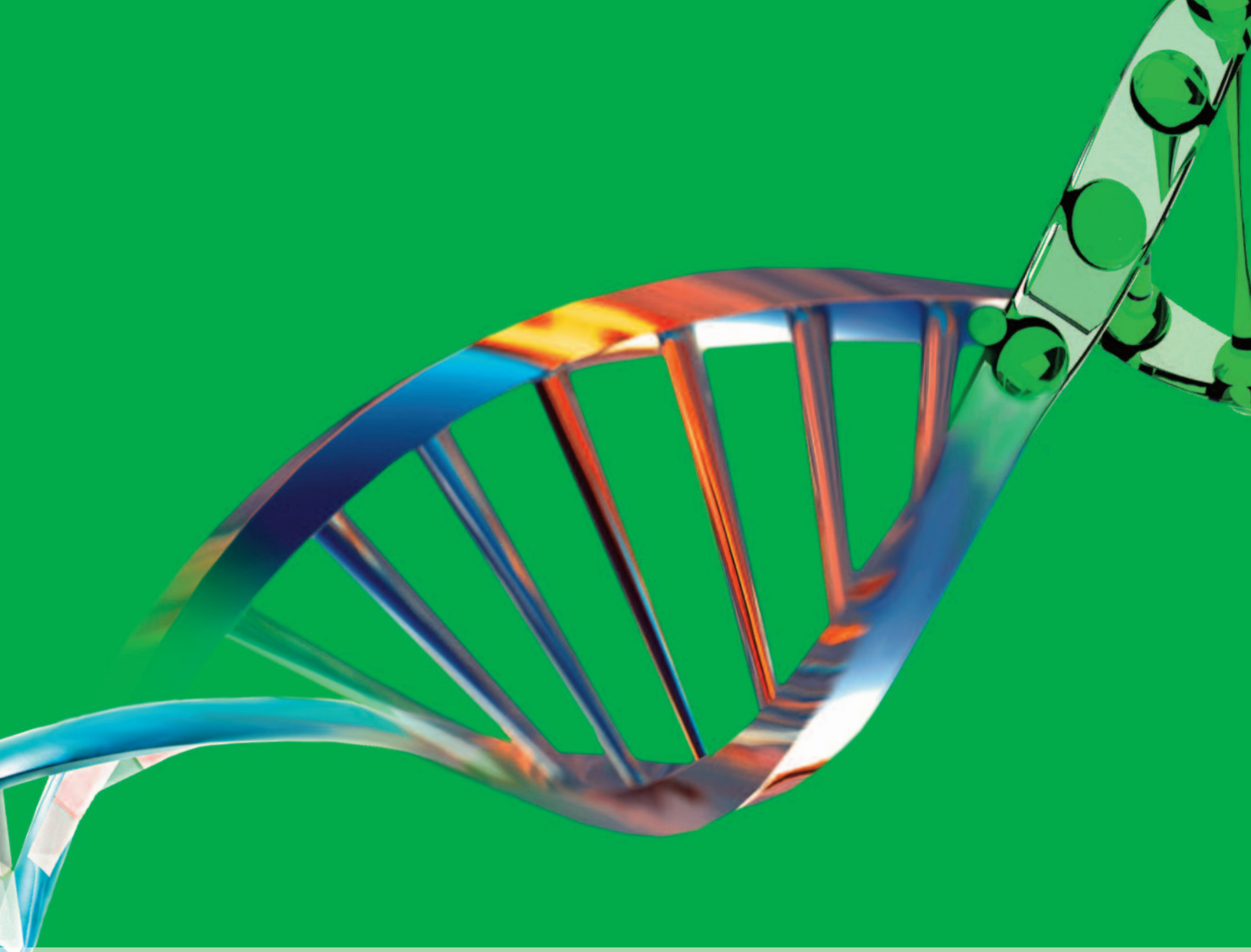
Economic Development

GOAL 13 Create a statewide P-20 STEM education and workforce development plan

- Not accomplished.
- However, implementation of the Common Core standards in the K-12 system in 2014 will eventually lead to students graduating college and/or career ready. In addition, the West Virginia College Completion Task Force Report (May 2012) addresses workforce development particularly with the focus on adult learners.
- The Community and Technical College System of WV Title 135, Series 27 Legislative Rule (2012) adopts procedures and guidelines for the administration of the Workforce Development Initiative Program. Among the programs that the rule addresses is the Learn and Earn Program. This program was created by the West Virginia Legislature with a mission to develop a strategy to strengthen the quality of the state's workforce by linking the existing postsecondary education capacity to the needs of business, industry and other employers by utilizing available funding to provide explicit incentives for partnerships between employers and community and technical colleges to develop comprehensive workforce development services.

GOAL 14 Create early-stage funding mechanisms to assist in the commercialization of technologies for entrepreneurs, start-ups and small technology firms

- Recently, the WV High Growth Investment Fund LLC was created using funds from Appalachian Regional Commission to set up the fund. The WV Angel Investor Network and a consultant worked together to create the fund which they expect to reach $1.5M.
- While not early stage funding, the West Virginia Capital Access Program is the State's program designed to increase small business access to capital. West Virginia has access to $13.1 million to fund new small business lending programs.



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