EDUCATION AND WORKFORCE
THE INSTITUTE FOR ADVANCED LEARNING AND RESEARCH

MISSION

The Institute for Advanced Learning and Research (IALR) develops and attracts technology and talent critical to Southern Virginia's economic prosperity.

Key Objectives and Performance Measures

- **We will revitalize the economy of Southern Virginia through innovative technologies and strategic partnerships.**

We will develop and implement bio-based energy and other emerging alternative energy strategies that can enhance economic revitalization in Southern Virginia by increasing the number of commercial ventures by 33.3% by 2012.

We will develop & implement bio-based energy & other emerging alternative energy strategies that can enhance economic revitalization by increasing the number of new jobs created because of the Sustainable Energy Technology Center (building to be completed by end of 2011) by 10% in 2012.

We will support research and development of novel and enhanced plant materials that have commercial relevance and value by increasing research and development expenditures in horticulture and forestry products by 10% by 2012.

- **We will advance and expand Science, Technology, Engineering and Math (STEM) educational opportunities for Southern Virginia.**

We will increase the number of Science, Technology, Engineering and Math (STEM) programs, courses and workshops offered by 10% by 2012.

We will increase the number of STEM participants by 10% by 2012.

- **We will support and facilitate research, conferencing services and educational programs by creating and maintaining an energy-efficient campus.**

We will measure the cost of energy consumption throughout the fiscal year to validate the creation and maintenance of an energy-efficient campus as evidenced by a 10% decrease in overall energy costs by 2012.

REVITALIZING THE ECONOMY OF SOUTHERN VIRGINIA THROUGH INNOVATVE TECHNOLOGIES

A primary function of IALR is to assist in regional economic and community development efforts by housing and encouraging research and product- related activities and encouraging cutting-edge technology and technology transfer in the region.

A priority for IALR is to take a leadership role in the development of a new bioenergy-based industry in Southern Virginia. This work is pursued by the IALR through its Institute for Sustainable and Renewable Resources (ISRR). Some plants that have great potential for conversion into bioenergy are very difficult to grow, using current propagation methods. The ISRR has developed tissue culture methods, which enables these plants to be grown in the 1,000's in a relatively short space of time. Field trials have shown that the cultured plants grow well under field conditions. This work has provided the opportunity for a new bioenergy industry to emerge in Southern Virginia.

The Advanced and Applied Polymer Processing Institute (AAPPI) provides the means for polymer-related businesses to gain competitive advantages by leveraging state-of- the-art testing and research infrastructure at a fraction of traditional costs. AAPPI serves customers as a virtual product development center, bridging academic research with an industry-focused perspective on commercialization with both for-profit companies, government institutions such as NASA and the Department of Defense.

The performance engineering- based efforts at IALR enable economic growth by attracting and developing advanced technologies that leverage the vehicle-related native assets of Southern Virginia. There are five different performance engineering labs and one research institute within the performance engineering research division, all collaborating with Virginia Tech and other partners to create a hub of activity in Southern Virginia around education and research endeavors to attract, serve and staff commercial businesses:

- Virginia Institute for Performance Engineering and Research – VIPER;
- Performance Engineering Research Lab – PERL;
- Vehicle Terrain Performance Lab – VTPL;
- Intelligent Transportation Lab – ITL;
- Bio-Inspired Technology Laboratory – BIT and
- The Computational Multiphysics Systems Lab – CMS.

The broad research mission of the performance engineering labs is to develop technologies to advance the state-of-the-art in vehicle design, testing and analysis. These technologies are saleable because automotive-related companies are in the market for products and services that will make them more competitive. VIPER has conducted research on its Eight Post Shaker test rig for a major automotive manufacturer and for several racing teams, including a well-known NASCAR team. These contracts generated income that was reinvested in the Institute.

The IALR outreach provides programs in science, technology engineering and math (STEM) for youth in the region. In 2009, IALR offered two outstanding outreach programs. The Dan River Information Technology Academy (DRITA), funded through the National science Foundation under the ITEST program, was the first ITEST program in Virginia. DRITA offered a comprehensive computer skills training program for ninth, tenth and eleventh graders, enabling promising youth to develop solid Information Technology (IT) skills and obtain the background and encouragement needed to enable them to pursue higher education in STEM and other fields in which advanced IT knowledge is needed. The program has brought together 74 Southside students from high schools in the cities of Danville and Martinsville, and from Halifax, Henry and Pittsylvania counties. More than 40 DRITA participants completed a 70-hour IT- related externship with local businesses and educational institutions including the public schools in Martinsville and Danville and in Halifax and Henry counties and at the Higher Education Center (HEC) in South Boston.

The Summer Educators' Development Institute (SEDI) provides instruction on how teachers can incorporate technology into their teaching and supplies information on STEM topics and educational research, with the opportunity to earn recertification points. SEDI was attended by 400 participants, enabling educators to earn recertification at no charge.

NanoscIEnce: It's No small Thing - Nanoscience Instruction for Educators - This nanoscience initiative offered a variety of professional development opportunities for K-12 educators of all disciplines and grade levels. Funded by the Department of Education through its Fund for the Improvement of Postsecondary Education (FIPSE), the initiative brought together experts from around the country to teach workshops combining hands-on activities with lectures. The Nanoscience initiative has been highly collaborative. Through this effort, extensive partnerships have been cultivated, linking IALR with the outstanding nanoscience education powerhouses and companies such as the University of Wisconsin- Madison, Rice University, Northwestern University, The Pennsylvania State University, Danville Community College, The University of North Carolina at Chapel Hill, North Carolina State University, NiseNet, Luna, and others.

The IALR partners with high schools and community colleges located in the region, as well as with senior higher education institutions in the Commonwealth to create academic pathways in STEM-related disciplines that are related to targeted industry sectors. These pathways will allow students to complete associate, bachelor, and graduate degree programs in science and engineering disciplines while never having to the leave the region. The goal is to create a workforce that is prepared at multiple educational levels to hold jobs that require skilled workers and pay high wages.

In 2009, IALR had a total of 4675 STEM-E participants, 268 workshops/classes (35 credit/233 noncredit) and a total of 42 instructors

HOW DOES IALR CAPITALIZE ON OPPORTUNITIES THAT CREATE A MULTIPLIER EFFECT TO BUILD CAPACITY AND DRIVE ECONOMIC GROWTH?

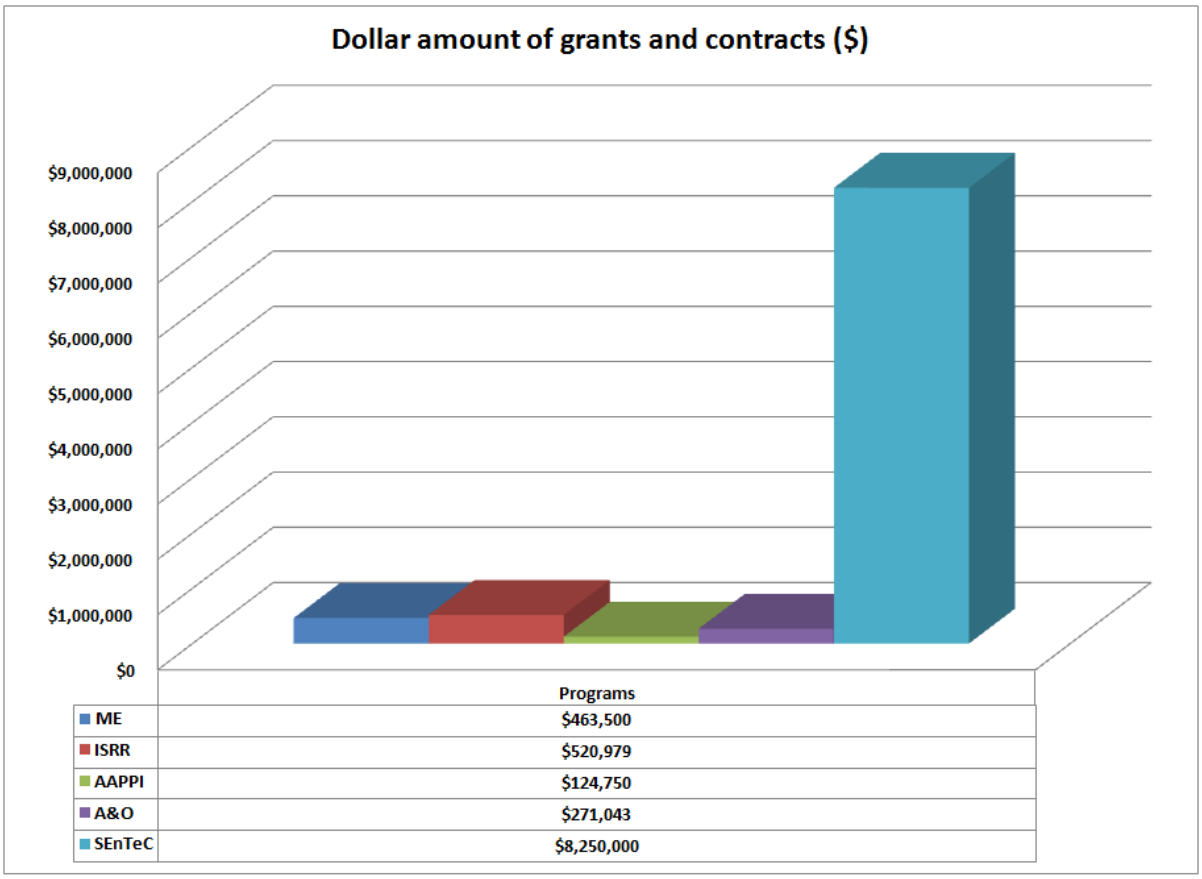
- The IALR has successfully worked to obtain grants and contracts during 2009, providing a 1.7 multiplier on State funds received.

- The IALR offered Nanotechnology workshops for 100 teachers funded through a federal grant. When each teacher touches100 students, the multiplier effect is that 10,000 K-12 students have learned about nanotechnology – a topic that is common in the science community but has not made it into Virginia's SOLs.

- The IALR offers employer-driven residential energy auditor training. Our ability to build capacity within the region to perform residential energy audits is an example of how IALR brings together multiple partners to meet a workforce need. Where we had no raters in the region, we now have 11 who are poised for certification; two of these individuals are unemployed. At $250 per home and 10 homes per week, we've just provided a livable wage that has a multiplier effect in the community. Homeowners can access tax rebates to pay for retrofits, driving business to our local suppliers, which sustains and creates jobs. In addition, these homeowners now have $150 more each month based on their electric bill savings; multiply that by 12 and we could put $1800 in disposable income per family back into the community to drive the secondary economy/service industry.

- Graduate students are enrolled full time in Masters or PhD programs. Currently there are 17 students enrolled in engineering and plant biology research programs which represents growth by a multiplier of 4 during the past four years. These programs contribute an average of $22,000/pa each during their stay in the region.

IALR SCORECARD – DOLLAR AMOUNT OF GRANTS AND CONTRACTS FY 2009



Total Value of grants and contracts awarded $9,630,272.

IALR STATE BUDGET REDUCTIONS AND IMPLICATIONS

2008	$6,221,656
2009	$5,612,027
2010	$6,144,538
2010 Addenda	($306,948)
2011 Base	$6,144,538
2011 Addenda	($619,477)
2011 TOTAL	$5,525,061
2012 Base	$6,144,538
2012 Addenda	($619,477)
2012 TOTAL	$5,525,061

These reductions have resulted in the elimination of 6 positions. Job duties were consolidated and services reduced.

The proposed reductions for the 2011 and 2012 IALR budgets will have direct impact on the research programs with the elimination of further positions and programs.

Budget reduction actions for 2011 and 2012:

Reduce Research Building Lease
Terminates existing research property lease and revises the current use of space by programs.

	FY 2011	FY 2012
General Fund	($190,500)	($254,000)

Reduce research program
Reduces expenditures of research programs. Areas impacted will include research and development, staffing and assistance provided to governments and industry.

	FY 2011	FY 2012
General Fund	($246,964)	($220,525)

Defer discretionary spending
Defers discretionary spending throughout the agency. Examples of reductions will include the elimination of memberships, consumables purchases and restrictions on travel.

	FY 2011	FY 2012
General Fund	($176,432)	($139,371)

The Institute for Advanced Learning and Research

VISION

The Institute for Advanced Learning and Research (IALR) will enable economic and community transformation in Southern Virginia.

MISSION

The Institute for Advanced Learning and Research develops and attracts technology and talent critical to Southern Virginia's economic prosperity.

IALR's research centers provide the basis for a new economy in Southern Virginia. University research faculty at the Institute support innovation programs that increase regional economic growth through sponsored research, product testing, and commercialization. The particular innovative strategies to be used to revitalize the economy include a focus on sustainable energy, high value horticulture and forestry products, and performance engineering which build on existing regional strengths already present in agriculture and motorsports.

As part of its mission to transform the area's economy, the Institute provides and/or co-sponsors a host of academic offerings aimed at educating area residents for the future economy. Outreach and education programs develop a future core-economy workforce while enhancing the preparedness of the existing labor market. IALR's technology education programs advance technology critical to succeeding economically. The Institute Conference Center annually attracts thousands of attendees who bring dollars and business to Southern Virginia.

IALR's Strategic Plan incorporates two leading goals:

1. To revitalize the economy of Southern Virginia through innovative technologies, and
2. To advance and expand science, technology, engineering and math (STEM) educational opportunities

To accomplish these goals, IALR has adopted the following strategies:

- Sustainable energy—Develop and implement bio-based energy and other alternative energy strategies to enhance economic revitalization
- Develop plants with commercial value—high value horticulture, forestry and bio-based products
- Performance engineering— Attract and develop advance technologies that leverage vehicle-related assets of the region
- Foster partnerships to support economic revitalization
- Facilitate STEM disciplines throughout the PK-12 curriculum
- Provide professional development for PK-12 teachers and other educators
- Develop and implement educational pathways to facilitate P-K through graduate education
- Collaborate with partners on programs that anticipate regional needs

Performance Engineering

VIPER— Virginia Institute for Performance Engineering and Research

PERL—Performance Engineering Research Lab

VTPL—Vehicle Terrain Performance Lab

ITL—Intelligent Transportation Lab

BIT—Bio-Inspired Technology Laboratory

CMS—Computational Multiphysics Systems Lab

The broad research mission of the performance engineering labs is to develop state of the art technologies.

Institute for Sustainable and Renewable Resources (ISRR)

The goal of ISRR is to use plant biology to enhance regional economic and community development.

IALR Education and Outreach

IALR's education programs are designed to meet three needs: preparing a workforce for the future, meeting current employer needs, and expanding access to higher education. Outreach programs encourage lifelong learning.

Sustainable Energy Technology Center—SEnTeC

SEnTeC will build on existing plant biology capabilities of ISRR with bioenergy crops while testing various conversion technologies at small-scale production facilities.

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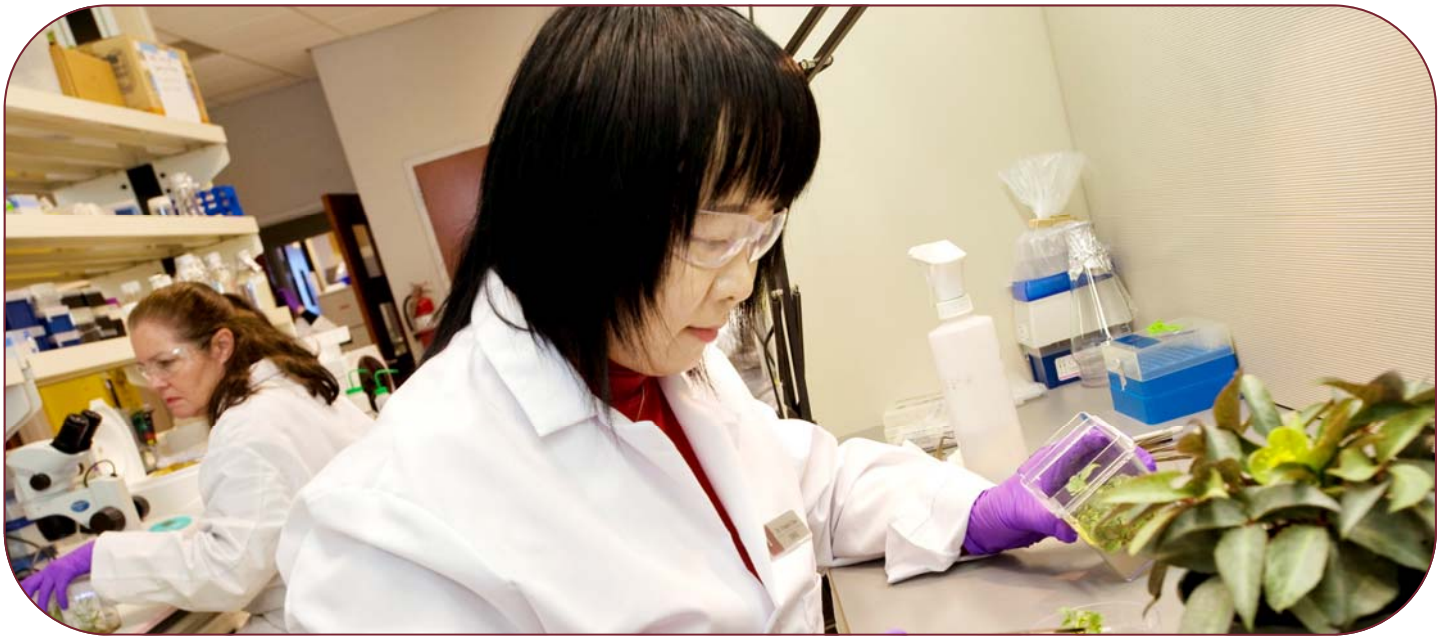
The Institute for Sustainable and Renewable Resources



The Institute for Sustainable and Renewable Resources (ISRR) contains a state-of-the-art biotechnology laboratory for plant tissue culture and molecular breeding.

The ISRR researchers focus on plant tissue culture, plant physiology/biochemistry, molecular biology and molecular breeding, with a current research portfolio designed to develop, enhance and diversify the agricultural renewable resource-based economy of Southside Virginia.

ISRR has four areas of concentration: High Value Horticulture and Forestry Plant Research, Bio-based Products and Bio-energy Production, Plant-based Biological compounds and Processing Technologies, and Molecular and Tissue Culture Service.

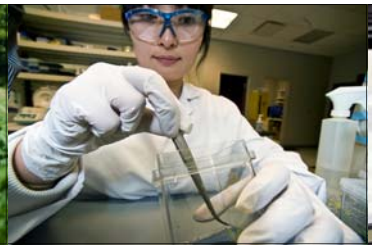
ISRR is generating new products, facilitating the creation of new start-ups, and strengthening existing small businesses. Commercialization of high value ornamental and bioenergy crops will begin in early 2010.

The novel varieties being developed for commercialization include the hellabores, or Christmas rose, a plant highly prized by gardeners for his beauty, hardiness and resistance to deer. Other plants under development in this program include impatiens, azaleas, and various varieties of Christmas trees, among others.

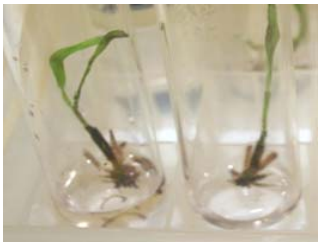
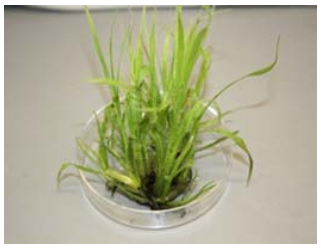
ISRR will continue to help define and participate in educational, extension/outreach, and commercialization activities that help local and regional stakeholders understand and play an active role in the transformation of a declining tobacco-based economy into a new bio-based economy.

The ISRR has attracted new faculty, staff and students to Southside Virginia, and is already making an impact on the local community.

For more information, contact Dr. Barry Flinn, ISRR Director, at 434-766-6770.

Outlined below are the steps that ISRR researchers follow as they progress from basic research with plant tissue through to cultivation and then commercialization of high value crops. An example of the sequence that an ornamental (Azalea) goes through is depicted in the left column and the same sequence for a bioenergy crop (Miscanthus) is shown in the right column.

Ornamental Plants (i.e. Azaleas)		Bioenergy Plants (i.e. Miscanthus)
	Placement of plant tissues (such as leaf or stem pieces) from desired plants into test tubes/petri plates	
	Testing of growth media and chemical additions for rapid, large scale shoot production from these tissues in culture	
	Rooting of the shoots to form plantlets for our plants of interest	
	Transfer of plants from test tubes/petri plates into soil for confirmation of survival and growth	

Commercialization begins in a commercial propagation lab such as the one shown here. The complete tissue culture process developed through ISSR's IALR research will create new jobs in laboratories as well as creating new plant growth opportunities for area farmers and growers. The establishment of this commercial propagation laboratory will facilitate the development of Southern Virginia as a horticulture and bioenergy hub.

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IALR's Education and Outreach Efforts

GOAL: To advance and expand science, technology, engineering and math (STEM) educational opportunities

To accomplish this goal, IALR's Academic and Outreach Department has adopted the following strategies:

- Facilitate STEM disciplines throughout the PreK-12 curriculum
- Provide professional development for PreK-12 teachers and other educators
- Develop and implement educational pathways to facilitate PreK through graduate education
- Collaborate with partners on programs that anticipate regional needs

Residential Energy Network (RESNET) training participants use the duct leakage equipment to perform a home energy audit.

Green Jobs Training

IALR received funds from the Dan River Region Collaborative to provide home energy rater classes to 60 individuals. IALR has partnered with the Cities of Danville and Martinsville, Danville Community College, Patrick Henry Community College, Mecklenburg Electric Cooperative, Pittsylvania County Community Action, and the West Piedmont Workforce Investment Board on the initiative. **This workforce training program increased the number of certified raters in the Southern Virginia region by 1100%.** IALR and it's partners are prepared to leverage this local investment to garner federal stimulus dollars through the Department of Energy. The National Fund for Workforce Solutions is reviewing IALR's effort to create new training models for rural regions.

For more information contact Dr. Julie Brown at 434-766-6711.

IALR's Education and Outreach Department is committed to creating a 21st Century workforce that is prepared to engage in a STEM-focused economy in Southern Virginia.

K-12 Students

In FY09, IALR provided summer camps and year-long STEM activities to over 480 youth participants, developing a workforce pipeline prepared to engage in the innovation economy.

Teachers

From nanotechnology to web-design, IALR provided over 30 workshops to 400 participants in FY09. This cost-effective program helps the region's education professionals maintain their teaching credentials.

Young Professionals

Chris Boggs received his PhD from Virginia Tech, completing his academic courses and research through IALR. Chris is now employed with VIPER Services in Halifax County and is just one example of IALR's efforts to recruit and train a talented workforce.

Lifelong Learners

Since 2008, IALR has provided computer skills training to over 425 Southern Virginia residents. Ten participants have earned their International Computer Driving License certification, an internationally recognized IT training credential.

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PERFORMANCE ENGINEERING AT IALR

THE INSTITUTE FOR ADVANCED LEARNING AND RESEARCH

The high performance engineering programs that are part of IALR's mechanical engineering research endeavor are focused on economic development through the attraction of automotive and motorsports-related businesses to the region and the creation of jobs at these businesses and at IALR"s Virginia Institute for Performance Engineering and Research (VIPER) and our other engineering labs.

Impact is being made

- VIPER, over the past several years, has conducted research on its Eight Post Shaker test rig for a major automotive manufacturer and for several racing teams, including a well-known NASCAR team. These contracts generated income that was reinvested in the business
- TMI AutoTech Inc., manufacturer of the Ariel Atom, relocated their manufacturing facility to the VIR Raceplex near VIPER. They currently employ about a half dozen people and plan to expand when the economy improves
- Volkswagen has relocated a facility next door to VIPER at VIR. This facility currently employs at least five staff members who prepare Jetta TDIs for Volkswagen TDI Cup races.
- The Advanced Vehicle Research Center (AVRC) opened a new 16,000 sq. ft. facility in the Cyber Park in August, 2009 noting that their work in advanced technologies and alternative fuel vehicles will benefit from the extensive research being done at IALR and its affiliated labs
- There is strong and growing interest from students interested in working in the motorsports field. Enrollment in the mechanical engineering degree programs has grown by a multiplier of more than 4 since enrolling the first students in the program; these programs contribute an average of $25,000 each during their stay in the region
- One of these students finished a PhD in Mechanical Engineering here and has returned to work at VIPER