

VIRGINIA CLEAN ENERGY BUSINESS INCUBATOR

RIVERSTONE TECHNOLOGY PARK

Halifax, Virginia

January 2009



For more information contact:

**Carole Cameron Inge, Executive Director
Modeling and Simulation Center for Collaborative Technology
Virginia Clean Energy Business Incubator Program Lead
Virginia Tech
434-294-1254
vtresearch@gmail.com**

Brief History

In August 2008, the Virginia Tobacco Commission funded the establishment of two energy research programs, the Virginia Clean Energy Business Technology Incubator and the Innovation Center for Advanced Manufacturing Technologies, both focused on energy-related, sustainable business processes and systems. These programs are based in Halifax County with the first in the Riverstone Technology Park (RTP) and the second in the historic Old Tobacco Warehouse in downtown South Boston, Virginia. The energy research programs complement four other regional energy efforts located within the Tobacco Commission service area of Southside and South West Virginia.

The Tobacco Commission awarded \$8 million to the Higher Education Foundation (HEF), a nonprofit 501(c)3 Virginia-based corporation headquartered in Halifax County. During the grant proposal phase, the HEF board executive committee asked Dr. Carole Cameron Inge of Virginia Tech to lead their grant application effort. Dr. Inge is in a research outreach capacity for Virginia Tech, with offices based in Riverstone Building One. When the primary grant was awarded, a sub award was given to Virginia Tech, and \$2 million was designated for the Virginia Clean Energy Business Technology Incubator in RTP under Inge's leadership. A new energy steering committee made up of HEF board members and the Virginia Tech modeling and simulation steering committee board members is envisioned for leadership needs.

Riverstone Technology Park Overview

Riverstone Building One is the site location for the new Virginia Clean Energy Business Technology Incubator. Building One is a 60,000 square foot facility within the RTP and features a 165-acre site focused on modeling and simulation, information technology, environmental engineering, broadband telecommunications, aerospace engineering design, geospatial technology, telepresence/remote project collaboration, and energy technology research and development. Plans for RTP include establishing a technical manufacturing facility and data warehousing capabilities.



Riverstone Technology Park Building One and the Virginia Clean Energy Business Technology Incubator Headquarters

RTP has protective covenants in place and over 4 miles of planned trails and walkways throughout natural surroundings. Future walking access to the Berry Hill Conference

Center and downtown South Boston is planned. Commons areas for the park's corporate tenants include conferencing space, videoconferencing, wireless Internet, exercise facility, and a corporate boardroom. Within 60 miles of RTP are 20 institutions of higher learning, including the Southern Virginia Higher Education Center in South Boston, the headquarters for the new advanced manufacturing "green" engineering program, also funded by the Tobacco Commission. RTP is part of a Virginia Enterprise Zone, which is part of a Technology Opportunity Fund, and is located in a technology zone. These incentives are attractive features for developing energy technology companies.



Riverstone Technology Park Location

Virginia Clean Energy Business Technology Incubator Overview

Beginning in November 2008, Virginia Tech, in cooperation with the HEF, established an energy center program in Riverstone Building One to research, develop, and evaluate energy systems and technologies in settings such as national parks, military bases, manufacturing facilities, hospitals, and other commercial locations to support a demonstration of lower energy costs, new renewable energy technologies, and new scientific applications for commercial development. **Using energy instrumentation and modeling and simulation methods, the goal is to provide Virginia with a suite of projects that will help businesses reduce energy costs and bring new energy technologies to market that will promote United States energy independence.**

2009-2010 Objectives

The four initial areas of concentration for the new energy program include:

1. Establishing energy audit services for regional nonprofits and for-profit entities;
2. Developing small distributed wind technology applications for commercial development;
3. Designing an energy laboratory to support bench- and pilot-scale energy technology development; and
4. Assessing the feasibility of large-scale tetra-generation power production for high energy consumers in the region.

Marketplace Trends

The energy and related environmental efforts are relatively new in the United States. Beginning in the 1960s, the notion of pollution control became important because of spewing smokestacks and toxic drainage systems that were illegal, unhealthy, and increasingly unacceptable to the American public. The 1970s brought the U.S. Environmental Protection Agency, which was followed by a series of laws in the United States related to air and water. The 1980s promoted the concept of pollution prevention with waste reduction and energy efficiency growing out of new business efforts. Businesses increasingly employed new environmental management systems to prevent pollution before it occurred. The 1990s saw a proliferation of energy and environmental management systems rise to the level of standardization, eventually leading to the ISO 14001 standards that were designed to measure and manage pollution—if not prevent it. Partnerships between companies and their suppliers became part of the corporate world during this time, and a new era of environmentalism was born. Finally, in 2000, with climate change evidence on the rise, the concept of zero waste, carbon-neutral, and natural capitalism emerged. Ultimately, this led to sustainability, a situation in which environmental efforts were intended to not only enhance the bottom line but to drive the top line and create money for companies and new innovations.

Sustainability includes three things: people; profit; and the planet. Sustainability has the ability to create new products, new markets and new business opportunities. With local businesses needing new opportunities to make money in Southern Virginia and a decline in the financial viability of historic commodities such as tobacco and textiles, and with the need to lower energy costs which spiked in 2008, it was the sustainability concept that drove the creation of the new energy program in Halifax County.¹

The sustainability energy industry involves many political, economic, environmental, and technological factors that interact with each other to influence marketplace trends. Officials at the U.S. Department of Interior say it is helpful to understand some of these factors because an increase in the market for a certain technology can equal a corresponding increase in employment. For these reasons, one of the focuses of the Riverstone energy research project will be not only to develop demonstration projects for new energy technology in settings such as parks, military applications, and commercial locations, but also to study the social, cultural, and economic impacts of green energy as it relates to human behavior and conservation. Human behavior in the energy sector is a key research area for social scientists in this next decade. The U.S. Department of Energy (DOE) had identified this issue through personal conversations with Dr. Inge at the Secretariat level.

Green marketing pilot programs show that the demand for renewable power products in a competitive marketplace may be quite large, and with each technology studied, researchers will assess this demand. Consumer demand for renewable power—along with the progress of utility restructuring and proposed state and federal mandates and incentives for consumers and utilities to purchase green power—could substantially strengthen the growing renewable power industry. This, in turn, may further decrease costs of renewable power and increase the number of jobs available in the renewable

energy industry in Southern Virginia. **Our goal is to grow these skills organically for local job potential as well as to import a technologically skilled workforce to meet our needs for the center. Our approach includes identifying natural resources that can be used to create alternative fuel for consumption.** One of the first projects is a feasibility study focused on a tetra-generation renewable cellulosic power production. Tetra Tech, Inc., a Fortune 500 energy engineering company, is leading this effort for the Virginia Clean Energy Business Incubator under a subcontract from Virginia Tech. A combination of local skills and a highly skilled imported workforce is being used for this task.

Anticipated Job Outgrowth from the Energy Project

Energy Jobs Targeted for Riverstone (Researchers and Service Technicians) *

- Energy policy (two)
- Electrical engineering (one pending)
- Civil engineering (two)
- Mechanical engineering (one)
- Chemical engineering
- Industrial engineering
- Aerospace engineering (one)
- Software optimization and programming
- Systems engineering (one)
- Environmental engineering (two)
- Geologists, geospatial scientists and hydro-modelers (three)
- Workforce specialists (online developers) (one)

* Numbers reflect Riverstone employees working full- or part-time in this capacity.

Virginia Clean Energy Business Technology Incubator Services

Virginia Tech created the energy incubator to attract and retain engineers, researchers, scientists, and related business tenants to the Tobacco region. To this end, Virginia Tech is currently integrating the academic communities of several universities with the business communities in and outside of the region. To date, this synergy has created research and commercial opportunities that enhance new energy technology development. AVID, LLC and Tetra Tech, Inc. are two commercial enterprises that have benefited from Virginia Tech's presence in Riverstone, and both companies recently expanded their offices to this location. Virginia Tech, with its key business partners, provides support services to incubate new manufacturing processes and products, as well as renewable energy technologies that have potential for commercialization and market penetration.

Energy Services (The term “modsim” denotes the use of modeling and simulation for this service.)

- Energy feasibility studies and audits (modsim)
- Energy tax trading and offsets
- Energy and environmental product development and sales (modsim)
- Emissions trading and offsets
- Business partnership development (domestic and international)
- Public relations
- Environmental Mediation
- Adaptation analysis (modsim)
- Natural resources management (modsim)
- Geospatial services (modsim)
- Logistics (modsim)
- Service support
- Manufacturing energy optimization (modsim)
- Energy policy
- Renewable energy technologies research (modsim)
- Education and workforce training (simulation and distance education)
- Disaster recovery and land management (modsim)
- Environmental and energy datacenter management and analysis

Energy Trends

An upsurge in the potential for profitable markets and private investment opportunities in clean energy and related information technology in Virginia is being stimulated by several key trends:

- Restructuring and deregulation of the electric utility industry and the move toward distributed technology,
- Global environmental concerns about issues such as climate change,
- Public perception that energy conservation is good business practice,
- Developments of new financial energy markets such as cap and trade,
- Developments of new environmental management systems and standards such as ISO 14001,
- Better understanding of “sustainability” as a trigger for business growth,
- New concerns for adaptation as well as biological systems,
- Rapid development of sophisticated information and communication technologies such as modeling, simulation, and geospatial data analysis,
- The focus of federal policy makers on renewable energy research and development,
- Recent interest by the Virginia Tobacco Commission in these types of energy research and development programs, and

- Potential for new legislation by the Virginia General Assembly to provide incentives to universities and private investors in clean energy research.

These growing issues, along with new and growing demands from the public, demonstrate the increasing need for renewable "clean" energy research and development. As a result, in the summer of 2008, Dr. Inge convened regional universities, legislative leaders, and corporate executives from Southern Virginia and outside the area to discuss the proposed research issues and services. Business partners, academics, and public entity leaders met at RTP to outline a plan to develop advanced technology systems supported by modeling and simulation to solve some of the complex problems in the area. As a result of this meeting, services were defined for the new energy center now located in Riverstone Building One.

Businesses Partnering with Riverstone and Virginia Tech

- AVID, LLC
- CaseNEX, LLC
- Cisco Systems, Inc.
- Frontline Test Services Company, LLC
- Ms. Ds Production
- NTs Unlimited, LLC
- Northrop Grumman, Inc.
- Tetra Tech, Inc.

Developing and commercializing technology by using renewable resources is a formidable task given the complexity and maturity of the markets. Success requires more than a superior technology and good research plan; it requires an understanding of these markets, a solid business concept and plan, a seasoned management team, established relationships with suppliers and industry leaders, an educational curriculum that is thoughtfully developed, and access to the financial and federal communities to find additional investment for research projects. To this end, the project team worked for six months to create a climate that nurtured business, academic development, and federal partners. It was understood from the beginning that business incubators that work with research efforts accelerate the growth and success of entrepreneurial activity through a broad array of support resources.

Our incubator provides the kinds of support services that give researchers, in symbiosis with their industry partners, a strong competitive advantage. Access to advice and collaboration from leaders in the energy industries, in-region consulting, strategy reviews, financing referrals, introductions to potential private and public partners, and marketing and public relations assistance are only a few of the services we provide. One of our first signature projects includes a tetra-generation feasibility study to assess power use and conservation methods by companies in the region. In this research effort, our engineers and scientists are collecting energy system data, meeting with regional energy service providers, analyzing energy policies, researching new energy system options, and developing financial strategies to reduce energy consumption and maximize energy production for large-scale businesses in the region.

Our team provides project participants access to appropriate space at RTP, shared laboratory services, and access to state-of-the-art equipment and software for their modeling and simulation needs. These research, technology, and business support services are necessary for sustainability of the initial phases of the project.

Alliance for Clean Energy Business Incubators (ACEBI)

To assist renewable energy researchers and entrepreneurs, we have applied to join with the ACEBI and DOE national laboratories, all of whom have an impressive network of researchers, investors, and industry leaders who have provided mentoring, financing, and networking opportunities for our developing clean energy community. Our new energy center is also building collaborations with the other energy centers funded by the Tobacco Commission in an effort to create the 19th ACEBI center in the nation and the first major collective energy effort for Virginia (see map below). When initiated into the program, our energy centers (collectively) will be featured on the map.



Using Tobacco Commission resources, we are developing a web portal for shared information and links to the rest of the energy efforts in the Tobacco region. Together, we are creating a climate for energy activities that is supported by ACEBI. Our application for ACEBI membership is currently in process. CaseNEX, LLC., is our on-line outreach and training partner for these efforts. CaseNEX, LLC., is a 15-year-old spin-off company from the University of Virginia's Darden Business and Curry Education Schools. It is envisioned that this partner will work with our center and the other energy centers in a

climate of collaboration on the outreach and training side of the program. Training of future energy and environmental scientists and engineers will be critical to this effort in the next decade.

When our web portal is fully developed, it will serve as a clearinghouse for federal and corporate collaboration on energy research, a process that began with discussions between Virginia Tech and the National Park Service (U.S. Department of the Interior), DOE, and the U.S. Department of Agriculture (USDA). As a result, USDA has identified Riverstone as a site location for a new USDA energy service center under development and targeted for completion in April 2009. The new center and the ACEBI are committed to strengthening its networks and encouraging new Virginia-based energy companies, venture firms, angel investors, nonprofits, government organizations, universities, and others committed to supporting clean energy to join its efforts. Our recent communication with ACEBI leadership has been positive, a potential strategic alliance that will benefit the Virginia energy effort.

Halifax County and its academic partners are committed to regionalism and are joining many advanced manufacturing groups in the region. We believe that the proposed project lays a foundation for research and development, while providing a mechanism for fostering incubation and commercialization of new products, services, engineering processes, and systems. Our partners at the Institute for Advanced Learning and Research (IALR) will play a role in collaborating on these efforts.

Our desired outcome is a trained, superior workforce that is skilled in advanced manufacturing technologies by virtue of its exposure to and participation in this research. We are working within the county and across the region to reach out and demonstrate that collaboration and regionalism are essential to growing a knowledge economy and improving economic conditions in the area. Our workforce efforts will extend beyond the research environment as we take advantage of the online networks housed in Riverstone to create a telepresence training and workforce network to develop the energy skills needed to grow this important industry. It is envisioned that CaseNEX, LLC, will expand their offices from Charlottesville, Virginia and manage our on-line activities from RTP. The Riverstone energy center will be the first of its kind to research energy, develop energy innovations, and provide workforce development programs for energy workers of the future under one roof in Virginia. All programs are scheduled to be up and running by the summer of 2009.

The Virginia Tobacco Commission is looking forward. This body of policy makers and stakeholders is influential, and they plan to use this influence to change the face of their communities in the next decade with a new infusion of investment. A second round of research and development funding has now been made available to the energy research community. New state legislation is in process for the management of such an effort. Dr. Inge and her partners stand ready to integrate the public sector interests with the private sector investments to expand jobs, create educational opportunities and develop new innovations that enable our country to become independent on foreign energy.

For more information contact:
Carole Cameron Inge