

**STATEMENT FOR THE RECORD**

**By**

**Clemson University President James F. Barker**

**Before the**

**HOUSE COMMITTEE ON EDUCATION & THE WORKFORCE**

**SUBCOMMITTEE ON HIGHER EDUCATION & WORKFORCE DEVELOPMENT**

**UNITED STATES HOUSE OF REPRESENTATIVES**

**August 16, 2011**

Good afternoon, Chairwoman Foxx and Members of the Subcommittee. My name is Jim Barker, and I am President of Clemson University. We appreciate the opportunity to host this subcommittee field hearing at our CU-ICAR campus and to testify before the subcommittee today regarding the role of higher education in job growth and workforce development.

We believe this is a timely topic given the changing landscape of higher education and the economic conditions facing our state and nation. Today more than ever, institutions of higher education need to work closely with government and private industry to ensure that our graduates are well prepared both for the immediate job market and for their future roles as leaders of our companies and our communities.

Clemson University is ready and eager to accept this challenge. In fact, it's what we were founded to do.

For those of you who are not familiar with Clemson, I'm pleased to provide some background information.

Ranked #23 among national public universities, Clemson University is a land-grant, science- and engineering-oriented research university that maintains a strong commitment to teaching and student success. Clemson is a student-centered

community characterized by high academic standards, a culture of collaboration, school spirit, and a competitive drive to excel.

It has recently been ranked #9 among “up and coming” universities, and #12 among national universities – public *and* private – with a strong commitment to undergraduate teaching, according to US News & World Report. Princeton Review rates us #1 in town-gown relations and #2 in the category of “happiest students.”

Clemson scores well above its peers on the National Survey on Student Engagement. More than 92 percent of seniors would choose Clemson again if they could start over – compared to a national average of 83 percent. Clemson also is the number one choice of Palmetto Fellows, the state’s top high school graduates, and more than half of Clemson’s incoming freshmen rank in the top 10 percent of their high school class.

The university was founded in 1889 through a bequest from Thomas Green Clemson, a Philadelphia-born, European-educated engineer, musician and artist who married John C. Calhoun’s daughter, Anna, and settled at her family estate in South Carolina. Clemson believed that the way to rebuild his adopted state’s war-ravaged economy was through scientific education, so he left his home and fortune to the state of South Carolina to create the institution that bears his name. His last will and testament eloquently described a two-fold purpose: To establish a “high seminary of learning” and to “develop the material resources of the state.”

Therefore, Clemson was specifically and purposefully established to support economic development – initially in agriculture, later adding support for manufacturing and now those industries plus a growing knowledge-based economic sector. Mr. Clemson understood that the surest path to prosperity was education. It remains so today.

Over the past decade, Clemson has substantially grown its economic development capabilities. We have followed the land-grant model of going where the industries are rather than expecting them to come to us, and we sought out best practices from research parks in neighboring states, such as North Carolina’s Research

Triangle Park, Centennial Campus and the Piedmont Triad Research Park in Congresswoman Foxx's home district.

It is appropriate that this hearing is being held at the Clemson University International Center for Automotive Research – or CU-ICAR -- given the mission of this campus and the collaboration that has occurred among the university, federal, state, and local government in partnership with the private companies involved, which has resulted in an economic transformation for our state.

CU-ICAR is a 250-acre automotive and motorsports “technopolis” in Greenville that has created more than 500 jobs, with another 1,700 announced. Named the 2009 Emerging Technology Park of the Year by the Association of University Research Parks, CU-ICAR represents a new model for university research-driven economic development.

Three critical ingredients in CU-ICAR's success were (1) a research university that was willing to listen and respond to industry needs; (2) government investment, and (3) a physical campus.

Each ingredient was essential. Back when this location was an empty field, there were conversations between Clemson and BMW about what the state's automotive cluster needed in order to remain competitive in the 21<sup>st</sup> century. They didn't talk about what kind of research they wanted us to do or what kind of test facilities they needed. They talked about the kind of engineers they needed to hire -- a new kind of engineer who understood how all of the various mechanical, electrical and computer systems in a modern automobile work together. Clemson faculty responded and created an entirely new curriculum focused on systems integration – and they continue to meet annually with industry advisors to ensure that the program remains relevant.

Critical financial resources were provided through a series of state legislative initiatives that funded endowed chairs, research infrastructure and innovation centers at the state's three research universities. Often, those funds required a private-sector match, which provided the ultimate measure of accountability. Our corporate partners did not invest in CU-ICAR out of a sense of philanthropy; they invested because what

we are doing is relevant for their business and their future.

City and county government helped fund infrastructure and support services, and federal funds are helping build the 60,000-square-foot Center for Emerging Technologies, where dozens of emerging or established companies can expand and develop technologies that complement research of Clemson faculty and students.

The 250-acre physical campus gave us the third critical ingredient -- adequate land to accommodate large companies, small start-ups and landing parties alongside academic programs and state-of-the-art research and testing equipment, all on a campus deliberately designed to foster formal and informal interaction and collaboration. Students and faculty move seamlessly from the classrooms and laboratories across the plaza to the assembly-line floor working side-by-side with BMW engineers at their plant in Greer.

What truly distinguishes Clemson's automotive engineering program is the blend of rigorous academic curriculum, daily interaction with industry leaders and a structured, hands-on learning opportunity we call Deep Orange.

Housed just across the plaza at the Carroll A. Campbell Graduate Engineering Center, Deep Orange transforms the facility into an original automotive equipment manufacturer and supplier. Students, faculty and industry partners actually produce a new vehicle prototype each year, giving students experience in vehicle design, development and production planning from their entry into the program until graduation. Through this initiative, the students will understand clearly how to innovate and develop automotive projects, which prepares them to be the leadership work force of the future.

CU-ICAR's results speak for themselves: 19 corporate partners, 30 research partners, 760,000 constructed square feet, \$230 million in public and private investment, America's first doctoral program in automotive engineering (launched in 2006), and a 100 percent employment rate for its seven Ph.D. and 25 Master's degree graduates.

The CU-ICAR model works, and it's one we are continuing to follow as we develop innovation campuses focused on restoration, conservation and energy in North

Charleston, and advanced materials, optoelectronics and high-performance computing in Anderson County.

The Clemson University Restoration Institute, being developed on an 27-acre tract of land in North Charleston, promises to make South Carolina a magnet for the restoration economy. It will soon house a major wind-turbine testing facility – funded by a \$45 million U.S. Department of Energy grant – which could make South Carolina the hub of the wind energy industry. Already, IMO Group – a German manufacturer of wind-turbine components -- announced that it would locate a facility, with 190 jobs, in Charleston partly because of Clemson’s testing capability.

Like CU-ICAR, the campus will focus on industry collaboration. Executives from 90 percent of the world's turbine manufacturers serve on technical and industrial advisory boards. They provide input into the design of testing facilities and development of educational programs, ranging from certifications in wind energy to entirely new degree programs in power engineering. These close-hand relationships mean the university can deliver a one-of-a-kind advanced testing facility tailored to the industry’s specific needs.

The Clemson University Advanced Materials Center boasts state-of-the-art equipment including one of the nation’s most advanced electron microscope facilities and a high-performance computing infrastructure that places Clemson in the top five among academic institutions for supercomputing.

This campus concentrates on small businesses with an entrepreneurial spirit to move technology and innovations into the marketplace. Often these are start-up companies spun out from licensing of Clemson research and intellectual properties, which has generated more than \$28 million in revenues and created 15 start-up companies over the past decade. In the past five years, the number of technology disclosures submitted by Clemson faculty, staff, and students has doubled, with a record 124 disclosures this past fiscal year.

Tetramer Technologies in Pendleton, S.C., for example, was founded in 2001 as a faculty start-up company commercializing high value optical polymer research

activities pursued at Clemson. Today, Tetramer is a thriving company with 26 employees that serves as a tier-one supplier to General Motors.

Each of these research campuses is as unique as the regions and economic clusters it serves. But each is anchored in academics, because the greatest contribution we make to economic development in South Carolina is a well-prepared Clemson graduate.

That's why the cornerstone of our new, 10-year strategic plan – the Clemson 2020 Road Map – is a goal of providing all students with engagement opportunities, which means structured, hands-on, problem-solving experiences inside and outside of the classroom. In other words, we want to give every undergraduate and graduate student the kind of relevant, creative experience that Deep Orange provides here at CU-ICAR.

The best way to illustrate how Clemson approaches student engagement is through examples of four innovative programs. Some have been around for decades, and some are just getting started. I've outline these programs in the written testimony I submitted to the Committee.

#### Creative Inquiry

A national publication called Creative Inquiry “a small-group learning experience for 14,000 undergraduates.” A combination of engaged learning and undergraduate research unique to Clemson, Creative Inquiry pairs small teams with a faculty mentor who guides them in exploring their own questions, not the teacher's. Projects typically span three to four semesters and are often interdisciplinary. In recent years, Creative Inquiry teams have focused on:

- designing a tire that allows lunar rovers to efficiently travel across the moon's surface,
- developing clean water systems for Haiti,
- designing buildings to reduce energy consumption,
- finding ways to use neural signals to control machines,
- developing a campus tour app for the iPhone
- and even writing and producing an original play and publishing a collection of

slave narratives.

### Immersion semester

Developed by faculty in parks, recreation and tourism management, the immersion semester enrolls all majors in a common curriculum during their sophomore year – and that curriculum rarely include lectures. Instead, students work in teams on special projects, take field trips, and attend seminars run by leaders in the field who offer first-hand insights about what is needed to succeed in the recreation and tourism industries.

One student wrote this on her year-end evaluation: “When I applied for internships (as an events planner), I explained to employers and organizations what the Immersion Semester consisted of and how we were getting hands-on experience with professionals in our field and planning and implementing an actual event. They looked at my degree with a whole new level of respect.”

### Internal co-ops

Engineering students have long seen the value of cooperative education – a program that puts them at work for a full semester in a field related to their academic discipline. The experience is mutually beneficial for both the students and the employers. We’re currently developing a new “internal co-op” program in which students will help run the university machine. Like external co-op experiences, the idea is to give students practical, hands-on, professional experience – not routine office jobs – that is directly related to their academic fields.

We will have financial management majors working side by side with the CFO, graphic communication majors designing university publications, and engineering majors working on real capital improvement projects.

### Residential study centers

Clemson University is a beautiful campus with many historic buildings, located in what is probably the best college town in America. However, after four years, architecture students have probably soaked up as much as they can from the physical environment, and they need to see new perspectives. The Clemson Architecture Center

at Charleston and residential programs in Genoa, Italy, and Barcelona, Spain, put students in a learning environment that is squarely in the middle of some of the finest architecture in the world and gives them direct access to leading experts in architecture, urban planning and historic preservation.

These kinds of engagement opportunities, often involving direct interaction with industry experts, will give Clemson students the tools to become leaders, thinkers, entrepreneurs and global citizens - in short, to be the kind of workforce needed in the 21<sup>st</sup> century economy.

In conclusion, I'd like to once again thank the Committee for this opportunity to speak on behalf of Clemson University -- and, more importantly, I want to thank you for your service to this nation.