260+ Energy-related with 28,000 workers in energy sector
E⁴ Carolinas, an Energy Trade Association
11,000 Power and Energy Engineers
39 Power plants in the 16 counties with 12 Nuclear reactors
Growing renewable energy portfolio
Several grid modernization initiatives
Change of generation mix towards natural gas
EPIC Background

EPIC was FOUNDED by the energy industry.

Needed talent for the future:

- Average age of engineers is 55+
- Economic Development
- Innovation in power industry

Professional development and life-long learning of employees

Applied research needs for a safe, reliable, and sustainable energy future.
Founding Industrial EPIC Partners

- Duke Energy
- Siemens
- Westinghouse
- AREVA
- URS Corp
- CB&I (Shaw)
- Electric Power Research Institute (EPRI)
- Tessera
- Steag Energy Services
Chairman: Dhiaa Jamil, Duke Energy, Group Executive and Chief Nuclear Officer

18 senior executives as board members from key companies:

- Duke Energy
- Steag
- AREVA
- URS/Washington,
- CB&I (Shaw), Senior Vice President
- EPRI
- Siemens Energy
- Westinghouse
- Piedmont Natural Gas
- EnergyUnited
- ABB
EPIC Sponsors and Research Funding
EPIC Goals

Education
- Educate Multi-disciplinary Energy Students
- Develop well-balanced curriculums
- Develop Energy Concentrations
- Program development with regional universities

Research and Development
- Applied multi-disciplinary research in the energy field
- Coordinate efforts with regional and global universities
  NCSU, Clemson, USC, Georgia Tech., KIT, Delft, etc.

Economic Development
- Creation of energy workforce pipeline
- Grow jobs, vendors, suppliers of energy companies.
- Incubation of energy related startup's
- Outreach and leadership activities
EPIC – a successful Public Private Partnership

- **State of North Carolina**
  - Capital for building $76 M
  - 25 new Faculty and staff $4.5 M per annum
  - Operational budget $500 k per annum

- **Industry Startup Support** $17 M

- **Research and grants**
  - Federal and industry $10 M per annum
EPIC Building

- The 200,000 ft\(^2\), $76 M, building opened in Fall 2012
- Unique LEEDs Gold Certified features.
- Classrooms, conference rooms, power labs, environmental labs, high bay structural lab., Smart Grid lab and offices
- Laboratories for electrical, civil, environmental and computer engineering
- Laboratory and Office for Industrial Partners
- Conference and event facilities
EPIC Faculty

100+ EPIC associated faculty and staff across campus:

- Power Systems, Power Electronics and Smart Grid
- Power Plant Design, Metrology and Manufacturing
- Infrastructure & Environment
- Renewable Energy Systems
- Energy Markets & Systems
EPIC Education Focus

Undergraduate Education – 350 Students taking Energy Courses
- Energy Engineering Concentrations (100+ students enrolled)
- Expand Co-op and Internship program
- Undergraduate Research Assistance
- Student participation in Leadership Academy
- 32 Energy Senior Design Projects
- “Introduction to Power & Energy”

Graduate Education in Development
- MBA with Energy Concentration, with Belk Business School
- COE-wide MS in Applied Energy and Electromechanical Systems
- 4 MS Concentrations in Energy Systems
- Certifications – Energy Efficiency, Nuclear, Smart Grid, I&C, etc.
- Energy Certification for Non-engineers
- Graduate Research Assistance
- Accredited short courses – PE through MS

Coordination with Regional Universities
EPIC Applied Research Clusters (1)

**Power Systems Modernization**
- Duke Energy Smart Grid Laboratory with RTDS and system analysis – NSF MRI
- Distribution Automation and Micro-grids
- Electric Vehicle and Energy Storage Integration

**Large Energy Component Design and Manufacturing**
- Siemens Large-scale Manufacturing Laboratory
- Materials Characterization Laboratory (MCL)
- Robotics and Welding Technologies

**Power Infrastructure & Environmental Development**
- Large-structures laboratory and T&D designs
- Utilization and recycling of spent fuels, air quality and water management
- Natural –gas fracturing and infrastructure

**Renewables and Energy Efficiency**
- Clean-rooms with PV cell, module process and LED research
- Off-shore wind, biomass and small-scale hydro technologies
- Integration of renewables and energy efficiency measures

**Energy Markets, Analytics and Systems**
- Quality Assurance, Nuclear Safety, Regulatory, Standards
- Distributed energy markets, analytics and operational research
EPIC Applied Research Clusters (2)

The Infrastructure, Design, Environment and Sustainability Center (IDEAS)

- Development and utilization of biofuels
- Natural and Built Site Design and Analysis (Green Buildings)
- Materials Characterization Laboratory (MCL)
- Environmental impact analysis
- Environmental Assistance Office for Small Business (EAO)

Sustainable Integrated Buildings and Sites (SIBS)

- I/UCRC NSF Center with industry related research
- PV integration in dense urban settings with limited roof space poor orientation, insurance issues, etc.
- Optical collectors to guide light into PV building
- Energy modeling for DSM, energy storage, and renewables
- Thermal-energy storage for peak-shaving
- Thermal storage technologies
Expertise in:

- Utility waste utilization and management, including coal and fly ash, nuclear waste
- Waste to energy production
- Water quality analysis
- Air quality analysis
- Waste water treatment for Natural Gas Fracking
Early College High School and Sustainable Park

- Partnership with Charlotte-Mecklenburg School System
- Grades 9-13
- STEM focus with energy concentration