

Oak Ridge National Laboratory

Presented to the
**Better Plants
Technology Deployment Day**

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Oak Ridge National Laboratory evolved from the Manhattan Project



The Clinton Pile was the world's first continuously operated nuclear reactor



Chemical processing techniques were developed to separate plutonium from irradiated fuel

ORNL innovations have had billion dollar impacts



Lab-on-a-chip: Caliper sold for \$600M in 2011

Cesium extraction: Basis for \$1.3B waste processing facility at Savannah River

Reactor life extension: \$20B cost avoidance

Advanced alloys: Chrome-moly steel in widespread use

Cryopreservation of mouse embryos: Frozen embryo transfer for livestock reproduction

Ion implantation: Technology for integrated circuits and medical implants

Centrifuge technology: Basis for vaccine purification and US enrichment industry

Instrumentation: >\$1B in products and spinoffs from ORTEC and TENNELEC

Reactor technology: Concept and technology development for light water, high temperature, and molten salt reactors

PUREX: Basis for nuclear fuel reprocessing techniques used worldwide

Radioisotopes: Multibillion dollar industry (>100 million procedures per year)

1940s

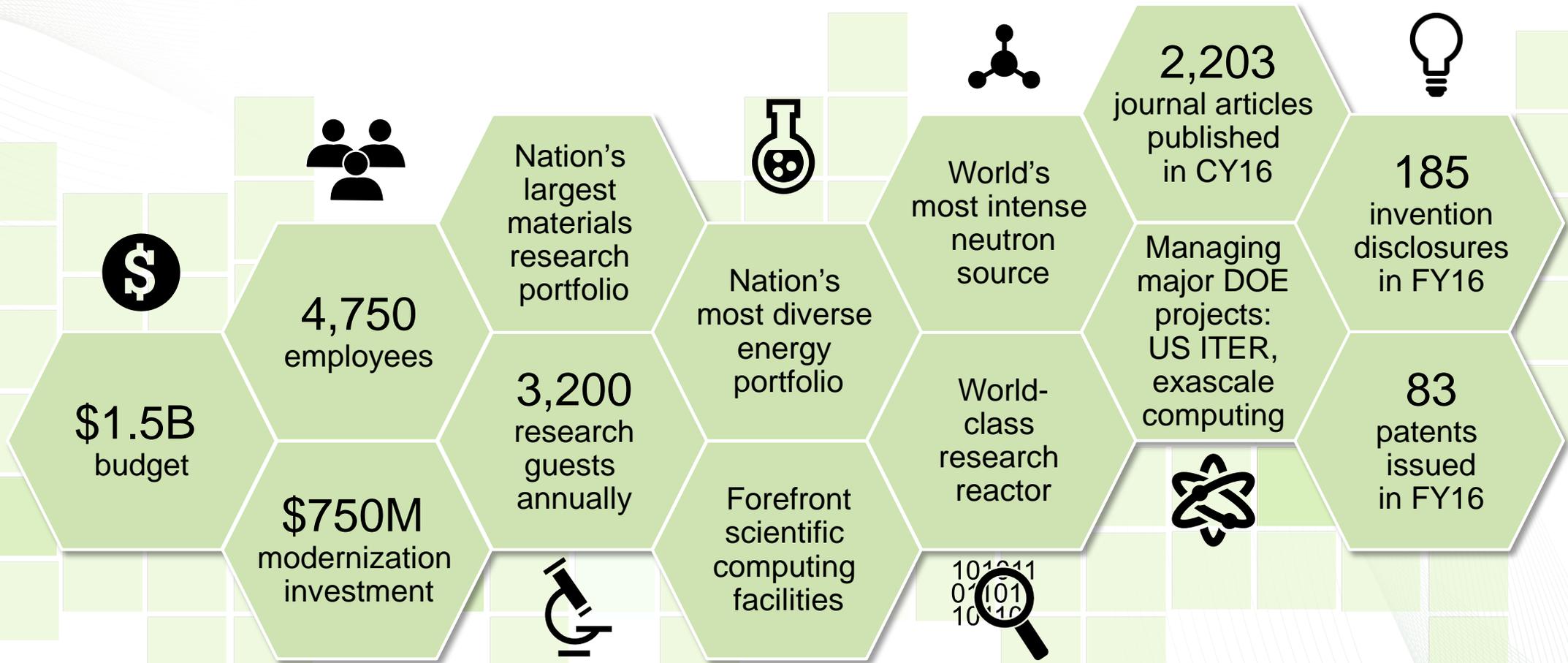
1960s

1980s

2000s

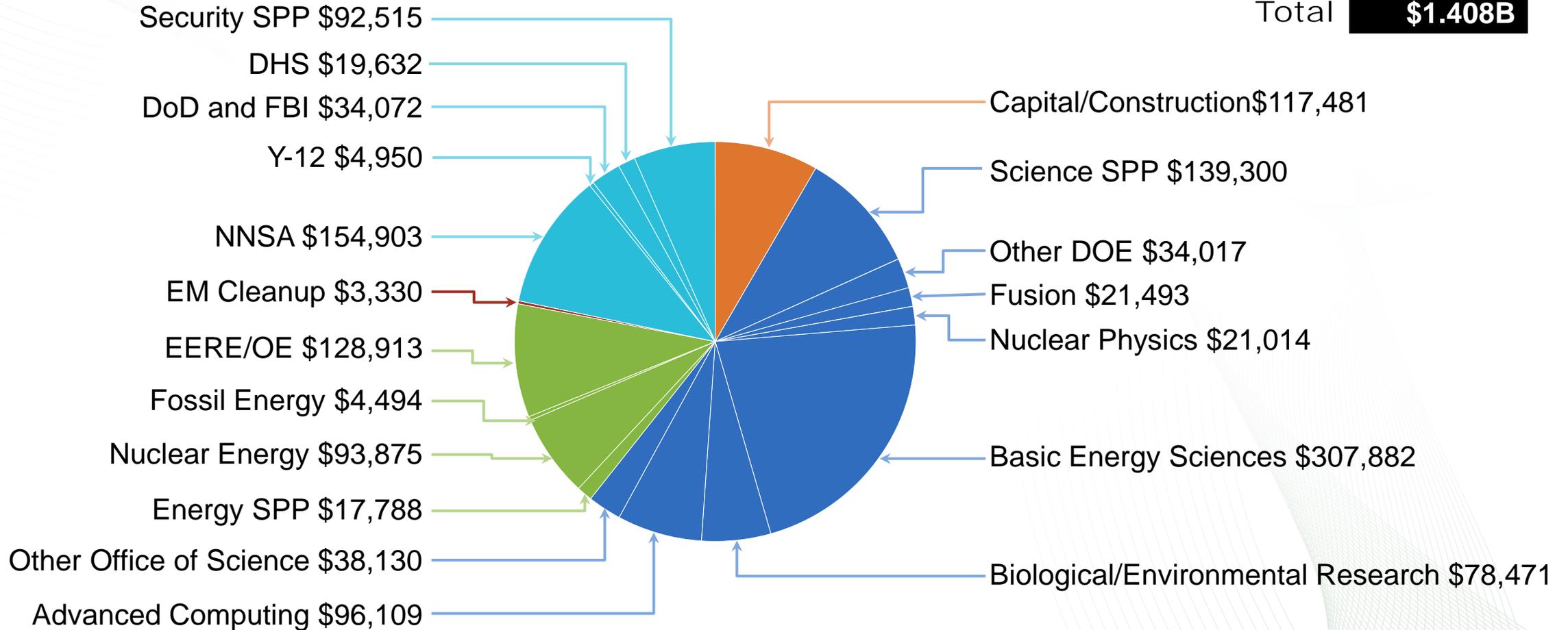


Today, ORNL is a leading science and energy laboratory



ORNL R&D programs address DOE missions and national needs (FY16 business volume, \$k)

Science	\$736M
Energy	\$245M
Cleanup	\$3M
National Security	\$306M
Capital/construction	\$117M
Total	\$1.408B



ORNL's mission

Deliver scientific discoveries and technical breakthroughs that will accelerate the development and deployment of solutions in clean energy and global security, and in doing so create economic opportunity for the nation



Signature strengths

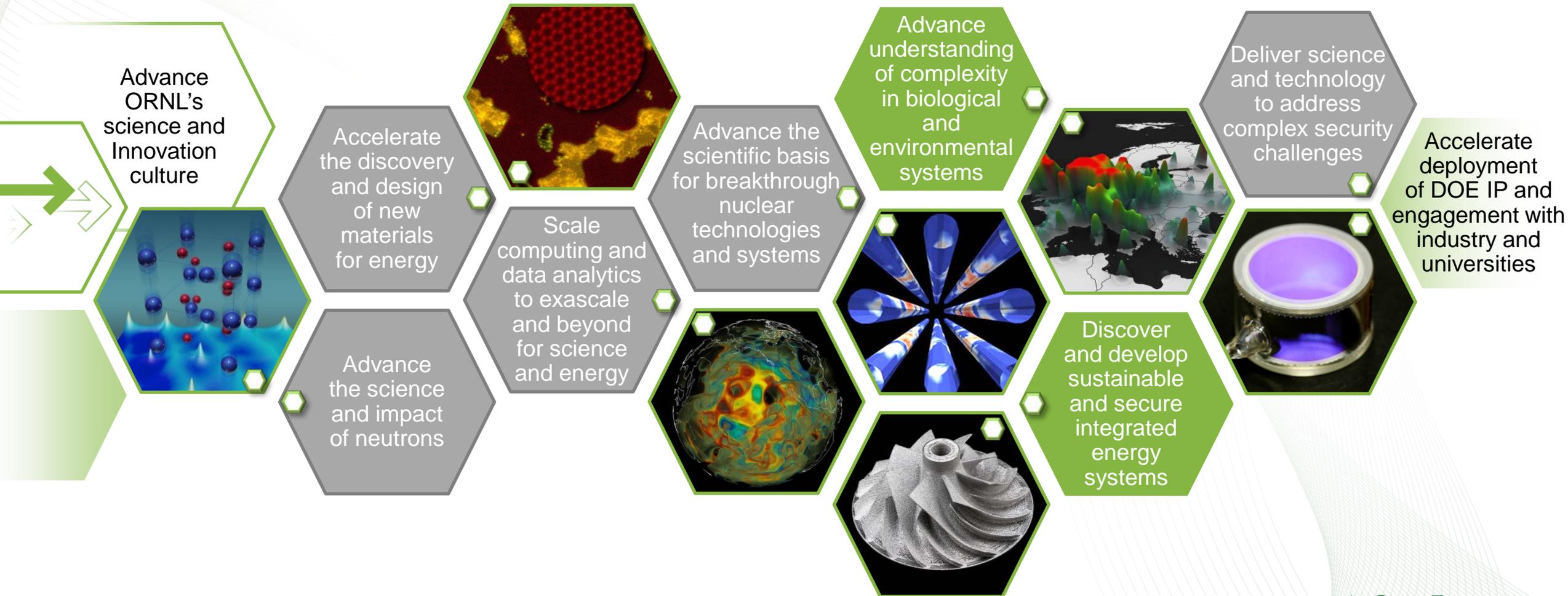
Computational science and engineering

Materials science and engineering

Neutron science and technology

Nuclear science and technology

Our core capabilities position us to tackle compelling science and technology challenges



Our staff continue to deliver national impacts

Buildings

Partnerships with industry to develop high-efficiency appliances

Low global warming potential (GWP) refrigerants

Transportation

Atomic-level imaging of catalysts

High-efficiency wireless charging for electric vehicles

Manufacturing

Guinness Book of World Records: Largest solid 3D printed item

Developing Wide and High Additive Manufacturing (WHAM)

Electricity

>25 grid modernization projects

Bioenergy

Leading proposal for new Center for Bioenergy Innovation

Billion-Ton Report

Climate and environment

Understanding climate change and planning for its impacts

ORNL's distinctive facilities bring thousands of R&D partners to Tennessee each year



Building Technologies
Research and
Integration Center

Carbon Fiber
Technology Facility

Center for Nanophase
Materials Sciences

High Flux Isotope
Reactor

Manufacturing
Demonstration Facility

National
Transportation
Research Center

Oak Ridge Leadership
Computing Facility

Spallation Neutron
Source



Partnerships are vital to accelerating technology transition and engaging with industry and universities

Technology transfer

- Technology Innovation Program (royalty-funded technology maturation)
- Technology licensing
- Intellectual property management
- Strategic Partnership Projects
- Cooperative R&D Agreements (CRADAs)



Industry and economic development partnerships

- R&D partnerships
- Regional industry recruiting and cluster development
- State and local economic development partnerships
- Institute for Advanced Composite Materials Innovation (IACMI)

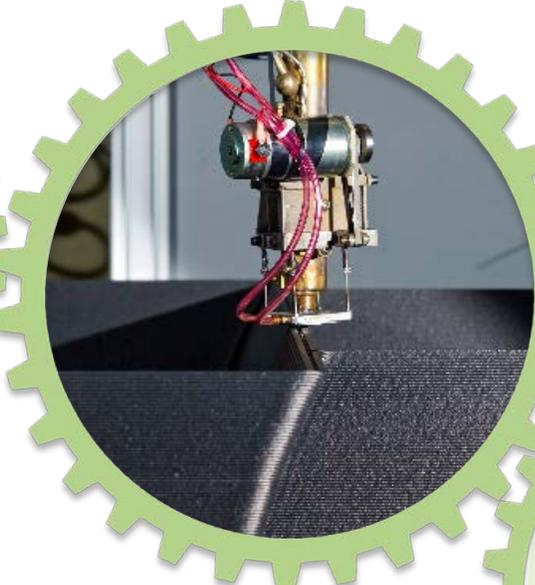
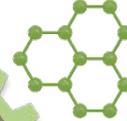


Graduate education and university partnerships

- Graduate education:
 - UT-ORNL Bredesen Center: 145 students
 - Graduate Opportunities (GO!) program: 53 students from 11 universities
 - DOE Office of Science Graduate Student Research program: 11 students
- ~260 joint faculty appointments



Strengthening the regional innovation ecosystem



Contributing to state and local economic development initiatives

Deploying an industry cluster strategy to build regional competitive advantage

Making our resources available to industry partners

- Technology licenses
- Small business vouchers
- Strategic Partnership Projects
- Cooperative R&D agreements

Carbon fiber
Automotive

Additive manufacturing

Thank you



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