Oak Ridge National Laboratory:
Science and Technology for the Energy Challenge

Presented to

ORNL Workshop on Positioning Your Small Business for Success

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Oak Ridge, Tennessee
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ORNL is DOE's largest science and energy laboratory

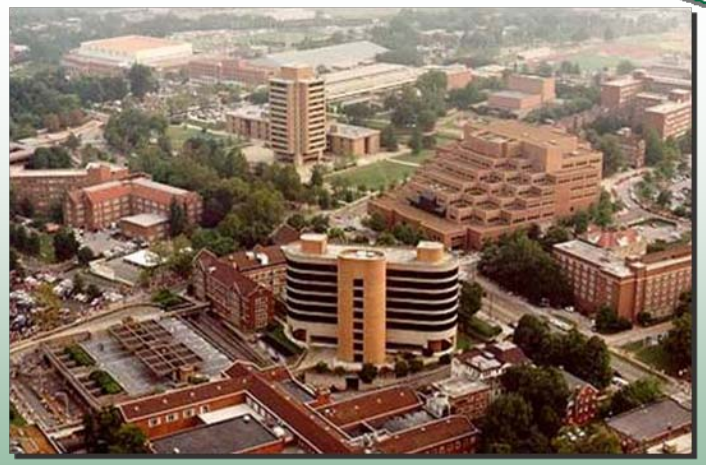
- **$1.3B budget**
- **4,250 employees**
- **3,900 research guests annually**
- **$350 million invested in modernization**

- **World's most powerful open scientific computing facility**
- **Nation's largest concentration of open source materials research**

- **Nation's most diverse energy portfolio**
- **Operating the world's most intense pulsed neutron source**
- **Managing the billion-dollar U.S. ITER project**

ORNL is managed by UT-Battelle, LLC

UT-BATTELLE
Limited Liability Company



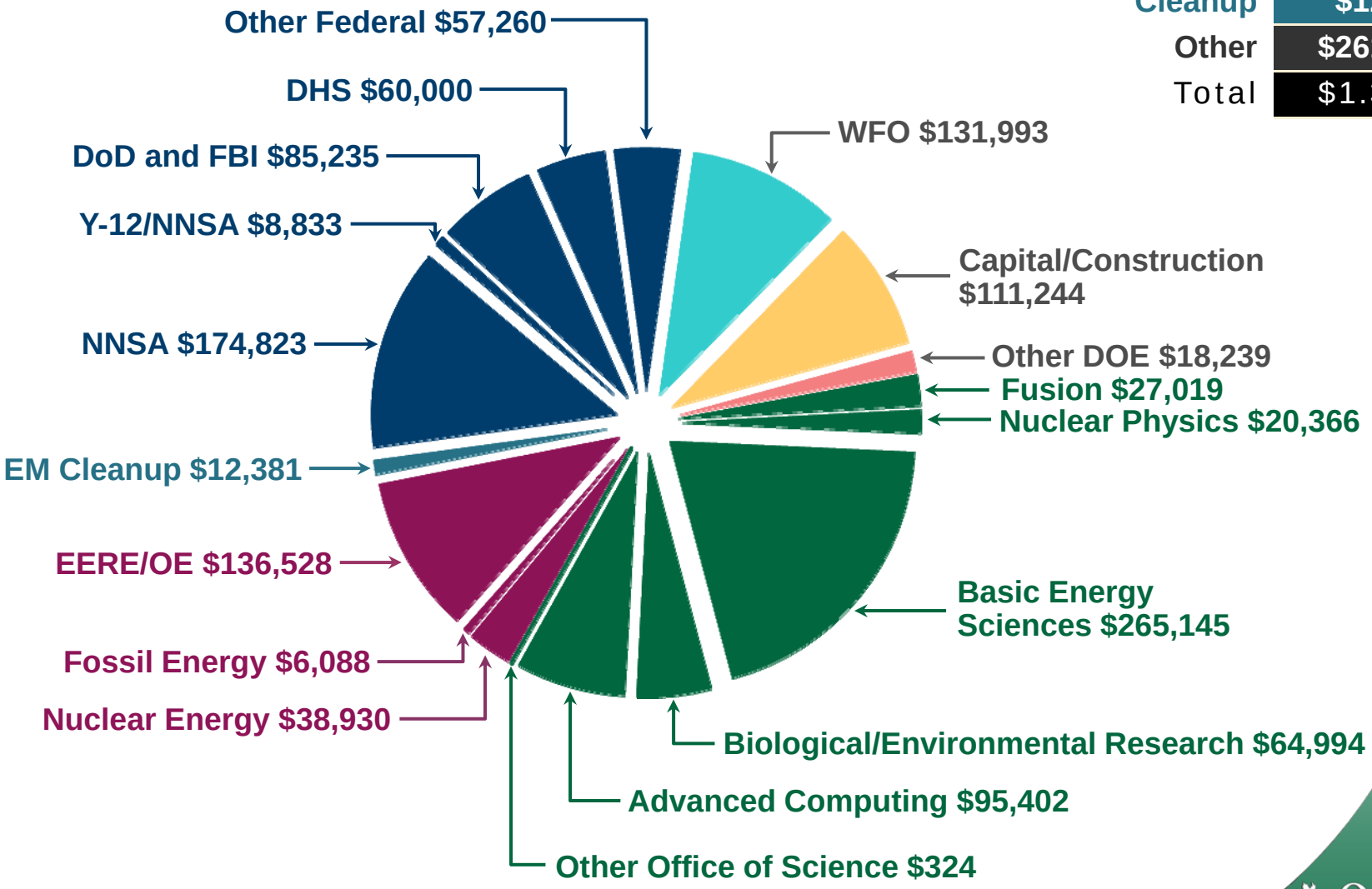
The University of Tennessee
Knoxville, Tennessee

Battelle
Columbus, Ohio

Duke University · Florida State University · Georgia Tech · NC State University · ORAU · Vanderbilt · University of Virginia · Virginia Tech

ORNL's projected FY 08 budget
(thousands of dollars)

Science	$473M
National Security	$386M
Energy	$182M
Cleanup	$12M
Other	$261M
Total	$1.3B



Partnerships are essential to our success

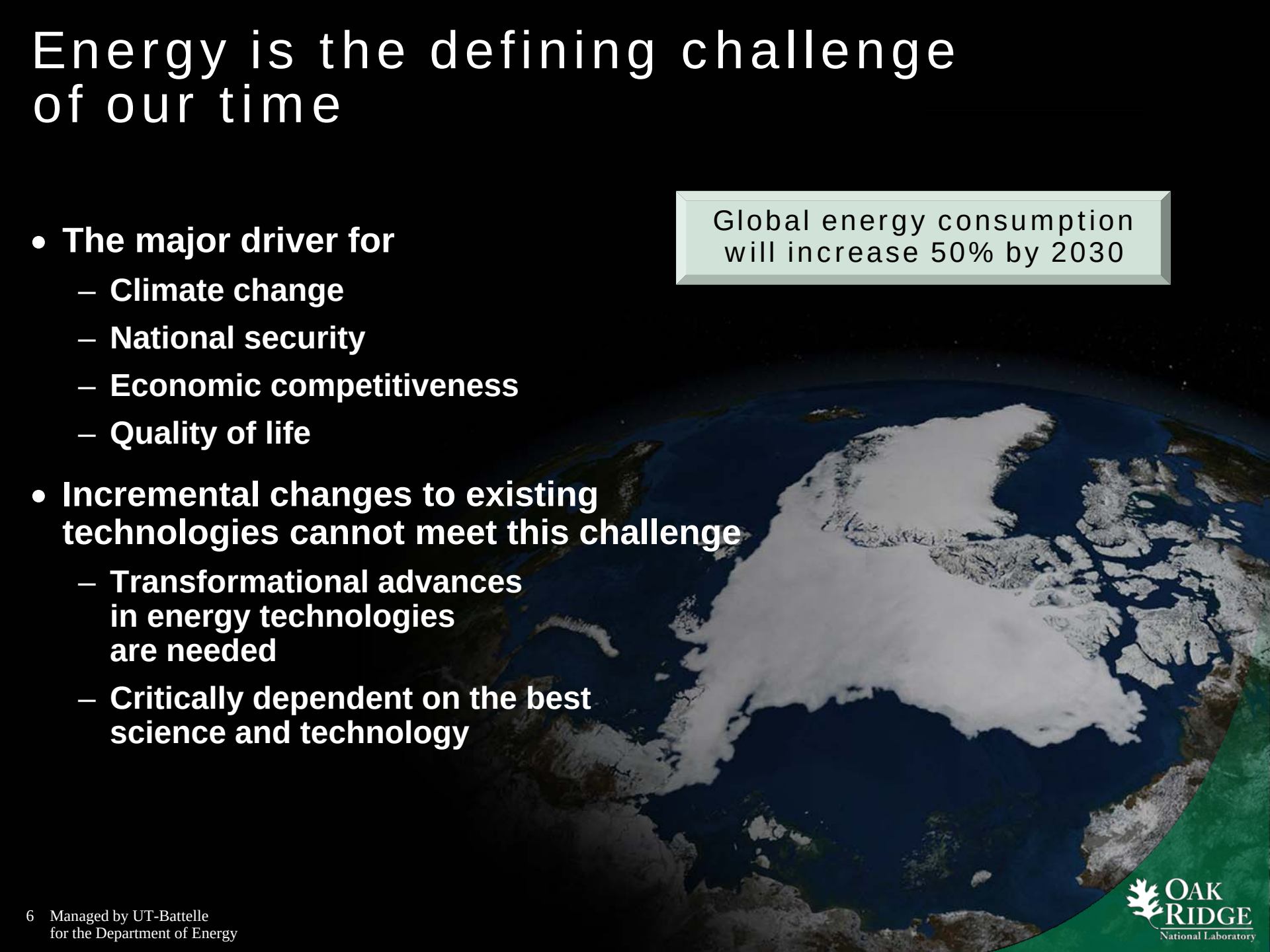
We are committed to:

- **Working with the local business community**
  - **Close to half of our budget is spent on subcontracts**
  - **About 45% of our subcontract dollars are spent in East Tennessee**
- **Providing opportunities for small businesses to supply us with goods and services**
  - **We consistently place more than half of our subcontract dollars with small businesses**

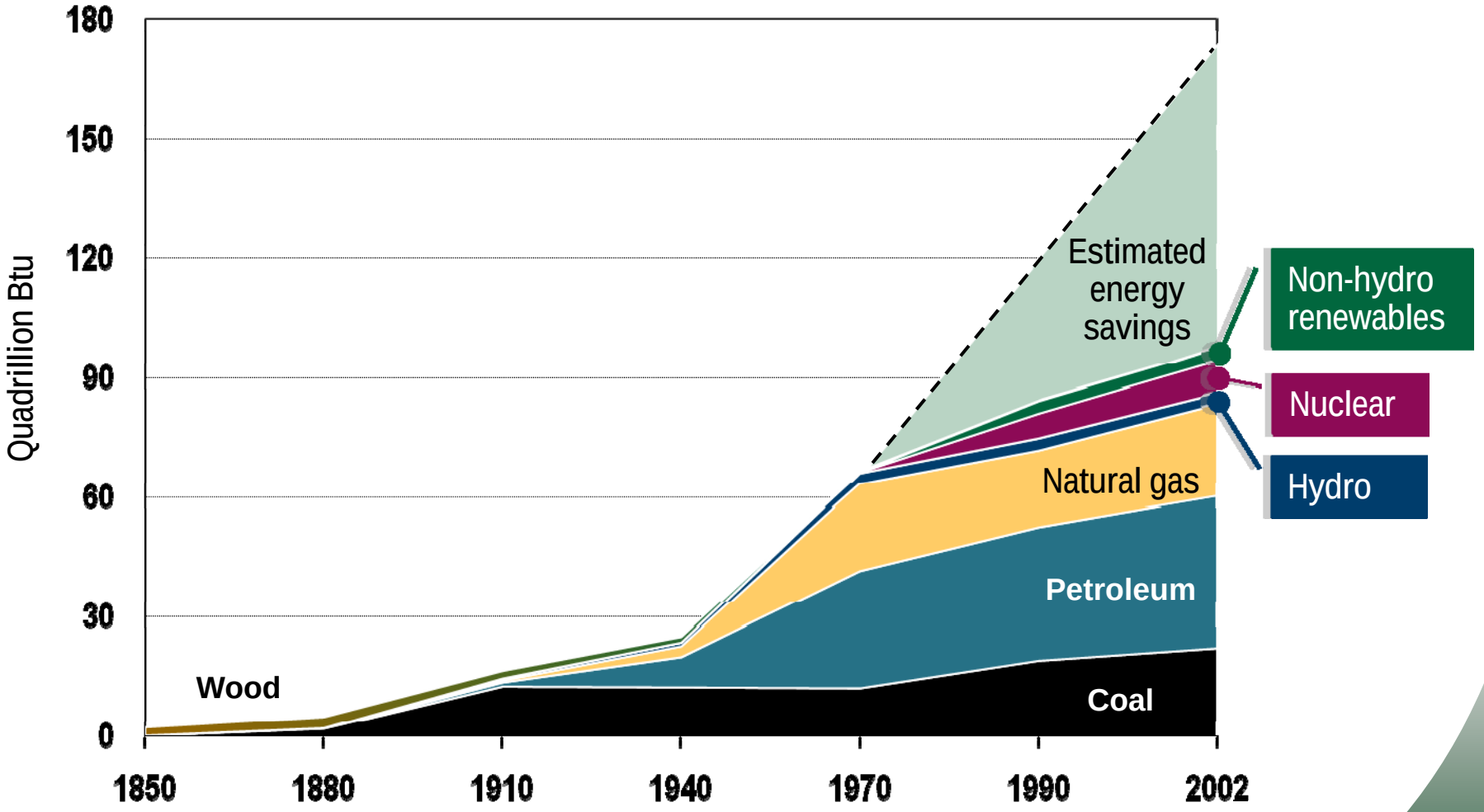
Energy is the defining challenge of our time

- **The major driver for**
  - **Climate change**
  - **National security**
  - **Economic competitiveness**
  - **Quality of life**
- **Incremental changes to existing technologies cannot meet this challenge**
  - **Transformational advances in energy technologies are needed**
  - **Critically dependent on the best science and technology**

Global energy consumption will increase 50% by 2030

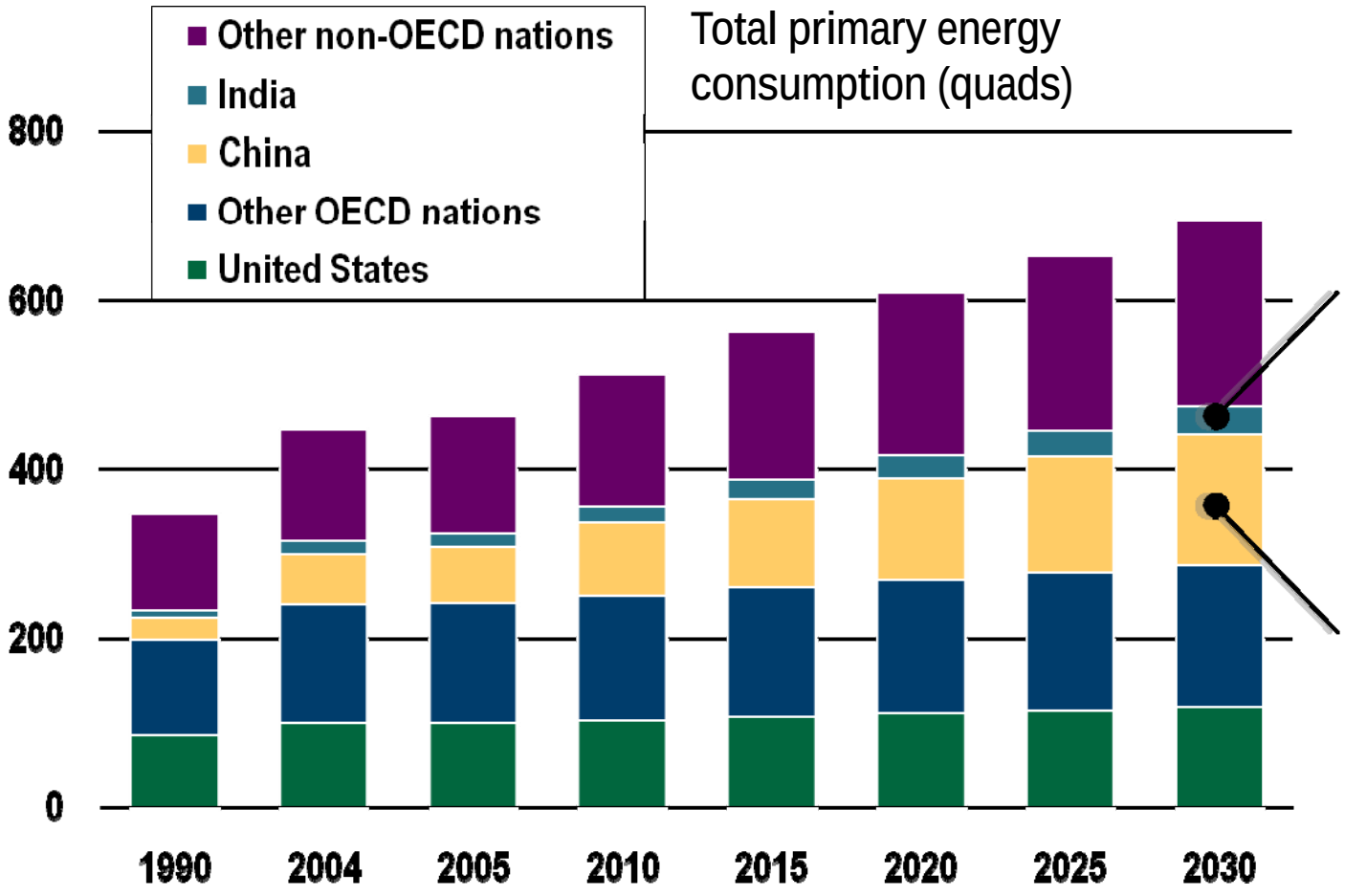


Improvements in the energy efficiency of the economy have been essential to the stabilization of U.S. energy consumption . . .



Source: Energy Information Administration, U.S. Bureau of Economic Analysis

. . . but energy demand is increasing rapidly in the developing world

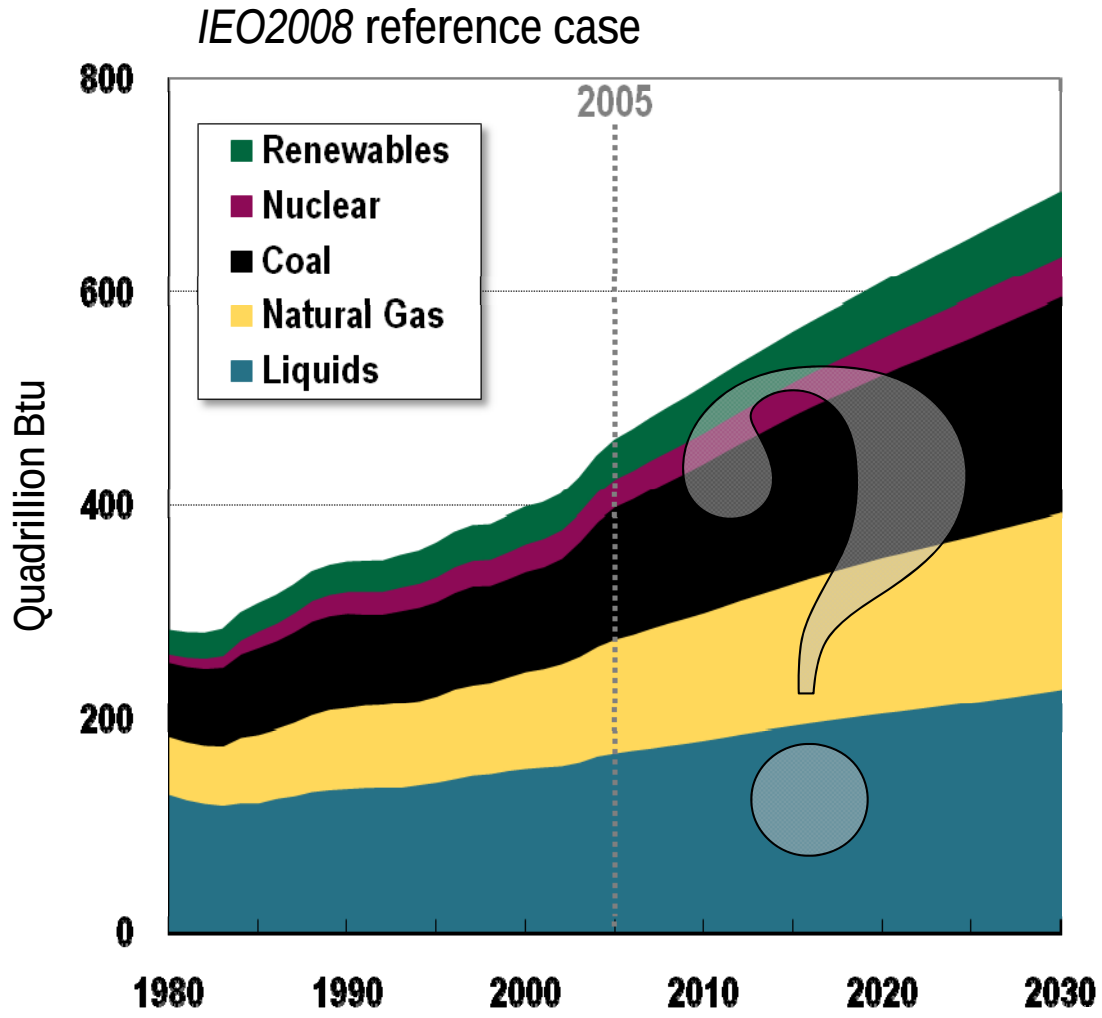


India ranks sixth in the world in oil consumption

China is building a new coal-fired power plant every week

Source: International Energy Outlook 2008, DOE/EIA-0484(2008), Energy Information Administration, June 2008

How will we meet increased demand?



- **Fossil fuel discoveries are not keeping up with depletion**
- **Reducing carbon emissions will be difficult and expensive**
- **Expanding nuclear fission raises proliferation concerns**
- **Most renewable sources have limited potential**
- **Demand will rise even with efficiency improvements**

Source: International Energy Outlook 2008, DOE/EIA-0484(2008), Energy Information Administration, June 2008

ORNL is uniquely positioned to deliver science and technology for energy

We have an extraordinary set of assets

- **Outstanding tools for materials R&D**
- **World-leading systems for open scientific computing**
- **Bioenergy Science Center**
- **Growing strength in climate change impact R&D**
- **The nation's broadest portfolio of energy programs**
- **Unique resources for nuclear technology**
- **Robust national security programs**

Our challenge:
Use these assets to enable science and technology breakthroughs that transform our energy future

OAK RIDGE National Laboratory

Studying materials with the world's best tools for neutron scattering

Spallation Neutron Source: World's most powerful accelerator-based neutron source

High Flux Isotope Reactor: Complementary capabilities and a new cold neutron source

UT-ORNL Joint Institute for Neutron Sciences: User gateway for SNS and HFIR

User program at SNS and HFIR up and running

OAK RIDGE National Laboratory

We have a 20-year plan to sustain leadership in neutron sciences

Build out instrument suite

Second guide hall and cold source

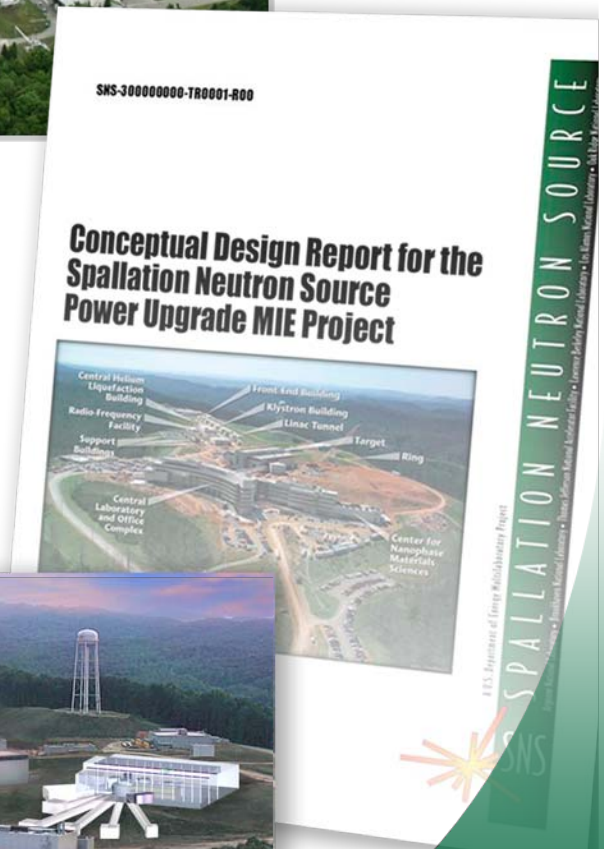
Neutron science support and user facility

2020

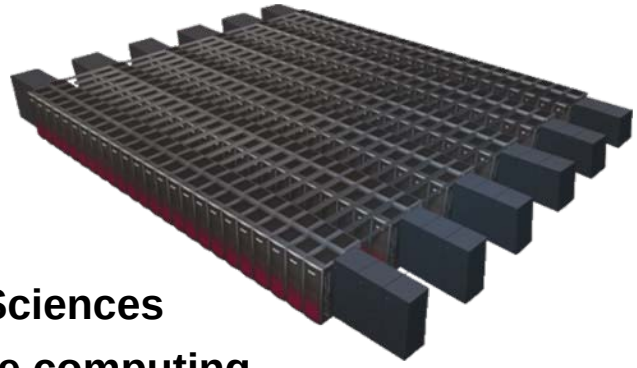
Power Upgrade Project

Long-Wavelength Target Station

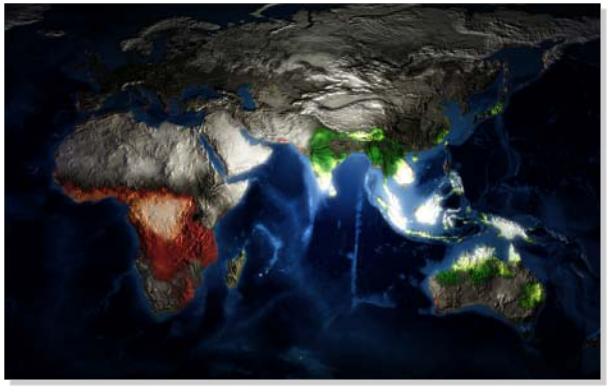
Complete instruments



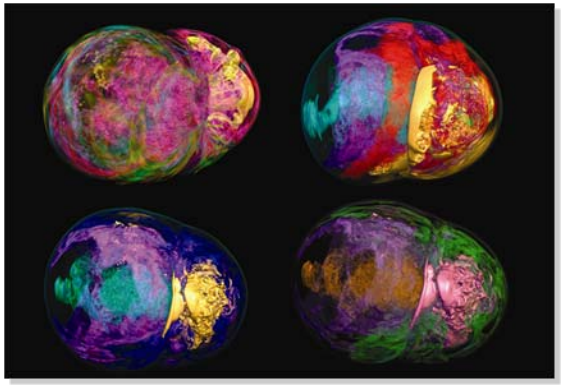
We are leading the development of ultrascale scientific computing



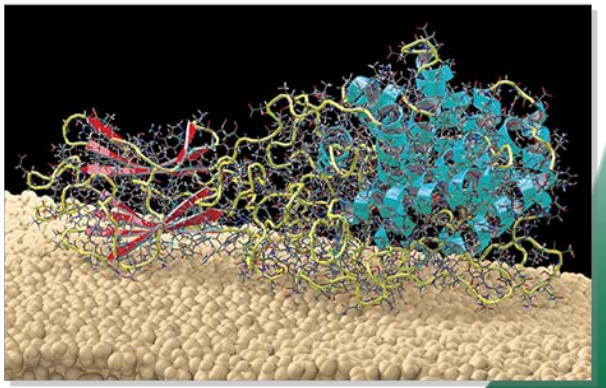
- **Addressing compelling questions in key areas of science and technology**
- **Executing a multiagency strategy**
  - **DOE's lead laboratory for open scientific computing**
  - **With UT, NSF's National Institute for Computational Sciences**
  - **DoD's lead laboratory for advanced high-performance computing for critical national security missions**
- **Operating a 263 teraflops Cray XT4 Jaguar**
- **On track to deliver 1 petaflops computing later this year**



Climate



Astrophysics

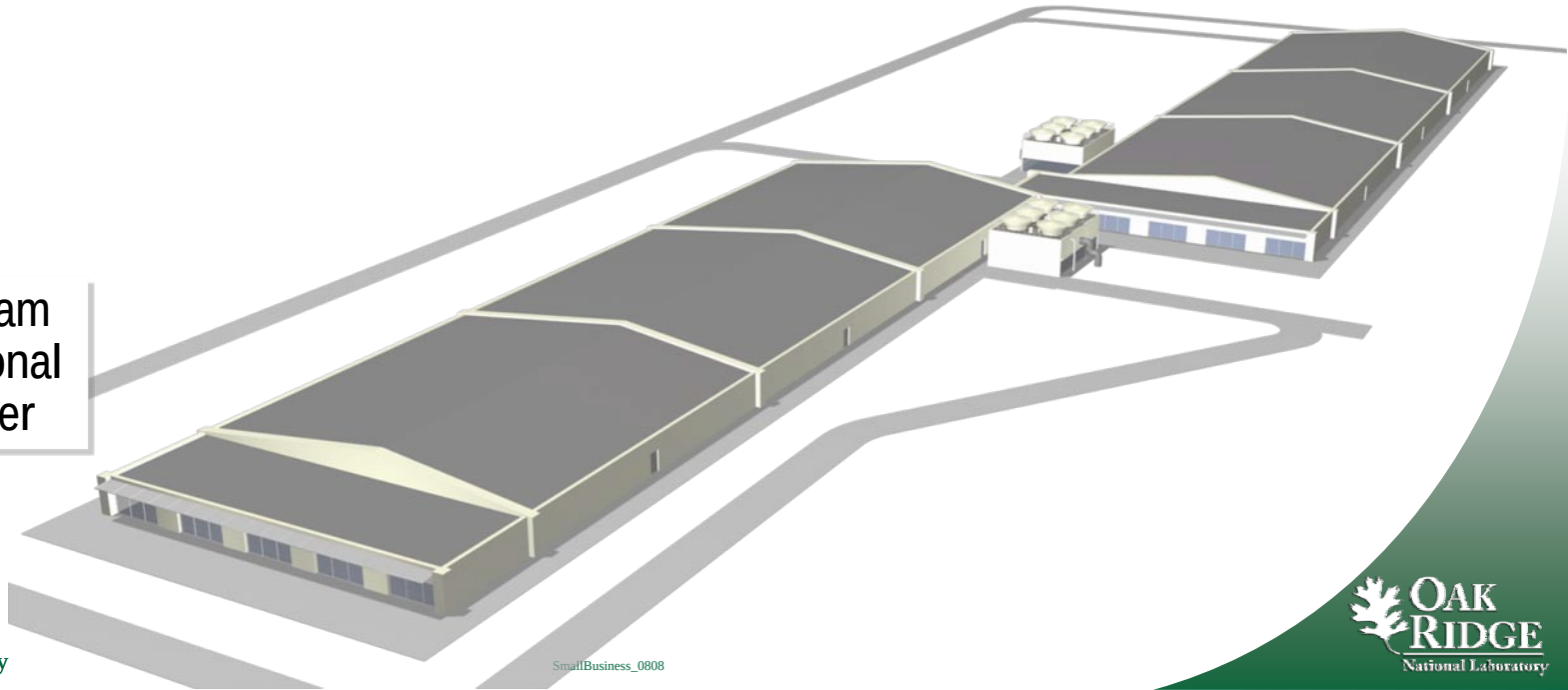


Biology

We plan to extend our computational capability by 1000× over the next decade

Vision: Maximize scientific productivity and progress on the largest scale computational problems

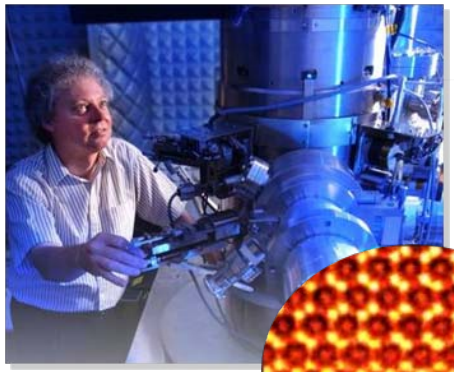
- **Provide world-class computational resources and specialized services for the most computationally intensive problems**
- **Provide stable hardware/software path of increasing scale to maximize productive applications development**

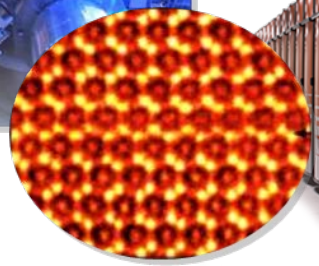


Multiprogram Computational Data Center

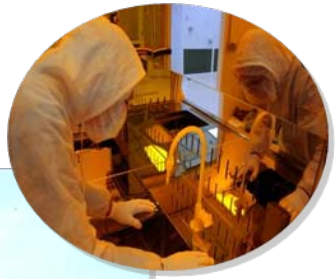
We are expanding the understanding and application of materials

Atomic resolution electron microscopy





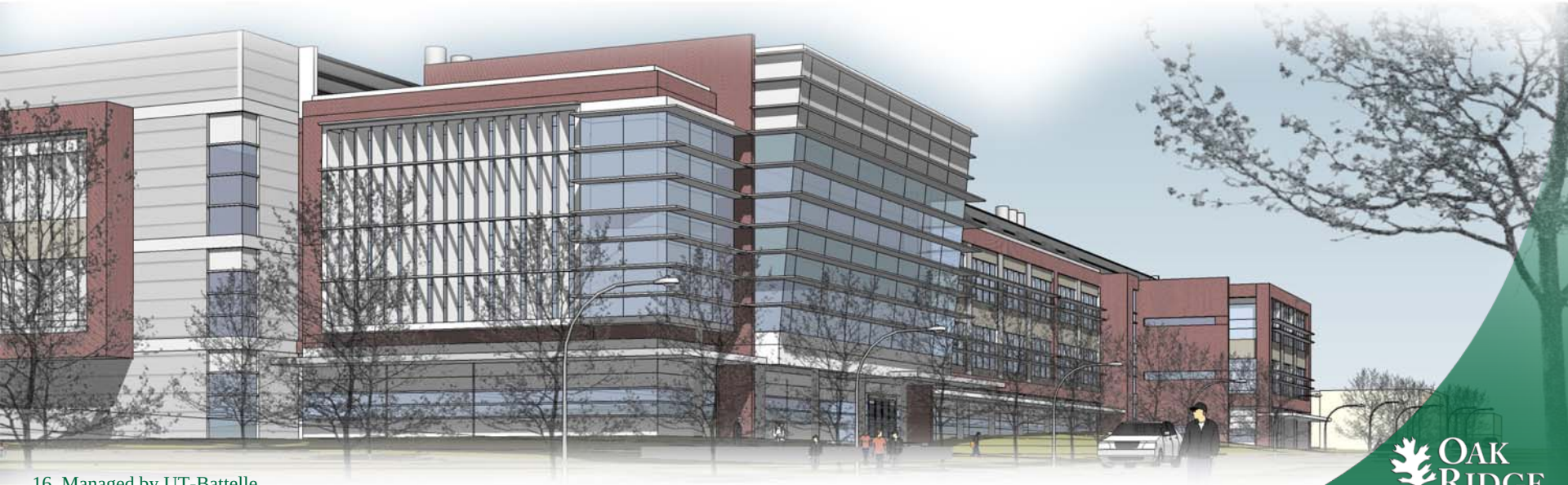
DOE's first nanoscale science research center



Hundreds of industry partners, thousands of university users

A new Multipurpose Laboratory Facility will enable 21st century chemistry and materials R&D

- **Sustains our leadership in tailored design, synthesis, and characterization of nanoscale materials and related molecular processes**
- **Supports new tools for probing atomic- and molecular-scale processes to enable the full realization of nanoscale science**



Transforming the new biology into bioenergy

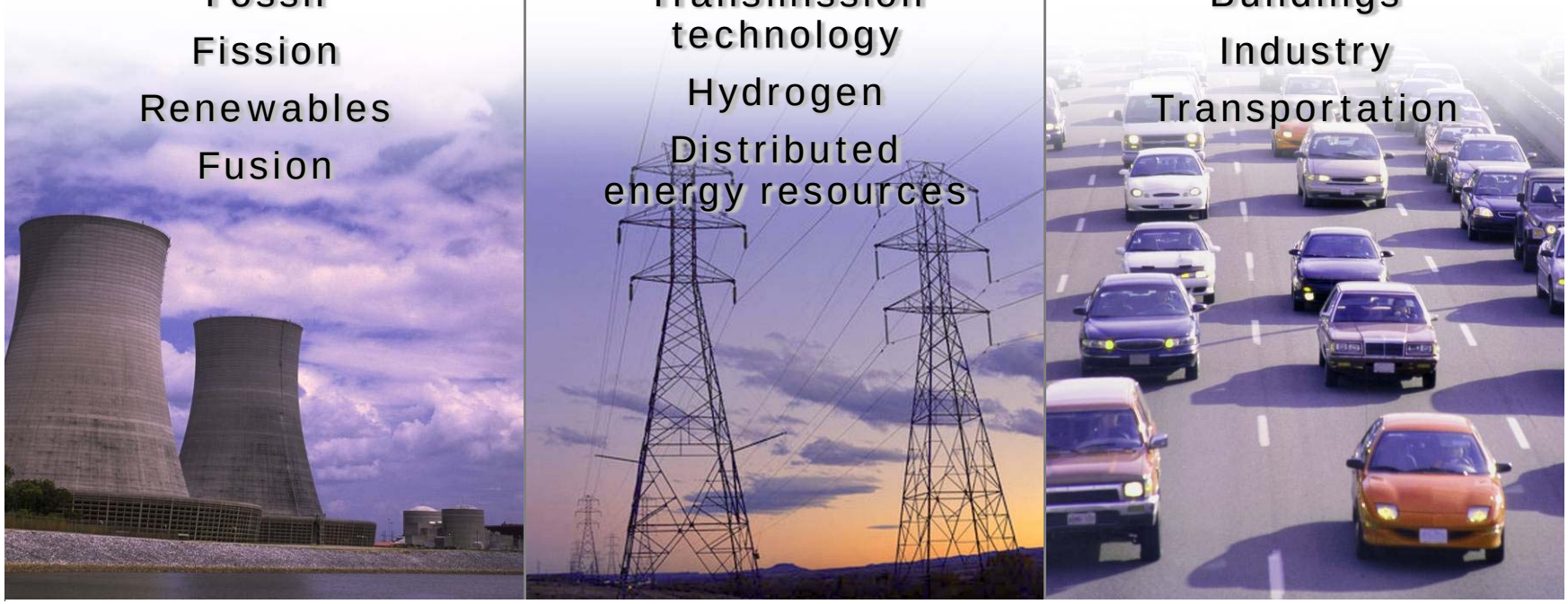
- **Developing bio-based solutions for energy, the environment, and carbon sequestration**
- **Managing the $135M DOE BioEnergy Science Center to advance cellulosic ethanol research**
- **Partnered with the $73M Tennessee Biofuels Initiative**
  - **Brings UT, ORNL, and industry together**
  - **Includes bioenergy research, a 5M gal/year pilot plant, and agricultural incentives for switchgrass**

BioEnergy Science Center

Biofuels Initiative

We are translating our science and technology into energy solutions

Generation	Distribution	Consumption
Fossil Fission Renewables Fusion	Transmission technology Hydrogen Distributed energy resources	Buildings Industry Transportation



Supporting DOE's strategic goals for energy security and independence

We have a regional strategy for demonstrating our energy technologies

- **The region offers an ideal testbed**
- **We are building or expanding relationships with regional partners across our energy portfolio**
  - **Automotive Research Alliance**
  - **Bioenergy Alliance**
  - **Southeast Solar Summit, October 2007**
  - **Industrial Energy Efficiency Summit, June 2008**
  - **Interstate 81 Corridor**
  - **Zero-energy houses**

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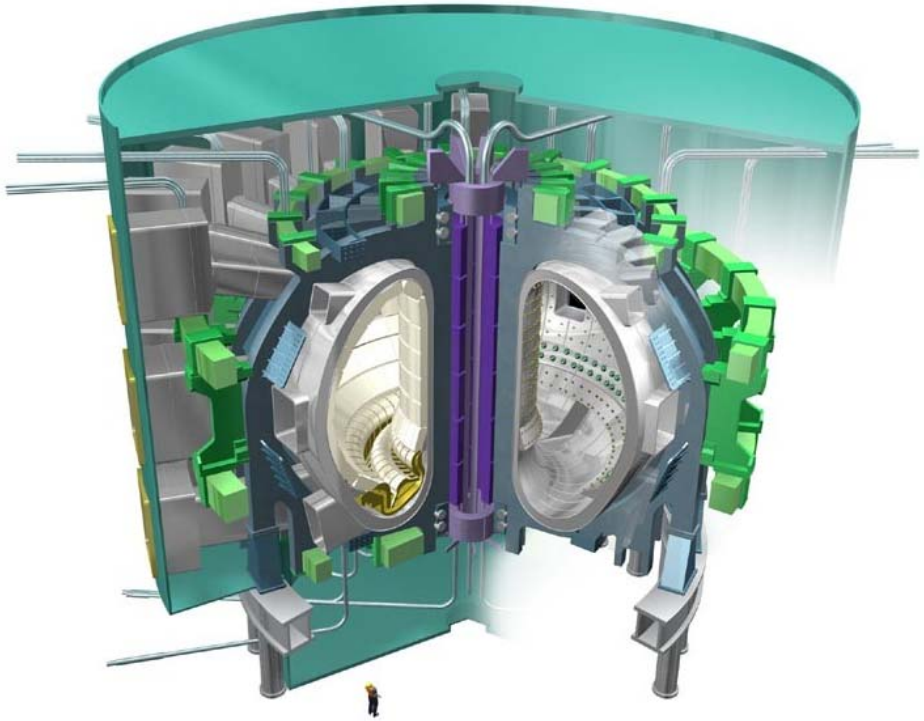
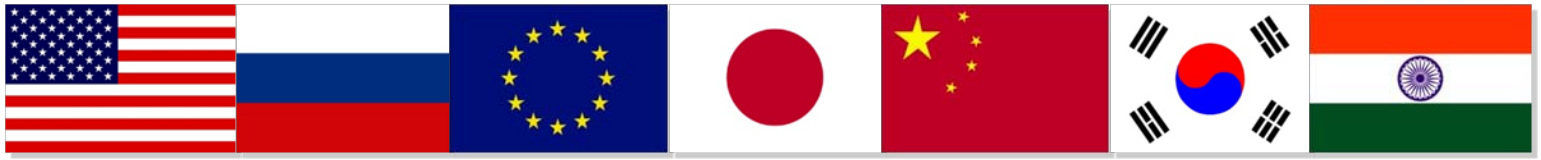
OAK RIDGE National Laboratory

ITER is the next step toward fusion power

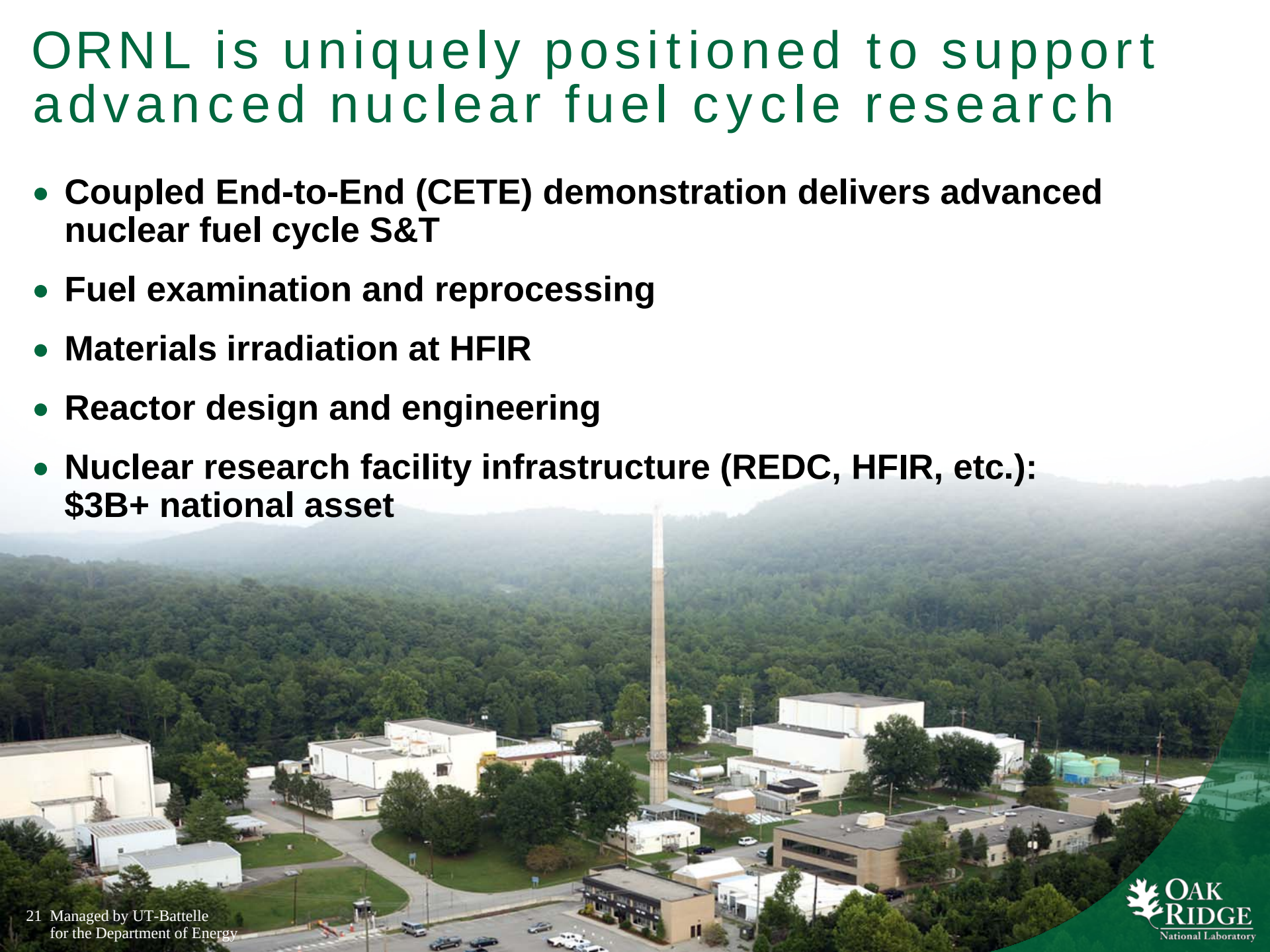
- **Joint international R&D project aimed at demonstrating the scientific and technical feasibility of fusion power**
- **To be built in Cadarache, France, with operation set to begin at the end of the next decade**
- **Total cost: About $12 billion**
  - **ORNL is managing the U.S. contributions to ITER**





ORNL is uniquely positioned to support advanced nuclear fuel cycle research

- **Coupled End-to-End (CETE) demonstration delivers advanced nuclear fuel cycle S&T**
- **Fuel examination and reprocessing**
- **Materials irradiation at HFIR**
- **Reactor design and engineering**
- **Nuclear research facility infrastructure (REDC, HFIR, etc.): $3B+ national asset**

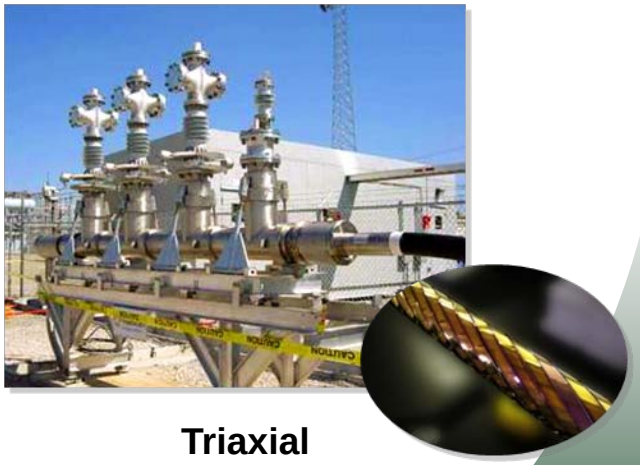


ORNL has a large and growing energy efficiency, renewable energy, and electricity delivery portfolio

- **Over $100M in FY 2007: Largest national lab effort in transportation and industrial technologies and in superconductivity**
- **Significant growth in fuel cells, biomass, and grid visualization/modeling**
- **Major national facilities including High Temperature Materials Laboratory, National Transportation Research Center, and Building Technologies Research and Integration Center**

Lightweight carbon fiber materials from lignin

“Zero-energy” homes

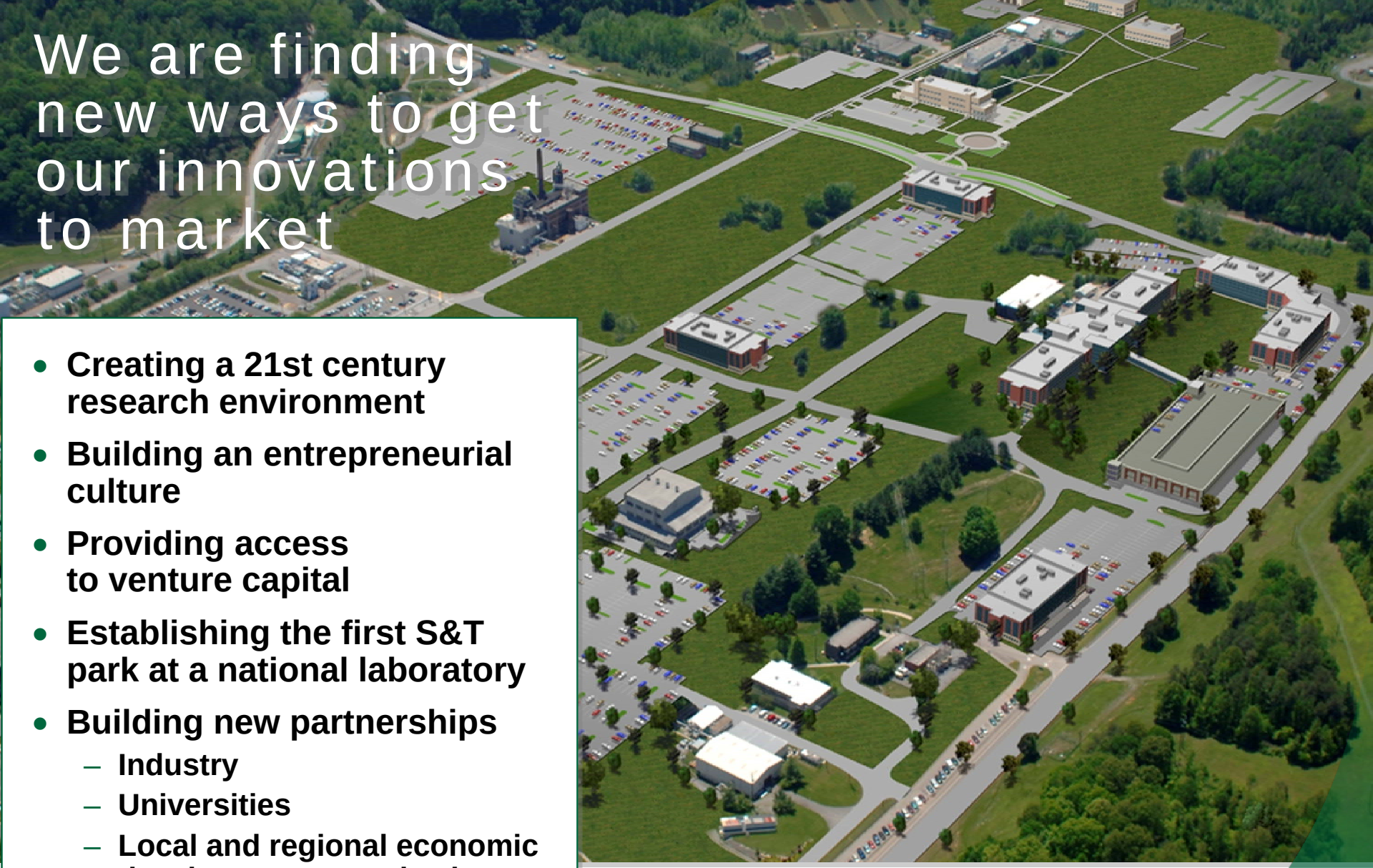


Triaxial superconducting cable installed at AEP Bixby

National security S&T has become a major business line at ORNL

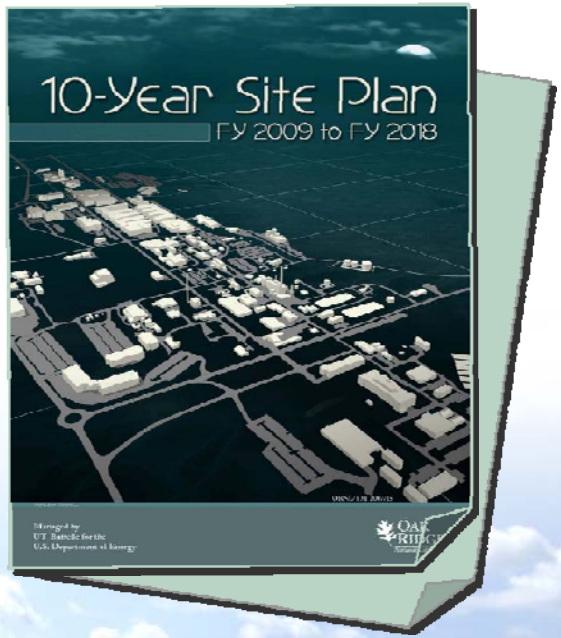
- **We are DOE's leading lab for nuclear nonproliferation**
- **We have a growing role with the Department of Homeland Security**
- **National security S&T builds upon and complements our DOE missions**

We are finding new ways to get our innovations to market



- **Creating a 21st century research environment**
- **Building an entrepreneurial culture**
- **Providing access to venture capital**
- **Establishing the first S&T park at a national laboratory**
- **Building new partnerships**
  - **Industry**
  - **Universities**
  - **Local and regional economic development organizations**

We have made great progress in modernizing the Laboratory



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OAK RIDGE National Laboratory

DOE-ORO Integrated Facilities Disposition Project: Completing ORNL's revitalization

Scope	Benefits
Environmental cleanup and site revitalization at ORNL and Y-12	• **Removes >200 facilities** • **Addresses legacy materials** • **Replaces liquid and gaseous waste systems** • **Provides real estate for future facilities** • **To be completed by 2018**

Other opportunities at ORNL

		RFP issue date	Estimated value
Support services	Engineering and technical support to Nuclear Nonproliferation Office	August 2008	$20M
	Basic Ordering Agreement for SensorNet Development Support	August 2008	$3M
	Architect/Engineering Services for ORNL Facilities Development Division and Spallation Neutron Source (multiple awards)	Fall 2008	TBD
	Basic Ordering Agreement for Infrastructure Support for Metering, Backflow, and Cross Connection Control at Fort Stewart and Hunter Army Airfield, Georgia	August 2008	$5M
Spallation Neutron Source	Fabrication of spare inner reflector plug	July 2008	>$1M
	Neutron Guide System and Beamline Shutter Insert Cartridge	July 2008	>$500k

Other opportunities at ORNL (continued)

		RFP issue date	Estimated value
AVID commodities agreements	Just-in-Time agreements:		
	• Clothing	FY 2008	$300k to $600k
	• Bulk gasoline and heating oil	FY 2008	$6M to $6.5M
	• Chemicals/Sigma Aldrich products	FY 2008	$1M to $3M
	• Heating, ventilation, and air conditioning	FY 2008	$1.5M to $2M
	• Toner cartridges	August 2008	$300k to $600k
	• Hoses/gaskets/rubber/pipes/valves/fittings	July 2008	$500k to $600k
ITER	Bulk steel (316 LN stainless)	Summer 2008	>$10M
	Systems Engineering Support to ITER International Organization	Expressions of interest due August 15, 2008	TBD
	Investigating and Demonstrating Technologies for CODAC High Performance Networks for ITER International Organization	Expressions of interest due August 26, 2008	TBD

Working with ORNL

- **Contracts and Procurement Director:**
  Jerome K. Hicks, (865) 576-0274
- **Asset Management and Small Business Programs:**
  Will Minter, (865) 574-9803
- **Small Business Program Office:**
  Keith Joy, (865) 576-5484

http://www.ornl.gov/adm/contracts

Oak Ridge National Laboratory:
Meeting the challenges of the 21st century

www.ornl.gov