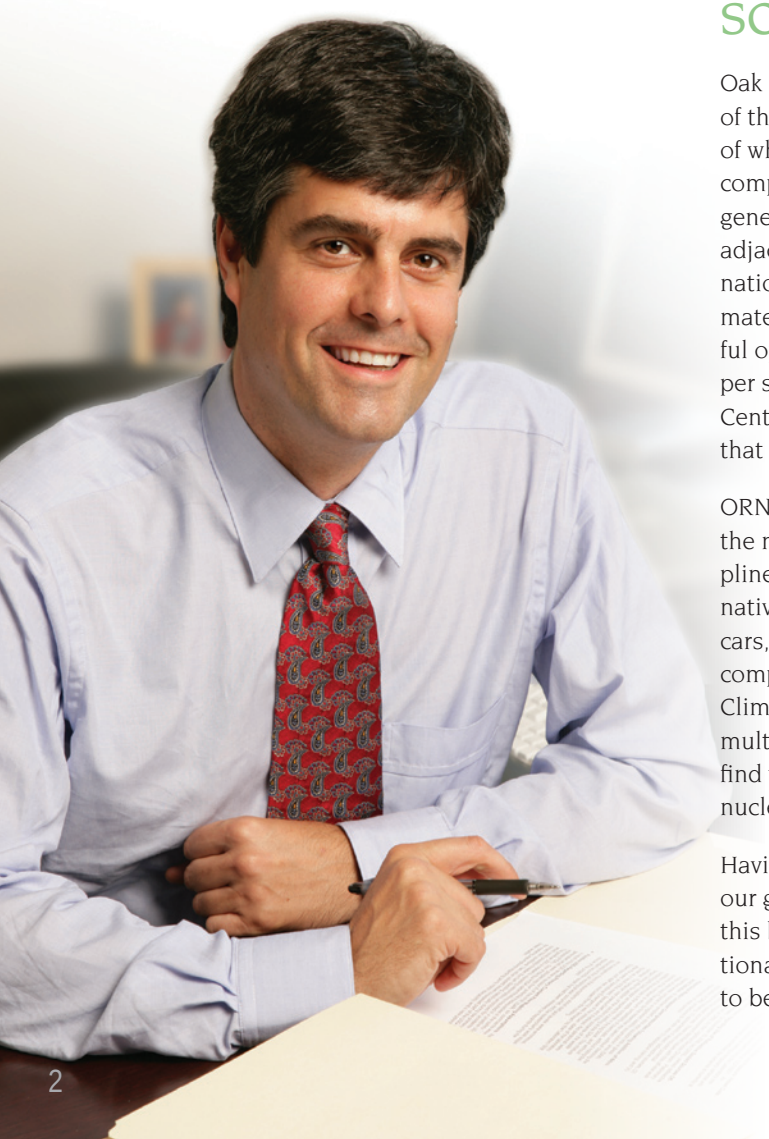
solving the BIG PROBLEMS

OAK RIDGE NATIONAL LABORATORY

MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

foreword



SOLVING THE "BIG PROBLEMS"

Oak Ridge National Laboratory's future could not be more exciting. Not since the days of the Manhattan Project has the laboratory witnessed anything approaching the scale of what is taking place today in Oak Ridge. With more than $2 billion in new facilities completed since 2003, ORNL has one of the world's most modern campuses for the next generation of scientific discovery. The $1.4 billion Spallation Neutron Source, located adjacent to the new Center for Nanophase Materials Sciences, combines with one of the nation's largest research reactors to continue our reputation as a leader in the study of materials. ORNL's Center for Computational Sciences houses the world's most powerful open science supercomputer capable of a mind-boggling 1,600 trillion calculations per second. Each of these facilities works closely with ORNL's new Bioenergy Science Center, funded by the Department of Energy to develop a new form of cellulosic ethanol that will not require land currently needed for the production of food.

ORNL researchers are applying this unique collection of scientific facilities to some of the most important scientific challenges of our time. Working across scientific disciplines, we are developing breakthrough technologies that will enable us to provide alternative sources of carbon-free energy while we reduce the amount of energy we use in our cars, homes and businesses. Drawing on our scientific expertise and high-performance computing capabilities, ORNL provided support for the Intergovernmental Panel on Climate Change that received a 2008 Nobel Prize. As the Department of Energy's largest multi-program laboratory, our outreach literally spans the globe, from helping utilities find ways of reprocessing spent nuclear fuel here in Tennessee to aiding the cause of nuclear non-proliferation in nation-states of the former Soviet Union.

Having modernized the laboratory and recruited some of the world's top scientific talent, our goal is to produce the kind of science that will literally transform our future. I hope this brochure conveys a sense of the enthusiasm we are experiencing at Oak Ridge National Laboratory. On behalf of the 4,400 staff at ORNL, we are excited about the chance to be part of solving America's "big problems."

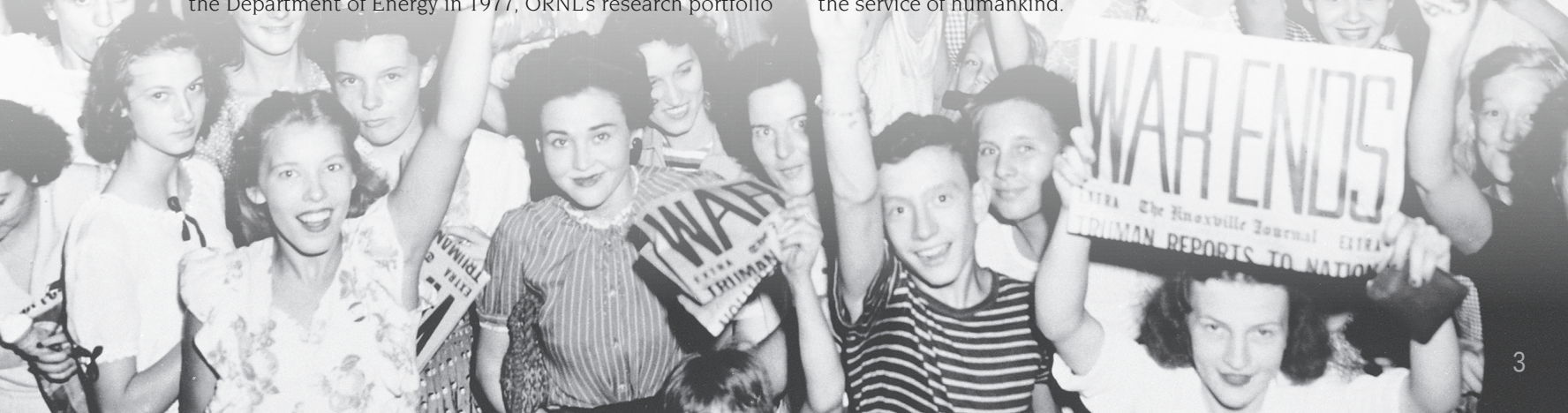
building

ON A HISTORY OF SCIENCE AND SERVICE

Born as part of the Manhattan Project in 1943, Oak Ridge National Laboratory was established in the dark days of World War II when American scientists feared that our adversaries were rapidly developing a new weapon of unimaginable power. Built seemingly overnight on isolated farm land in the mountains of East Tennessee, Oak Ridge became the "secret city" that within two years housed more than 75,000 residents. Working under assumed names in the Graphite Reactor, Enrico Fermi and his colleagues developed the world's first sustained nuclear reaction, leading to the atomic bomb that ended the war.

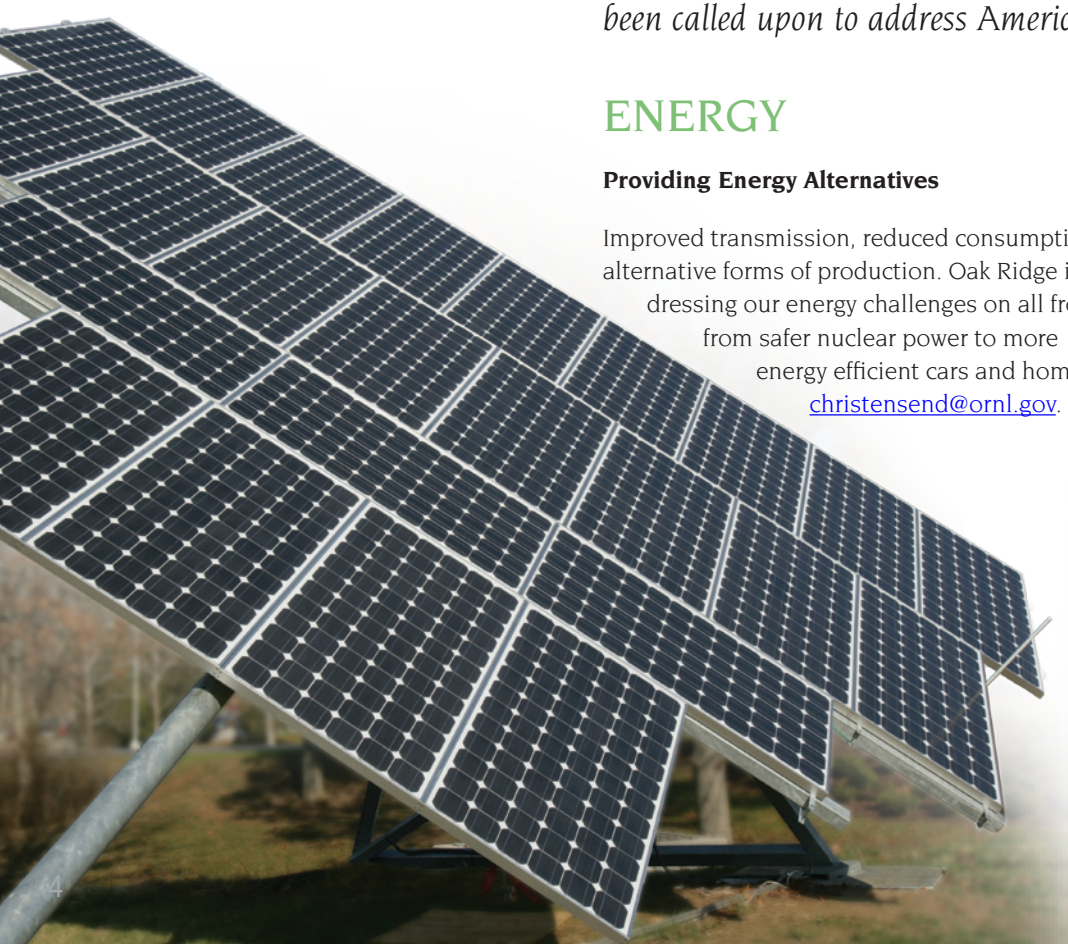
ORNL's involvement with nuclear weapons ended after the war. The laboratory's scientific expertise shifted in the 1950s and 1960s to peacetime research in nuclear energy medicine, biology, materials and physics. The Graphite Reactor evolved from a wartime role to produce the world's first medical radioisotopes for treating cancer. Following the creation of the Department of Energy in 1977, ORNL's research portfolio expanded to include the broad areas of energy, national security, and the environment. The end of the Cold War and the growth of international terrorism led to a further expansion of research into a range of technologies that include efforts to stem the spread of nuclear weapons. As the laboratory entered the 21st Century, ORNL's role as America's largest facility for science and energy laboratory took on new significance as the world sought new ways of providing an adequate amount of sustainable energy.

ORNL today is managed for the Department of Energy by UT-Battelle, LLC, a partnership of the University of Tennessee and Battelle Memorial Institute. The laboratory was created in 1942 with a collection of scientists brought together from every corner of America. While the new generation of scientists at Oak Ridge National Laboratory represents more than 80 countries, they remain heirs to a great history. More than six decades later, they continue a rich tradition of scientific exploration in the service of humankind.



6 Scientific Themes

Born of necessity. Inspired by our quest to know. We have always been called upon to address America's greatest scientific challenges.



ENERGY

Providing Energy Alternatives

Improved transmission, reduced consumption, alternative forms of production. Oak Ridge is addressing our energy challenges on all fronts, from safer nuclear power to more energy efficient cars and homes. christensend@ornl.gov.

HIGH-PERFORMANCE COMPUTING

Breaking Scientific Barriers

With unmatched capacity for open scientific research, Oak Ridge's Jaguar supercomputer has broken the "petaflop" barrier, or 1,000 trillion mathematical calculations per second, making it possible to model the most complex scientific problems. zachariat@ornl.gov.

NATIONAL SECURITY

Guarding the Gates

From biochemical sensors to stopping the proliferation of nuclear weapons, technologies that make America safer are among the laboratory's top research priorities. graywh@ornl.gov.

NEUTRON SCIENCE

Leading the World

The Spallation Neutron Source and the High Flux Isotope Reactor together make Oak Ridge the world's foremost center for neutron science. andersonian@ornl.gov.

ADVANCED MATERIALS

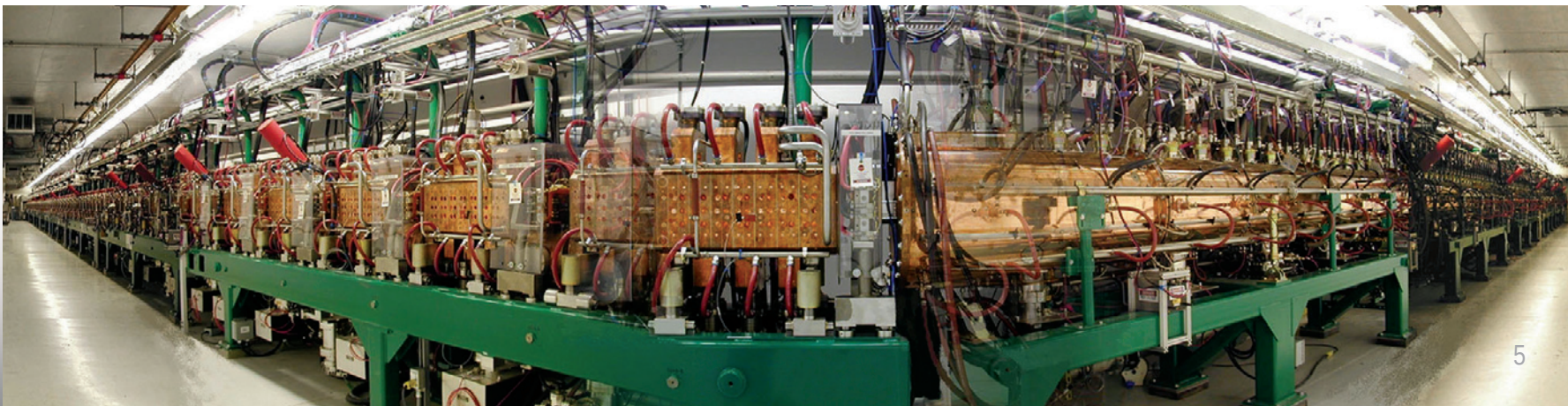
Strengthening American Industry

With DOE's first Nanoscience Center; the world's most powerful electron microscope, and the High Temperature Materials Laboratory, Oak Ridge plays a critical role in American industrial competitiveness. buchananmv@ornl.gov.

BIOLOGICAL SYSTEMS

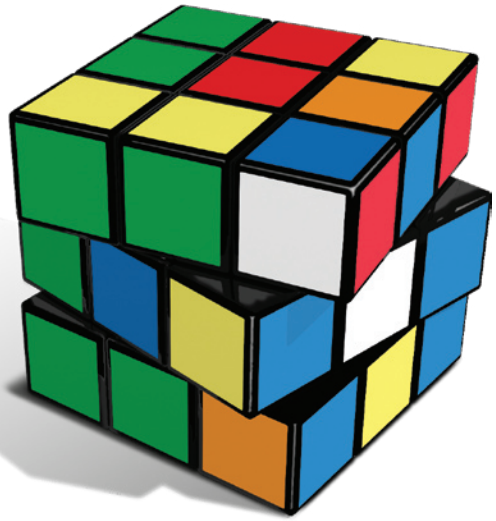
Developing New Options

Whether converting biomass to fuel or understanding the impacts of climate change, biological research at ORNL is helping develop new options for energy, environmental protection, and human health. jacobsgk@ornl.gov.



10 BIG challenges

National laboratories were created to solve the scientific problems that require facilities and resources beyond the reach of most universities and private industry. As *America's largest energy laboratory,* ORNL *is tackling* 10 *"big challenges" of critical importance to America's energy future.*

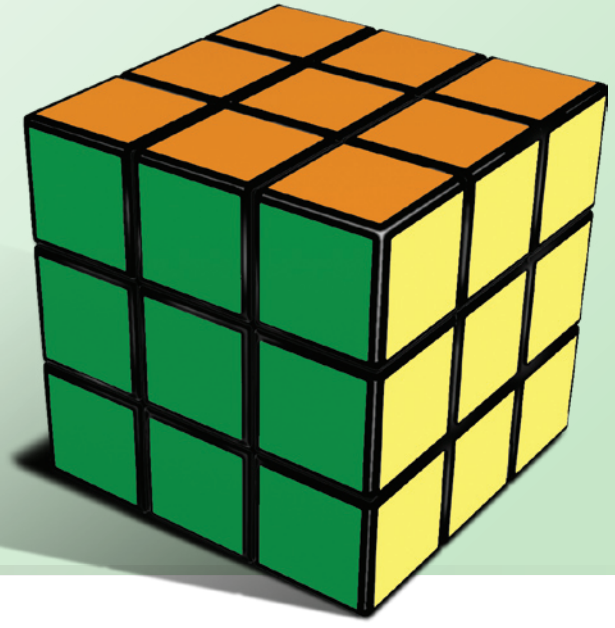


Lowering the Cost of Solar Power: Replacing energy from fossil fuels will require lowering the cost of solar power. New thin-film photovoltaic cells, hundreds of times thinner than a human hair, could open the door to the next generation of solar technologies.

Responding to Climate Change: What are the impacts of global warming, and how we can respond to those changes, are among the most critical questions of the next decade. ORNL is marshalling a variety of resources, including environmental sciences and high-performance computing, in the quest for environmentally sound energy solutions.

Closing the Nuclear Fuel Cycle: Meeting a growing demand for energy without increasing carbon emissions will require an expanded role for the nuclear industry. ORNL is developing reprocessing technologies that could enable up to 97% of the spent fuel to be reused instead of permanently stored.

Designing High-Mileage Cars: With a goal of reducing the consumption of fossil fuels, ORNL researchers have developed a new generation of composite materials that could greatly reduce the weight of cars and trucks. Combined with efforts to increase engine performance, cars of the future could achieve 100 miles per gallon with no compromise of safety or performance.



Developing a New Generation of Ethanol: Many Americans seeking a substitute for gasoline prefer ethanol that is not made from valuable food supplies. ORNL's Bioenergy Science Center is developing new forms of cellulosic ethanol that can be grown on millions of acres of marginal land with little need for water or fertilizer.

Storing Alternative Energy: New ways of storing energy will be critical to efforts to reduce the consumption of fossil fuels. ORNL's expertise in advanced materials will play a leading role in developing a new generation of batteries that can store energy generated by solar panels, wind turbines and electric cars.

Reducing Energy Consumption: Reducing the energy consumption of homes, offices and factories is a major goal of America's energy policy. Working with the Tennessee Valley Authority, ORNL has constructed five Habitat for Humanity homes with an electric bill of only 40 cents per day. Researchers hope to develop a zero-energy home by 2012.

Finding an Inexhaustible Source of Energy: New research tools, including ORNL's supercomputers, are bringing the dream of fusion energy closer to reality. ORNL is leading the U.S. role in ITER, the international effort to build an experimental fusion reactor that could lead to an inexhaustible source of energy.

Modernizing the Electric Grid: ORNL is testing High Temperature Superconducting cables that can carry up to 140 times more electric current without losses. Superconducting cables will reduce the number of power outages and lessen the need for additional power plants.

Storing Carbon Emissions: One aspect of reducing the volume of carbon emissions into the air involves understanding the potential alternative of placing the carbon underground and the resulting impact on the ecosystem. ORNL research will help form the basis for assessing strategies for ocean and soil-based carbon sequestration.

User Facilities

AT OAK RIDGE NATIONAL LABORATORY

ORNL *each year makes some of the world's most advanced research facilities available to more than* 3,000 *visiting scientists.*

Building Technologies Research and Integration Center

Center for Nanophase Materials Sciences

Center for Structural Molecular Biology

High Flux Isotope Reactor

High Temperature Materials Laboratory

Holifield Radioactive Ion Beam Facility

National Center for Computational Sciences

National Transportation Research Center

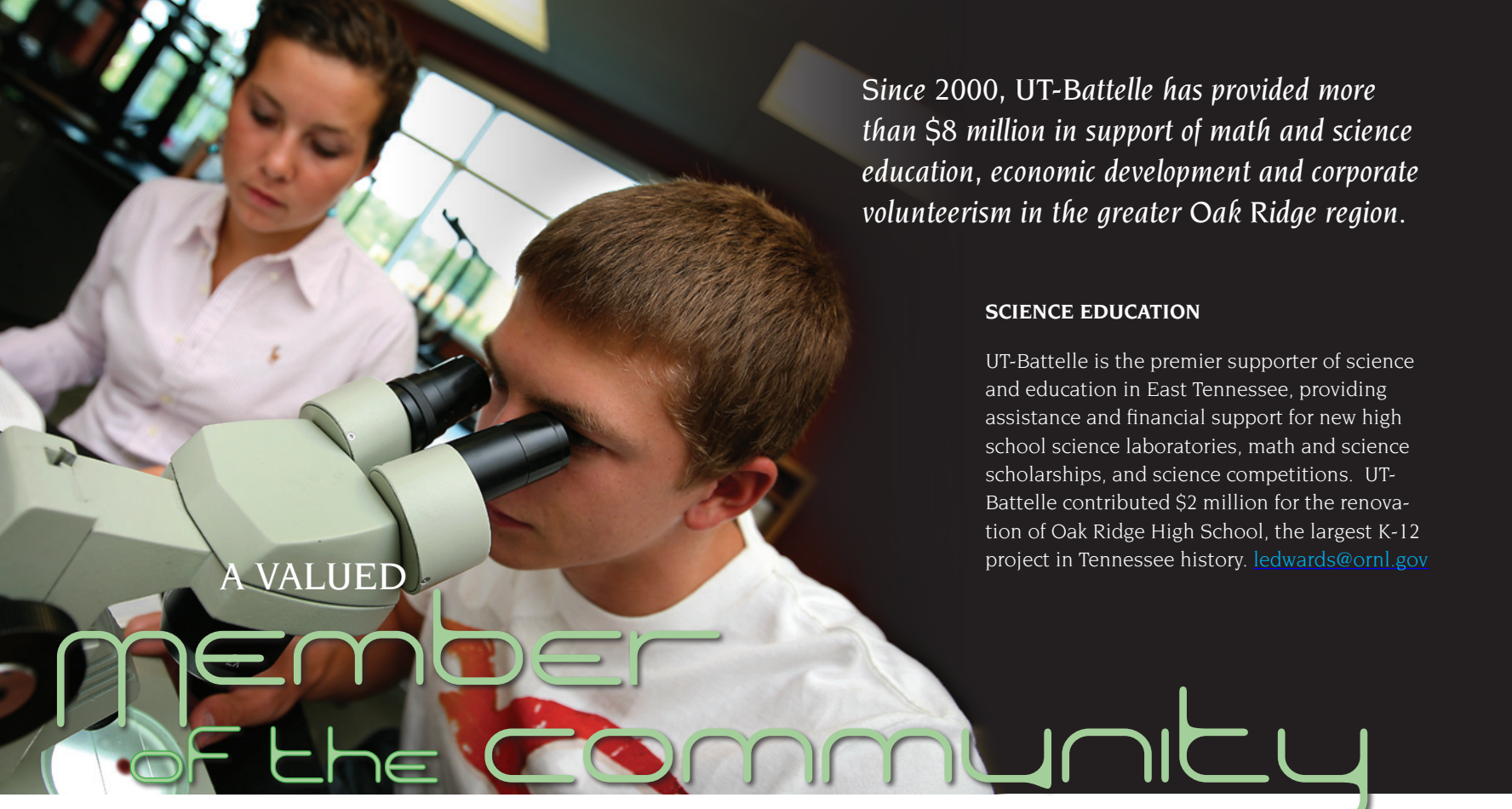
Electron Linear Accelerator

Safeguards Laboratory

Shared Research Equipment

Spallation Neutron Source

For more information, see User Facilities at www.ornl.gov



A VALUED member of the community

Since 2000, UT-Battelle has provided more than $8 million in support of math and science education, economic development and corporate volunteerism in the greater Oak Ridge region.

SCIENCE EDUCATION

UT-Battelle is the premier supporter of science and education in East Tennessee, providing assistance and financial support for new high school science laboratories, math and science scholarships, and science competitions. UT-Battelle contributed $2 million for the renovation of Oak Ridge High School, the largest K-12 project in Tennessee history. ledwards@ornl.gov

CORPORATE VOLUNTEERISM

Working through Team UT-Battelle, ORNL employees donate thousands of hours to outreach projects in the Oak Ridge region. In addition to being East Tennessee's largest supporter of the United Way, UT-Battelle provides approximately $1 million annually to a variety of educational and civic initiatives ledwards@ornl.gov

ECONOMIC DEVELOPMENT

UT-Battelle is committed to being an active partner in the region's economic development. With assets that include the $150 million Battelle Ventures program, the $35 million Innovation Valley Partners venture capital fund, and a new S&T Park located on the ORNL campus, the laboratory's Office of Technology Transfer and Economic Development has helped start more than 80 new technology-based companies using intellectual property developed at ORNL. For universities and existing industries, the laboratory's 12 world-class user facilities make high-tech tools available for testing and research. ballardt@ornl.gov

University partners

With an eye toward developing the next generation of scientists and engineers, UT-Battelle has established partnerships with major southeastern research universities to facilitate joint appointments, collaborative research and graduate student opportunities.

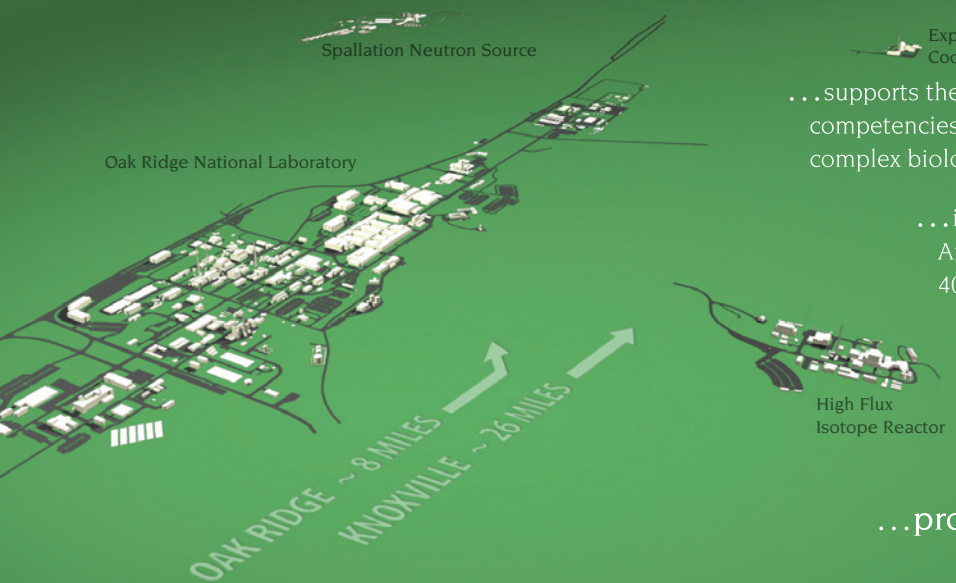
University of Tennessee, Duke, Florida State, Georgia Tech, North Carolina State, Vanderbilt, Virginia, Virginia Tech, Oak Ridge Associated Universities

ORNL . . .

Knoxville

. . . is the Department of Energy's largest science and energy laboratory, managed since April 2000 by a partnership of the University of Tennessee and Battelle.

. . . has 4,400 staff from more than 80 countries, 3,000 guest researchers, 12 user facilities and a budget of approximately $1.4 billion.



. . . supports the Department of Energy's mission through six major scientific competencies in energy, neutron sciences, high-performance computing, complex biological systems, materials research and national security.

. . . is located in Eastern Tennessee on the Oak Ridge Reservation in Anderson and Roane counties. The laboratory is near Interstates 40 and 75 and is 20 miles from Knoxville's McGhee-Tyson Airport.

. . . welcomes visitors to the laboratory. Because of security requirements, visits must be arranged ahead of time. Contact ORNL Visitor Services (865) 574-7199, or email x10visit@ornl.gov, for information about how to arrange a visit to ORNL.

. . . provides additional information at *www.ornl.gov*.

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