

Oak Ridge National Laboratory

7. Infrastructure

Oak Ridge National Laboratory (ORNL) sits in the southwest corner of DOE’s Oak Ridge Reservation (ORR), a reserve of approximately 34,000 acres of federally owned lands within Anderson and Roane counties in Tennessee. The Oak Ridge National Environmental Research Park, covering 20,000 acres of the ORR, is an outdoor laboratory and a national user facility. The most recent land use planning information can be accessed at <http://landuseplanning.ornl.gov/index.html>. The main ORNL site includes facilities in two valleys (Bethel and Melton) and on a major ridge (Chestnut). The site has many of the same functions and requirements of a small city. It is supported by a dedicated fire department, medical center, and security force. It operates extensive utilities with both centralized (e.g., steam and sewage treatment plants) and distributed systems. The average age of all on-site operating buildings is 31 years; the average age of DOE-owned operating buildings is 35 years. Utility systems in general adequately support ongoing research, although there are pockets of condition, capacity and reliability issues requiring attention. Over the past 7 years, site revitalization efforts have delivered new and upgraded user facilities and transformed the East Campus into the kind of world-class research complex expected by today’s scientific workforce. Some 1.2 million square feet (sf) of excess space (188 facilities) stands ready for final disposition; this includes 7 buildings (561,118 sf) located at the Y-12 National Security Complex. Also located on the ORNL campus are 42 DOE Office of Environmental Management (DOE-EM) facilities (195,716 sf), operated by contractors other than UT-Battelle. Cleanup of legacy materials and facilities is ongoing but only partially funded. Over the next two years, three new leases are planned; 15,000 sf of office, 260,000 gross square feet (gsf) of data center, and an as-yet-undetermined square footage of high bay space. One clean parcel transfer of some 30 acres is anticipated to accommodate the private sector-financed Multiprogram Computational Data Center (MCDC).

| ORNL SC Facility Distribution, FY 2008 | | |
|--|------------|------------------|
| Location | Number | Space, sf |
| UT-Battelle (DOE-owned) | 204 | 3,369,410 |
| Leased on site* | 7 | 495,057 |
| Leased off site* | 7 | 143,999 |
| Museum (AMSE) | 3 | 60,166 |
| Excess facilities | 29 | 260,501 |
| Total | 250 | 4,329,133 |

*Amount is leased net square feet (nsf) rather than gsf.

| ORNL SC Facility Summary (Owned and Leased Buildings) | | |
|--|------------|-------|
| Replacement Plant Value (\$M) | | 1,167 |
| Total deferred maintenance (\$M) | | 139 |
| Prior year maintenance (\$) | | 32 |
| Asset Condition Index | MC | 0.89 |
| | MD | 0.84 |
| | NMD | 0.99 |
| Asset Utilization Index | Office | 0.93 |
| | Warehouse | 0.99 |
| | Laboratory | 0.93 |
| | Housing | 100 |

Facilities and Infrastructure in Support of Mission

ORNL has new facilities on Chestnut Ridge and a revitalized east campus; revitalization of the west campus will be complete within the next 5 years. In general, ORNL possesses the world-class technical facilities and the vibrant campus setting that attracts the best and brightest staff, and provides opportunities to interact and conduct multidisciplinary science safely and securely. The Ten Year Site Plan (TYSP) outlines the site, facilities, and infrastructure that will serve science and technical research at the Laboratory for the 21st century. ORNL will secure these resources by maintaining existing assets, providing new specialty and general-purpose technical facilities, providing new site utility infrastructure and support services facilities, and advancing the final cleanup of the Manhattan Project and Cold War legacy on its Central Campus.

Specialized facility projects outlined in *Facilities for the Future of Science: a Twenty-Year Outlook*, a privately financed 260,000 gsf computational data center project, and the FY 2008 SLI Modernization of Laboratory Facilities line item project are in progress to maintain ORNL's leadership roles in neutron sciences, computational science and engineering, and advanced materials. These projects provide new research capabilities and address the performance gaps that obsolete research facility configurations present to R&D. (Inefficient building systems also hamper meeting DOE energy objectives and drive up cost of operations.) Other business lines face similar issues, which will be addressed through overhead resources [e.g., Institutional General Purpose Projects (IGPPs), leases] and future line item projects (see following table).

Many ORNL site utility systems and service support facilities are far into their design life, with some beyond their useful life. Maintenance investments, based on each asset's intended future use, have sustained operational reliability and preserved the usefulness of these properties. However, as ORNL site revitalization continues, the condition, configuration, location, and capacity of these assets will no longer serve ORNL research operations. The TYSP proposes several SLI projects to replace these aged assets with upgraded and relocated utility grids and service support facilities.

Full ORNL revitalization will not be achieved until Central Campus legacy facilities and materials, including their liabilities and risks, are removed and the site is readied to accommodate future missions. DOE's Oak Ridge Office is advancing an Integrated Facilities Disposition Project (IFDP) at ORNL and the Y-12 National Security Complex to decontaminate and decommission excess and unwanted facilities, disposition legacy materials/waste, and complete the site's environmental cleanup of soil, groundwater, and surface water. ORNL's TYSP supports the DOE-EM effort by upgrading facilities and infrastructure to enable vacating the Central Campus ahead of cleanup activities. DOE Office of Science support for the IFDP is critical to positioning ORNL to deliver the next 50 years of world-class research.

As seen below, ORNL's facility and infrastructure strategy leverages the SLI program, program investments, private sector funding, and Laboratory overhead resources including IGPP, maintenance, and energy savings performance contracts (ESPCs). A peer review to support condition evaluations and/or planned investments will occur in FY 2009.

| Business Line | Facilities and Infrastructure | Summary Condition Evaluation | Planned Investments | |
|---------------------------------------|---|---|--|---|
| | | | Laboratory | DOE |
| Neutron Sciences | <ul style="list-style-type: none"> • SNS • HFIR • Chestnut Ridge and Melton Valley Campus: 8000 and 7900 building series | <p>Major user facilities are adequate to support this business line; planned technical advances will be needed to maintain position as world's leader. Additional site services needed for growing user population. Design abilities of second SNS target station close mission capability gaps in nano-sciences, biomaterials, energy storage media, structural materials, and magnetic systems.</p> <p>State of Tennessee - funded laboratory facility as well as BES GPP-size laboratory and office build-outs of CLO will meet needs of growing user population. On-site overnight housing, convenient food service, and additional parking lots are also required.</p> <p>SNS and HFIR have sustainment plans in place to ensure adequate maintenance and renewal.</p> | <p>To meet needs of growing user population:</p> <ul style="list-style-type: none"> • State of Tennessee–funded Joint Institute for Neutron Sciences (31,000 sf laboratory building) • 60% design complete for ORNL User Housing Facility (BES GPP) • Design of Chestnut Ridge Cafeteria and expanded Chestnut Ridge parking (IGPP) to start in late 2008 • If required, second user housing facility (IGPP) is proposed in 2012 | <ul style="list-style-type: none"> • SNS Power Upgrade Project submitted for CD-1 approval; design and construction schedule: FY 2008–FY 2014 • SNS second target station submitted for CD-0 approval |
| Computational Science and Engineering | <ul style="list-style-type: none"> • 5100 • 5300 • 5600 | <p>New facility required by mid-2010 to accommodate ORNL's multi-agency computing strategy</p> | <ul style="list-style-type: none"> • Short-term utility requirements met through East Campus electrical and chilled water systems upgrades (IGPP) • CD-0 for privately financed Multiprogram Computational Data Center (with accompanying site infrastructure) approved for FY 2009 • Additions and modifications to existing DOE facilities (4500N/S, 6012) being considered to add office space; leases also being considered | |

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| Business Line | Facilities and Infrastructure | Summary Condition Evaluation | Planned Investments | |
|--|---|---|---|---|
| | | | Laboratory | DOE |
| Advanced Materials and Interfacial Processes | <ul style="list-style-type: none"> • 4500 series • 8610 (CNMS) • 3625 (AMCL) | <p>1950s-vintage design of ORNL materials development laboratories does not meet research needs; building fire barriers and chemical loading are concerns. Several facilities [e.g., Buildings 3025E/M (3,700 sf labs, 20 offices) and 3150 (4,600 sf labs, 12 offices)] must be vacated during next 5 years to accommodate final site remediation.</p> | <ul style="list-style-type: none"> • Ongoing projects to address chemical loading concerns by installing smoke detectors and chemical storage units (IGPP) • Where excess capability exists, research activities relocated from Central Campus are being consolidated into newly renovated space in DOE-owned buildings (Laboratory overhead) • No excess capacity exists to relocate microscopy laboratories from Central Campus; design of AMCL expansion will start late in FY 2008 (IGPP) | <ul style="list-style-type: none"> • FY 2008 SLI Modernization of Laboratory Facilities line item replaces ~140,000 sf in Buildings 4500N/4500S, which contain some of our least usable laboratories |
| Biological and Environmental Sciences | <ul style="list-style-type: none"> • 1000 series • JIBS | <p>Core capabilities consolidated on West Campus; general modernization initiative (similar to East Campus) under way. Individual-contributor 1970s-style labs need updating to large multi-contributor labs with additional hood capacity; additional field storage, sample preparation facility, facility maintenance storage, and greenhouse capacity required. Some building components require repair or upgrade (water dechlorinizer, electrical breakers). Parking lots, pedestrian walkways, roads, landscape require reconfiguration to improve safety environment and quality of work life.</p> | <ul style="list-style-type: none"> • Multiple IGPP and expense funding projects under way to complete general repairs and upgrades to West Campus laboratory facilities • Upgrade to Building 1505 HVAC included in proposed FY 2008 ESPC • New 9,000 sf combined field equipment storage, facility maintenance storage, and sample preparation facility, plus new greenhouses, are proposed (IGPP) • General upgrades to West Campus quad designed; construction to start in April 2008. | |
| Nuclear Science | <ul style="list-style-type: none"> • 6000 | <p>Conventional portion of facility fully supports business line, requiring only the established routine maintenance program</p> | <ul style="list-style-type: none"> • Replace electrical switchgear (Laboratory overhead) • Remove and replace one of last two 1950s-vintage wooden cooling towers on site (IGPP) by 2010 | |

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| Business Line | Facilities and Infrastructure | Summary Condition Evaluation | Planned Investments | |
|------------------------------------|--|---|---|--|
| | | | Laboratory | DOE |
| Energy Technology | <ul style="list-style-type: none"> • 3500 • 5800 • NTRC | Existing facilities and infrastructure adequately support this business line, but strong link to materials development makes replacement of Building 4500N/S material development laboratories critical for success. | <ul style="list-style-type: none"> • General maintenance and small capital projects (e.g., 7601 air handler upgrades) are sustaining functionality of DOE-owned facilities (Laboratory overheads, IGPP) • Lease arrangement being considered for future high bay facility | |
| Arms Control and Non-proliferation | <ul style="list-style-type: none"> • 5300 • 5700 | Adequately supported by facilities and infrastructure | | |
| Laboratory Operations | | <p>With few exceptions, Chestnut Ridge (SNS, CNMS) and East campuses fully support housed business lines, providing world-class technical facilities and a vibrant campus setting. West campus to be modernized in next 5 years; routine maintenance and renewal will ensure site technical facilities can adequately serve DOE missions and nation for next 50 years.</p> <p>As composition of site and occupants changes, modifications to utility infrastructure and replacement of support service buildings beyond normal design life cycle are needed to support new/upgraded technical facilities. Emergency response services (fire, protective forces) no longer centrally located to site population; response times not always adequate. Fabrication and maintenance services, storage facilities need to be closer to customers. Utility plants and distribution systems need to be sized/reconfigured to match future needs. Workplace amenities now common in R&D industry need to be sited conveniently.</p> | <ul style="list-style-type: none"> • See Biological and Environmental Sciences business line for West Campus modernization • Multiple projects to address end of useful life issues for building and utility system components (IGPP) • Proposed ESPC: Increase use of renewable energy sources and improve energy efficiency by modifying centralized steam system, replacing lighting, upgrading HVAC system, and installing biomass cogeneration plant • Proposed ESPC and several small projects (IGPP) will reduce water use through installation of closed loop systems and reduced-water bathroom fixtures • As locations become available, multiple projects will expand on-site parking (IGPP) • Signage, traffic calming devices, and general road upgrades will promote safety and improve general look of site (IGPP) | <ul style="list-style-type: none"> • FY 2009 IFDP (DOE-EM Site Cleanup) line item dispositions legacy facilities and materials from Central Campus to complete final site remediation • FY 2011 SLI Site Utility Modernization line item replaces utility system components at the end of their design life, adds redundancy to some systems, reconfigures distribution systems, and right-sizes systems for future need; replaces central waste treatment plant • FY 2014 Melton Valley Research Operations Support Facility SLI line item consolidates nuclear operations, relieves overcrowding in maintenance and fabrication shops • FY 2014 Site Operations Facility SLI line item replaces and relocates facilities housing fire department, protective forces, other first responders • FY 2017 7000 Area Maintenance/Fabrication Facility SLI line item replaces facilities that do not support safe, efficient operations. Where possible services will be consolidated to reduce overall facility footprint • FY 2017 Waste Handling Facilities SLI line item reconfigures building systems to accommodate future waste streams |

| Business Line | Facilities and Infrastructure | Summary Condition Evaluation | Planned Investments | |
|---------------|-------------------------------|---|---------------------|-----|
| | | | Laboratory | DOE |
| | | ORNL site will not be fully ready to meet future business line needs without final cleanup of legacy Central Campus facilities and materials. | | |

Strategic Site Investments

Neutron Sciences

Two projects funded by the Office of Basic Energy Sciences (BES) are proposed to maintain ORNL leadership in neutron science. The SNS Power Upgrade Project (PUP) will increase the beam power capability of the world-leading neutron beam facility, while the second target station doubles the number of SNS beam lines, enabling a much broader scientific program. The Joint Institute for Neutron Sciences (JINS) was founded by ORNL and the University of Tennessee to serve as intellectual center for the neutron sciences and as a gateway for users of ORNL’s neutron beam facilities; construction of the 31,000 sf facility, funded by the state of Tennessee, will start in the first quarter of FY 2009. With SNS and HFIR, the neutron sciences community has access to state-of-the-art pulsed and steady-state neutron sources. JINS will enhance and support research using both of these facilities. JINS will also foster joint faculty positions between ORNL and its university partners and will assist multi-institutional research teams using neutron scattering and other uses of neutron beams to develop new applications. Starting in FY 2008, on-site housing and cafeteria facilities, as well as expanded parking capacity, will be constructed as landlord and IGPP projects to accommodate the estimated FY 2012 population of 1500 unique users. Multiyear BES maintenance and General Plant Project (GPP) programs will sustain and configure SNS and its support buildings to meet user needs.

Computational Science and Engineering

New HPC opportunities include petascale systems (in the 10- to 250-petaflops range over the next 3 to 4 years), leading to an exascale system in the next decade. ORNL expects to install an exascale computer system in 2018. To accommodate this growth, the Laboratory is proposing a Multiprogram Computational Data Center (MCDC) to support classified and unclassified computational science and engineering capability. The facility has 230,000 sf of computer space, 30,000 gross sf of office space, and 20 MW of electrical and cooling capacity. In FY 2010, 50,000 sf of space will be finished and ready to occupy. The remaining space will be built out in parallel to the installation of computing hardware. CD-0 was approved in March 2008. The business case is being developed to seek private financing and employ commercial construction practices. The MCDC will hold the needed hardware, but to accommodate the next 5 years of estimated staff growth (50 persons annually) other facilities will be needed and a variety of options are being considered.

Advanced Materials and Interfacial Processes

Materials science research is housed in some of ORNL’s oldest buildings, including its largest chemistry and materials development complex, Buildings 4500N and 4500S. Several ongoing IGPPs are expanding fire detection systems and installing chemical storage units to accommodate chemical loading and compensate for inadequate fire barriers until the FY 2008 SLI Modernization of Laboratory Facilities line item is complete. The project constructs 140,000 sf of modern laboratories to replace laboratories that by their condition, configuration, and functionality limit ORNL’s ability to perform certain research work, to operate safely and efficiently, and to attract and retain top scientists. Once laboratories in Buildings 4500N and 4500S are vacated in FY 2013, a series of IGPPs will downgrade their use to office and service support space.

Central Campus materials science buildings are being vacated ahead of final site cleanup, which is scheduled to begin as soon as FY 2010. The relocation of research activities is being accommodated by renovating existing East Campus facilities; this includes the expansion of the Advanced Materials Characterization Laboratory to house ORNL's most advanced microscopes. These renovations are being addressed through overhead resources.

Biological and Environmental Sciences

The modernization of the West Campus started in FY 2007 to enable the consolidation and collocation of Biological and Environmental Sciences core capabilities. The State of Tennessee-funded Joint Institute for Biological Sciences, completed at the end of FY 2007, provides new research laboratories. Two existing DOE-owned research facilities, Buildings 1504 and 1505, are undergoing reconfiguration to combine several sets of small 1970s-style laboratories into large, open laboratories to enhance research collaboration. Additional maintenance and repair investments are being made in the newer West Campus office and laboratory buildings. Two new buildings are planned during the next 5 years: a field equipment storage and sample preparation facility, which will also store facility maintenance materials, and a greenhouse. Additional parking, pedestrian walkways, and landscaping are being added to address safety and quality of work life issues. Within the next 5 years, this campus should have the look and feel of the completely revitalized ORNL East Campus.

Nuclear Science

Routine building maintenance and the planned replacement of an old wooden cooling tower will provide functional office and laboratory facilities for this business line.

Energy Technology

The Energy Technology business line is housed in the National Transportation Research Center (an off-site leased facility jointly shared with the University of Tennessee), the on-site leased Engineering Technology Facility, and other on-site DOE-owned facilities. Both leased buildings were constructed within the last 7 years and fully support the business line. Routine maintenance and renewal has kept the DOE-owned facilities in a condition that also fully supports ongoing research. Energy Technology will also benefit from the replacement of materials development laboratories in Buildings 4500N and 4500S.

Arms Control and Nonproliferation

Program growth indicates a possible building expansion for NN.

Laboratory Operations

Within the next five years, ORNL's second-priority SLI project, the FY 2011 Site Utility Modernization project, accomplishes basic, but critical, modernization of various ORNL utility systems. Parts of the DOE-owned infrastructure are beyond their design life and experiencing an increasing number of failures. The project includes upgrading major components of the water, chilled water, and septic utility systems. ORNL's SLI Modernization Initiative projects were identified using the DOE-SC Chief Operations Officers SLI Modernization Initiative screening and selection criteria. No changes in priorities have occurred since the original SLI program baseline was established in April 2007.

A portion of the annual \$14M IGPP budget will be directed at strategic site investments. Planned IGPP/Institutional General Purpose Equipment (IGPE) projects will expand user amenities on the Chestnut Ridge Campus, complete revitalization of the West and Melton Valley campuses, and enable remediation of Central Campus by providing replacement facilities. The remainder will address unplanned facility and infrastructure safety, compliance and operational issues.

ORNL has also worked with Johnson Controls to develop an ESPC project as part of the DOE TEAM Initiative. ORNL has the opportunity to reduce annual greenhouse emissions by 730,282 tons of greenhouse gases (CO₂), 1,567 tons of nitrogen oxides (NO_x), and 3,778 tons of sulfur dioxide (SO₂). This is a 17% reduction in greenhouse gas emissions, which is equivalent to planting over 32 million trees or

taking more than 2.1 million passenger cars off of the road. An annual energy savings of 432,059 million Btu and water use reduction of over 15 million gallons per year is expected. The guaranteed savings on utility costs would be redirected to cover the ESPC costs. As planned, the ESPC also provides an alternate means for laboratory modernization; specifically, it upgrades the steam plant distribution system and the heating, ventilation, and air conditioning (HVAC) systems of several key research facilities. ORNL has gained DOE approval to move forward with detailed energy surveys and development of a final proposal. Final DOE approval will be sought in August 2008, with construction of the project to be completed in May 2010.

Maintenance

At a site level, maintenance investments in facility and infrastructure will be held at industry recommended levels (2–4%). In all cases, assets will be maintained to assure worker safety and protection of the environment. Proactive maintenance (e.g., preventative maintenance) will be done in buildings that have a high confidence of long-term programmatic continuity. For buildings with the potential of shifting programmatic needs, only reactive maintenance (e.g., repair) will be completed until building modifications reconfigure the building for a longer term need. Maintenance will be minimized where possible in buildings approaching or at the end of their programmatic and functional life. This strategy results in deferred maintenance addressed primarily through building closures and capital upgrades.

Excess without a determined funding path

As previously mentioned, DOE's Oak Ridge Office has identified a need to implement an IFDP at ORNL and the Y-12 National Security Complex to decontaminate and decommission excess and unwanted facilities, disposition legacy materials/waste, and complete the site's environmental cleanup of soil, groundwater, and surface water. The excess facilities and legacy materials/waste work scope is to be transferred from the Office of Science, NNSA, and the Office of Nuclear Energy to DOE-EM. For DOE-EM, this scope is new and not yet incorporated in the DOE-EM multiyear program. The preliminary cost range is \$4B to \$8B (unescalated FY 2007 dollars) with a project duration of 15 to 20 years. Completion of this project will allow full modernization of ORNL, including rightsizing and upgrading the industrial waste systems serving ORNL as well as addressing radiochemistry and materials examination technical facilities required for the cleanup effort and future research. More than 188 excess facilities would be removed. The project received CD-0 in 2007; the acquisition strategy is being submitted during 2008 for CD-1 consideration. In support of the proposed cleanup, ORNL's excess facility disposition program readies facilities for IFDP inclusion or for final DOE Office of Science disposition. This includes completion of excess facility surveillance and maintenance required to ensure worker safety and environmental compliance.

Trends and Metrics

ORNL's FY 2007 performance rating for providing for efficient and effective design, fabrication, construction and operation of research facilities and sustaining excellence in operating, maintaining, and renewing the facility and infrastructure portfolio to meet Laboratory needs was "A-". ORNL has planned and delivered leading-edge research and user facilities. In FY 2007, SNS produced a total of 3,500 hours of neutron production time and world-record beam power. HFIR operated with satisfactory reliability, completing its three scheduled runs. The baseline review of CNMS showed an effective user program. Planning for LCF upgrades was successful, with ORNL playing an important role in working with the vendor and in interagency efforts toward High Productivity Computing Systems. During FY 2007, construction of the Joint Institute for Biological Sciences, funded by the state of Tennessee, was completed in time to support bioenergy program development. Electrical and chilled water upgrades were initiated to ensure that utility system reliability and capacity could keep pace with the expansion of computational and computing capability. CD-0 was obtained for a 140,000 sf replacement building that will renew much of ORNL's chemical and material sciences laboratory space.

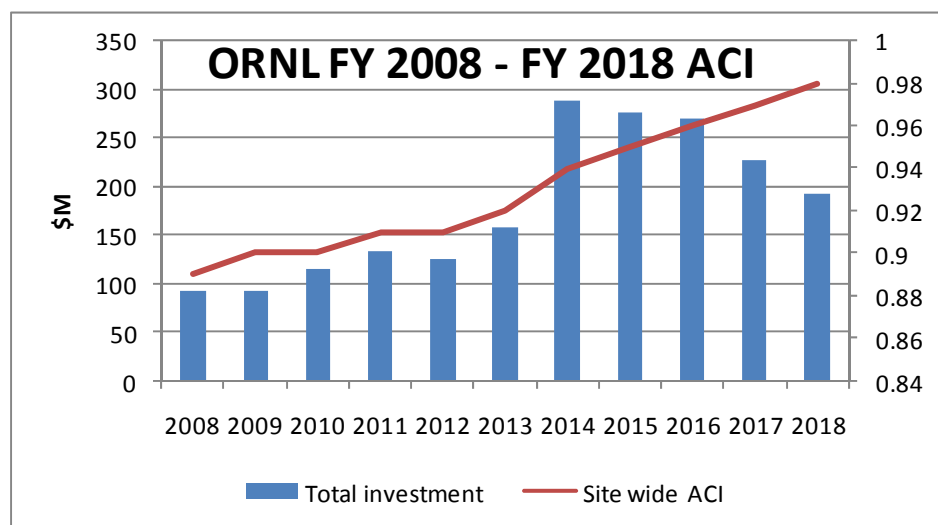
ORNL has a successful modernization strategy that consolidates staff on site; vacates aged, expensive-to-maintain buildings; and constructs new or revitalized strategic facilities. Since FY 2000, 1.9 million sf of space has been vacated and 1.0 million sf of new space constructed; the average age of buildings has decreased by 10 years. Over half the site population now works in facilities that were constructed or renovated within the last 7 years. Over 15% of ORNL’s square footage is LEED certified. ORNL’s ten-year facility and infrastructure plan continues the established strategy and achieves the DOE corporate Asset Condition Index (ACI) goal by FY 2018. It assumes that the operating budget continues to support annual maintenance investments at 2–4% of RPV and a \$14M IGPP program targeting infrastructure modernization. Processes and plans are in place to ensure that required facility and infrastructure capabilities are there for future research.

ORNL Facilities and Infrastructure Investments (\$M): Impact to Asset Condition Index

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|--|---------|---------|---------|--------|---------|---------|---------|---------|---------|---------|---------|
| Maintenance | 55.5 | 55.6 | 56.5 | 57.7 | 58.9 | 60.1 | 61.5 | 62.9 | 64.3 | 65.8 | 67.3 |
| DMR | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Excess Facility Disposition (overhead) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| IGPP | 14.2 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| GPP* | 8.3 | 4.0 | 4.0 | 4.2 | 4.3 | 4.5 | 4.7 | 4.9 | 5.1 | 5.3 | 5.5 |
| Line Items | 9.3 | 14.1 | 35.0 | 51.1 | 43.3 | 73.9 | 204.1 | 191.4 | 185.0 | 141.0 | 107.3 |
| Total Investment | 93.8 | 94.2 | 116.0 | 133.5 | 127.0 | 159.0 | 289.4 | 276.9 | 270.7 | 226.9 | 193.4 |
| Estimated RPV | 1,748.9 | 1,789.1 | 1,835.2 | 1884.4 | 1,927.7 | 1,977.0 | 2,119.6 | 2,168.4 | 2,320.1 | 2,442.7 | 2,498.9 |
| Estimated DM | 184.8 | 183.0 | 180.5 | 178.0 | 174.4 | 164.6 | 124.9 | 112.9 | 82.5 | 72.0 | 51.8 |
| Site-Wide ACI | 0.89 | 0.90 | 0.90 | 0.91 | 0.91 | 0.92 | 0.94 | 0.95 | 0.96 | 0.97 | 0.98 |

*FY 2009–FY2018 programmatic GPP only

ACI



Sustainability

Over the next 6 years, research programs are expected to increase electrical consumption by an estimated 200%. It has been proposed that DOE energy goals be met through a national laboratory portfolio approach that combines achievements of individual sites. As shown in the following table, by 2010 ORNL plans to achieve a 43.6% reduction in its energy intensity, primarily through the proposed ESPC. This ESPC will enable ORNL to obtain 3.7% of its power from renewable energy in FY 2010 and reduce water intensity by 15.4%. Planned Laboratory overhead funded projects will allow ORNL to individually meet the overall TEAM water intensity reduction goal within the same time frame. ORNL's shortfall for the renewable energy goal can be filled through other national laboratory achievements or the purchase of renewable energy credits (RECs). If RECs are required, a DOE consolidated procurement for all sites will be the most cost-effective approach.

DOE Order 430.2B Goals

| Requirement / Goal | Funding Source | Cost | Baseline Year | Milestone Year | Cumulative Progress |
|--|------------------------------------|---------|---------------|----------------|---------------------|
| Energy Intensity Reduction in Goal Subject Buildings FY03 - FY15: 30% | <i>Current Status >>></i> | | FY 2003 | FY 2007 | 11.3% |
| | <i>Planned Projects:</i> | | | | |
| | ESPC | \$28.3M | | FY 2010 | 41.6% |
| | Site | \$3M | | FY 2010 | 42.6% |
| | Site | \$3M | | FY 2012 | 43.6% |
| Renewable Energy Percentage of All Power FY07-09: 3% FY10-12: 5% FY13: 7.5% | <i>Current Status >>></i> | | n/a | FY 2007 | 0.4% |
| | <i>Planned Projects:</i> | | | | |
| | ESPC | \$40M | | FY 2010 | 3.7% |
| | Site | \$250K | | FY 2010 | 3.8% |
| | HQ procures RECs * | \$24K | | FY 2010 | 5.0% |
| | Site | \$250K | | FY 2012 | 3.4% |
| | HQ procures RECs * | \$144K | | FY 2013 | 7.5% |
| Water Intensity Reduction in Goal Subject Buildings FY07 - FY15: 16% | <i>Current Status >>></i> | | FY 2007 | FY 2007 | n/a |
| | <i>Planned Projects:</i> | | | | |
| | ESPC / Site | \$780K | | FY 2010 | 18.0% |
| | | | | | |

* ORNL will not be able to fully meet the renewable energy goals without the purchase of Renewable Energy Certificates (RECs) or the transfer of renewable energy credits from another site(s). Solar and wind projects are not economically viable in the ORNL area. It would appear that the most efficient, cost-effective method for DOE to obtain RECs would be for DOE-HQ to make a bulk procurement of RECs at the lowest possible price for all DOE sites that need them. A portion of the renewable energy progress shown above reflects such a purchase.