

National Renewable Energy Laboratory Business and Operating Results FY 2002



Vision: *Defining the aspirations for NREL forms the foundation of its five-year strategic plan...*

The NREL Vision

NREL will be the world's preeminent institution for advancing innovative renewable energy and energy efficiency technologies from concept to adoption. By partnering with our stakeholders, we will support a sustainable energy future for the nation and the world. In achieving this next level of excellence, NREL will set the standard for others.

Mission: *The alignment of NREL's mission with those of DOE and EERE is solid...*

U.S. Department of Energy

The Department of Energy mission is to promote clean, abundant, affordable, and reliable energy; reduce the global danger from nuclear, chemical, and biological weapons while maintaining the U.S. nuclear stockpile; and advance energy-related sciences for the betterment of mankind.

Office of Energy Efficiency and Renewable Energy

The EERE mission is to strengthen America's energy security, environmental quality, and economic vitality in public-private partnerships that enhance energy efficiency and productivity; bring clean, reliable, and affordable energy technologies to the marketplace; and make a difference in the everyday lives of Americans by enhancing their energy choices and their quality of life.

National Renewable Energy Laboratory

NREL's mission is to develop renewable energy and energy efficiency technologies and practices, advance related science and engineering, and transfer knowledge and innovations to address the nation's energy and environmental goals.

Foreword

The National Renewable Energy Laboratory (NREL) plays a key role in advancing the U.S. Department of Energy's (DOE) mission. Work at NREL focuses on discovery, development, and systems integration in such technology areas as hydrogen and fuels cells, distributed energy, and renewable electricity and fuels, which will improve our nation's energy security, electricity reliability, local and global environment, and efficiencies of energy production and use.

NREL's work has been consistently recognized by external entities, including the industry's top publications and technical journals such as R&D Magazine, Science, Journal of the American Chemical Society, Journal of Applied Physics, Popular Science, Architecture, and Technology Review, as well as several prestigious institutions such as the Federal Laboratory Consortium for Excellence in Technology Transfer and the American Solar Energy Society. The complete list of awards that NREL and its researchers have won can be viewed by visiting: <http://www.nrel.gov/awards/>. Such recognition highlights the positive contribution the Lab has made to the development of clean and efficient energy technologies.

To support this success and enable NREL to execute its mission with distinction, the Lab continued to focus on providing support products and services in an effective and efficient manner – maximizing R&D output per dollar invested at NREL. This report profiles NREL as one of DOE's national laboratories, emphasizing the management, delivery, and continuous improvement of business and operational support products and services.



A set of bio-reactors used for photobiological hydrogen production by the green alga, *Chlamydomonas Reinhardtii*.

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Biodiesel can be made from any fat or oil. Current U.S. biodiesel production is primarily from oil from soybeans, such as these pictured, or from recycled restaurant cooking oil. Cleaner burning and renewable biodiesel is most often blended at 20% with petroleum diesel.



NREL FY02 Budget Authorization

NREL advances energy efficiency and renewable energy technologies from concept to commercial application in support of DOE's evolving mission. NREL's work spans from basic science, through technology development and validation, to ultimately transferring knowledge and innovations to others.

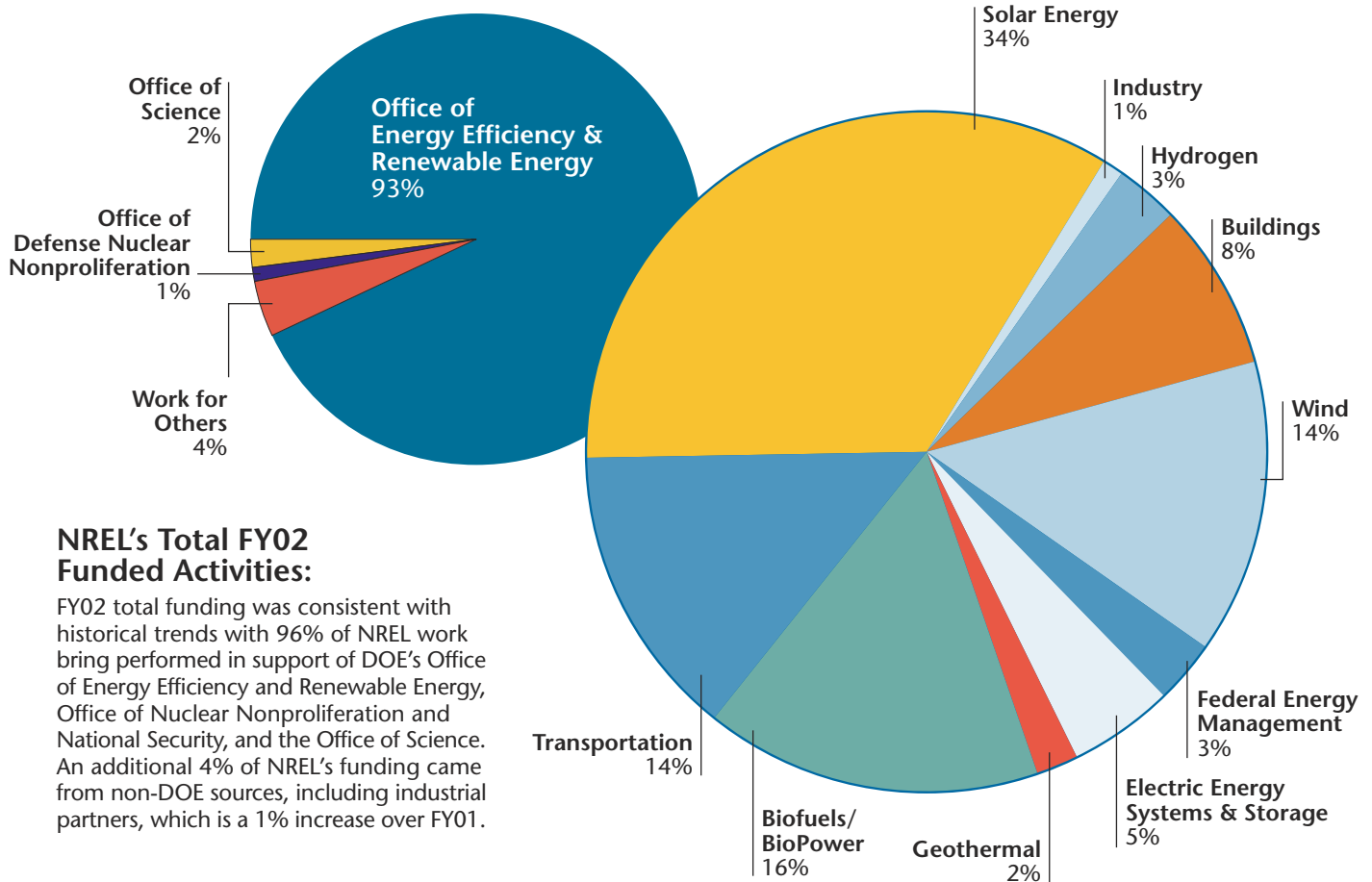
NREL's mission and activities are intimately linked with that of the Department of Energy's Office of Energy Efficiency & Renewable Energy (EERE). EERE has stewardship for NREL and oversight of the majority of the Lab's program portfolio. In FY02, 93% of NREL's total funding was from EERE.

In addition to working with EERE, NREL conducts basic research in support of the Office of Science in key areas that underpin the Laboratory's mission. NREL also supports the Initiative for Proliferation Prevention Program managed by the DOE Office of Defense Nuclear Nonproliferation.

Through this program, NREL performs collaborative research with scientists from the former Soviet Union to develop and commercialize clean energy technologies, thereby channeling these capabilities to peaceful alternatives.

With the proviso that the work the Lab performs be consistent with its mission, NREL does work with, and for, a wide range of parties outside DOE, including industry, universities, state and local governments, other federal agencies, and both domestic and international nongovernment organizations.

In March 2002, Assistant Secretary David Garman announced a new organizational structure for EERE, which was implemented in July. This restructuring also realigned the core R&D programs managed by EERE. The charts below reflect the congressional budget structure that existed during FY02, rather than the new organizational structure that has subsequently been implemented.



NREL's Total FY02 Funded Activities:

FY02 total funding was consistent with historical trends with 96% of NREL work being performed in support of DOE's Office of Energy Efficiency and Renewable Energy, Office of Nuclear Nonproliferation and National Security, and the Office of Science. An additional 4% of NREL's funding came from non-DOE sources, including industrial partners, which is a 1% increase over FY01.

NREL's FY02 Funding from EERE:

NREL's work spans a variety of technologies and a wide array of energy sources and types, which positively impact a broad range of energy issues.

Performance-Based Management

NREL's performance is measured in terms of progress toward achieving its six "critical outcomes" – long-term, strategic goals stated in terms of results that are of significant importance in achieving DOE's and NREL's vision and mission.

NREL's FY02 Critical Outcomes:

Science and Technology

Conduct research, development, field verification and testing, technical analysis, and technical assistance efforts that advance viable energy technology options from concept through application and span energy pathways from supply through conversion and delivery to end-use.

Leadership

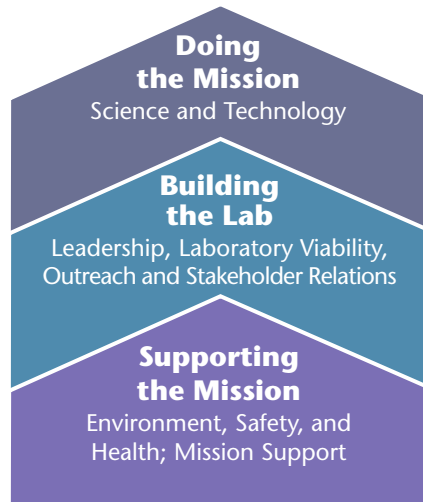
Provide leadership that creates opportunities to enhance NREL's role as a recognized national and international asset.

Laboratory Viability

Ensure the long-term viability of the Laboratory by building and enhancing NREL's core scientific competencies and facility capabilities.

Mission Support

Manage and enhance NREL business and management systems and work processes to provide an effective and efficient work environment that enables the execution of NREL's mission.



Environment, Safety, and Health

Protect the safety and health of the NREL workforce, the community, and the environment.

Outreach and Stakeholder Relations

Provide leadership in building strong and productive relationships and alliances with stakeholders; advance awareness and support of the DOE renewable energy and energy efficiency missions; and advance math, science, and technology education.

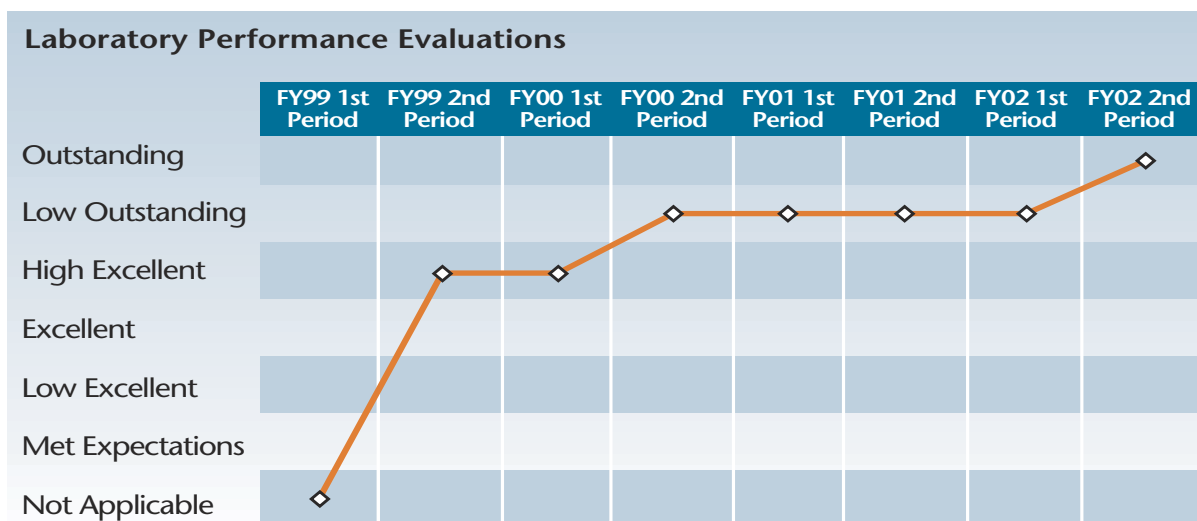
NREL's critical outcomes reflect the highest-level expectations DOE has of NREL, and can be grouped into the following categories:

- Doing the Mission (excellence in science and technology)
- Building the Lab (defining and creating the future)
- Supporting the Mission (effective and efficient delivery of support products and services)

NREL's leadership uses this framework to balance priorities and associated investments and create an environment that promotes success in each area.

Laboratory Performance Evaluations

Effective Laboratory management creates a work environment in which NREL staff can excel while contributing to each of the Lab's critical outcomes. Through a systematic focus on continuous improvement, the Lab is able to achieve higher levels of success across each of its critical outcomes, and as a result, received an overall evaluation of "Outstanding" at the end of FY02 – the highest rating possible.



Laboratory-Level Management Outcomes

NREL actively monitors its performance using key indicators at the Lab level. The following charts demonstrate the outcomes of effective management, emphasizing results and improvements.

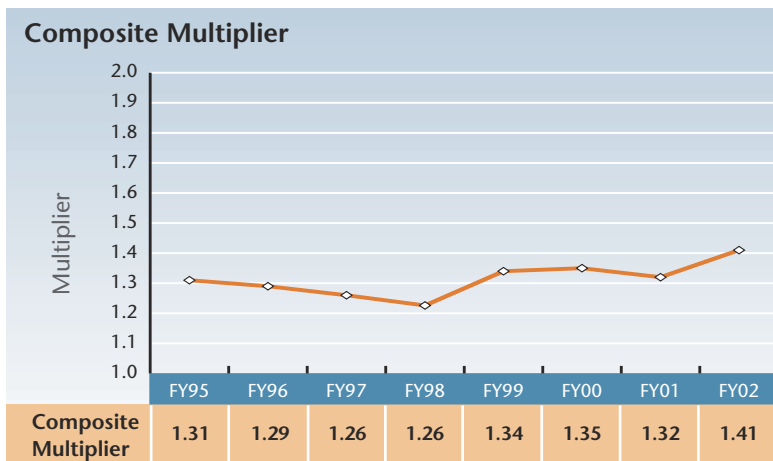
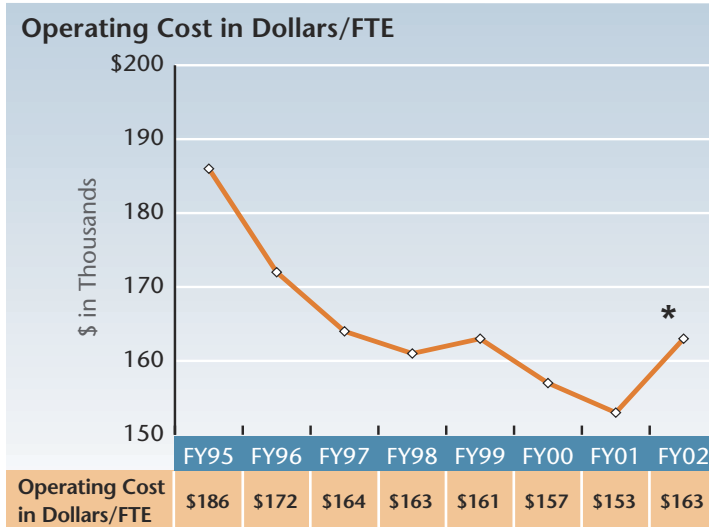
Measures of Efficiency

Operating costs per research FTE:

Operating cost per research Full-Time Equivalent (FTE) is a measure of cost effectiveness and overall operating efficiency. NREL's operating costs per research FTE have been reduced 11.9% in real terms since FY95.

Operating costs include labor, facilities overhead, recharge costs, and other indirect costs.

** The increase in FY02 is a result of strategic investments made to build NREL's computational science capabilities, enhance the Lab's electronic processing capabilities, and enhance the Lab's security following the September 11, 2001, terrorist attacks*



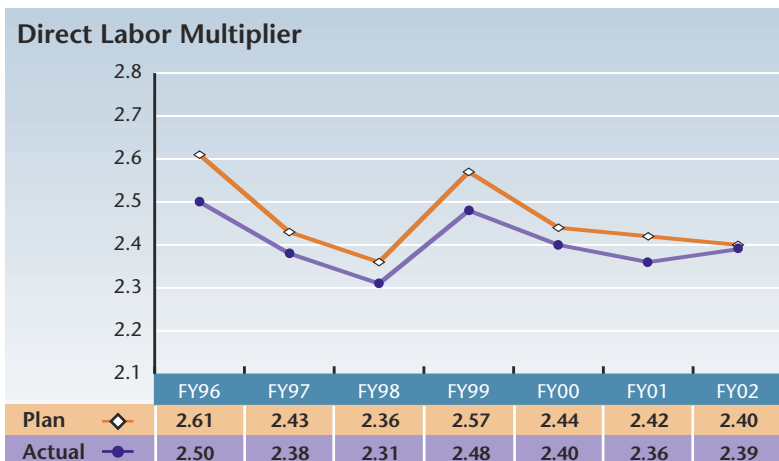
Composite multiplier:

NREL monitors the overall ratio of total support costs to Lab in-house and subcontracted efforts. Careful management of this ratio between direct and indirect costs allows NREL to be a low-cost provider within the DOE laboratory system. Late receipt of funding in FY02 lowered subcontract costs, resulting in an increase to the composite multiplier.

Direct labor multiplier:

NREL achieved a labor multiplier of 2.39 in FY02.

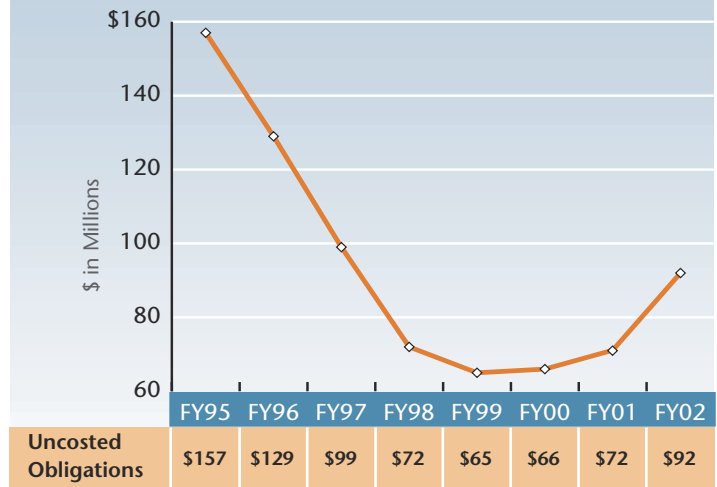
Proactive management and timely response to changing requirements and priorities enabled the Lab to beat its goal of 2.40. NREL also provided support for material acquisitions at a lower cost than planned, with an actual rate of 5.3% compared to the planned 6.2% rate.



Uncosted obligations (GSO):

NREL has reduced its Goods and Services on Order (GSO) balance since FY95 – both in real terms and as a percent of the total funds available to spend. Delayed receipt of funding in FY02 required the Laboratory to delay placing subcontracts, which resulted in a higher ending GSO. However, much of this GSO has been committed to subcontract work to be completed in FY03.

Uncosted Obligations (GSO)

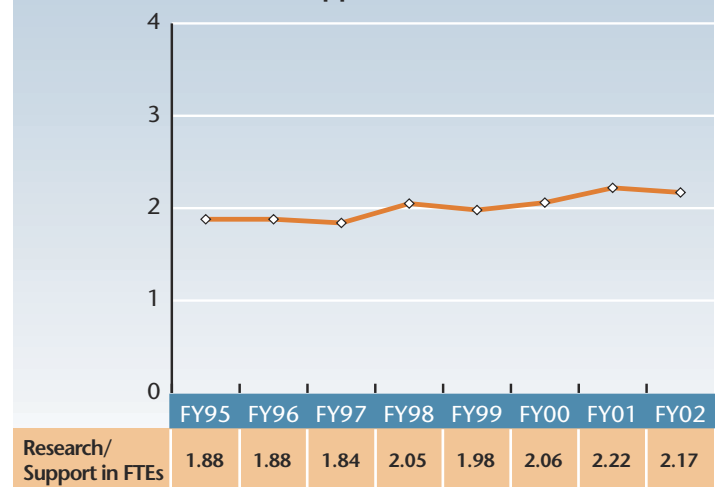


Measures of Productivity

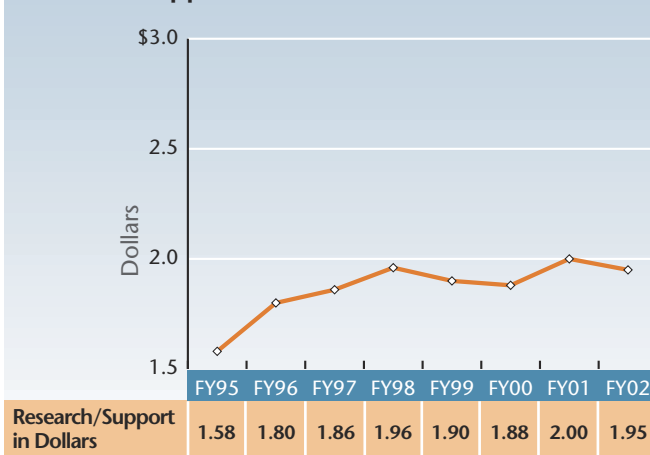
Ratio of research to support FTEs:

The ratio of research (direct) to support (indirect) FTEs has increased more than 15% since FY95. This indicates that more NREL staff are working directly on the science and technology needs of the Laboratory's clients, relative to those providing the support products and services required to conduct NREL's mission work.

Ratio to Research to Support FTEs



Research/Support Ratio in Dollars



Ratio of research to support activities measured in dollars:

Nearly two of every three dollars invested at NREL are spent directly on producing research, development, field verification and testing, technical analysis, and technical assistance outcomes and results. Transitions resulting from contract recompetition, and new operating requirements have been effectively managed to improve this outcome consistently during the past several years. There has been a 24% improvement in the research support ratio since FY95. Changes reflect NREL's strategic investments in capability building.

Technology Transfer and Intellectual Property Stewardship

The Technology Transfer team at NREL works with industry to transform NREL expertise and technology into commercially available products. In addition, the Technology Transfer team provides expertise in business, marketing, engineering, program management, and research and development to those interested in renewable energy through the Lab's Enterprise Development Program.

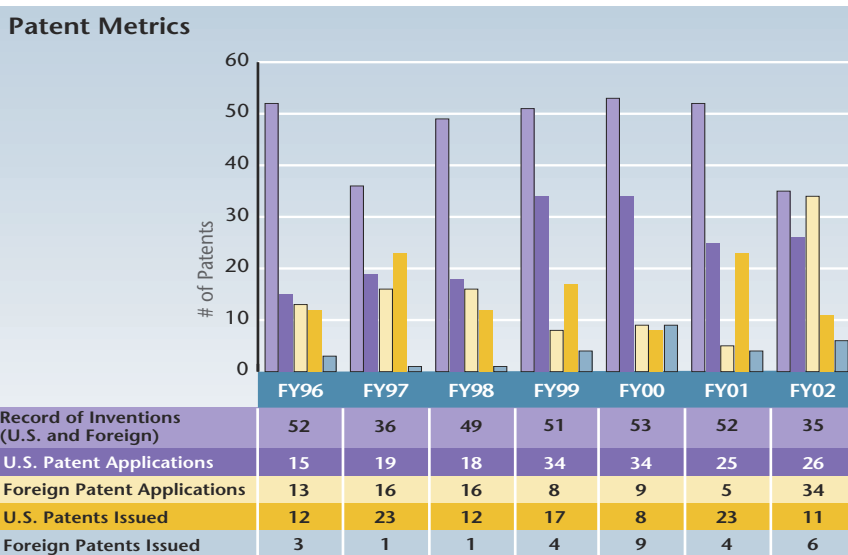
- License agreements were completed with five companies for the commercial development and sale of NREL technologies, and joint commercialization agreements were completed with three universities holding joint ownership in NREL inventions.
- NREL reviewed its entire license portfolio and closed out several non-productive licenses, allowing the Lab to offer these technologies to other interested industry partners. This action also resulted in a reduction in administrative time and costs.
- The National Alliance of Clean Energy Business Incubators, which NREL helped establish, continues to grow rapidly, maintaining its early success. Providing business and financial services to clean

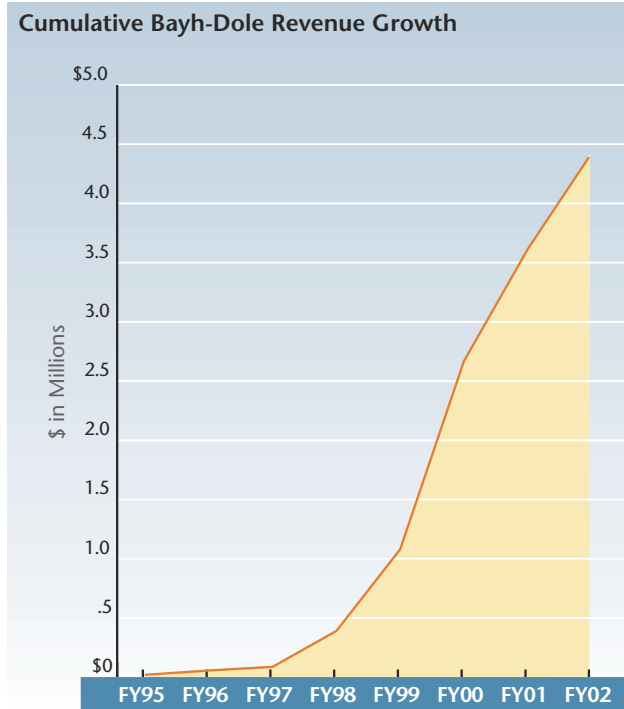
energy entrepreneurs, the Alliance is now fully independent from NREL and counts 35 member companies. NREL remains actively involved in the Alliance by coordinating communications and "deal flow" among the Alliance, investor partners, and clean energy companies.

- NREL completed the Clean Energy Company Directory, which works in concert with the existing Investor Directory. These directories are available on the Internet and help facilitate deal flow to the incubators and the Lab's investor partners.
- The 15th Industry Growth Forum, which provides needed resources and support to private-sector companies focused on energy efficiency and/or renewable energy technologies and markets, was held and attended by approximately 300 people and offered presentations from more than 60 investors and 46 companies. As a result, 31 investors are engaged in financing discussions with participating companies.
- NREL helped DOE's National Nuclear Security Agency select Armenia as the fourth country member of the Initiative for Proliferation Prevention (IPP) Program. The IPP Program, funded through DOE, is a cooperative program designed to provide meaningful, sustainable, non-weapons-related work for former Soviet weapons of mass destruction scientists, engineers, and technicians.

A seven-year comparison of annual patent applications, patents issued, and records of inventions:

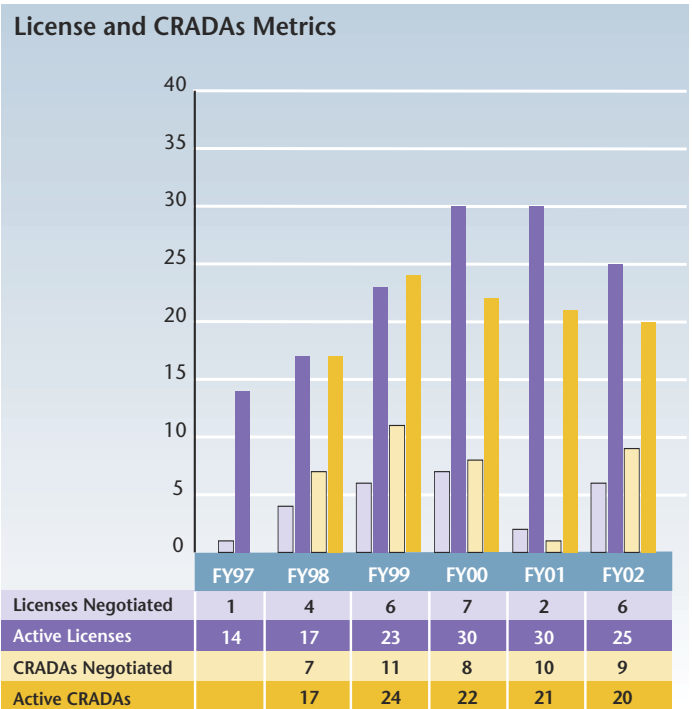
NREL continues to leverage its intellectual property through patents, patent applications, and records of inventions to meet Laboratory and DOE goals and objectives.





An eight-year review of cumulative Bayh-Dole revenue from successful commercialization of NREL intellectual property:

From modest beginnings in FY95, significant growth of Bayh-Dole revenue continues to provide an important source of funds for strategic investment at NREL.



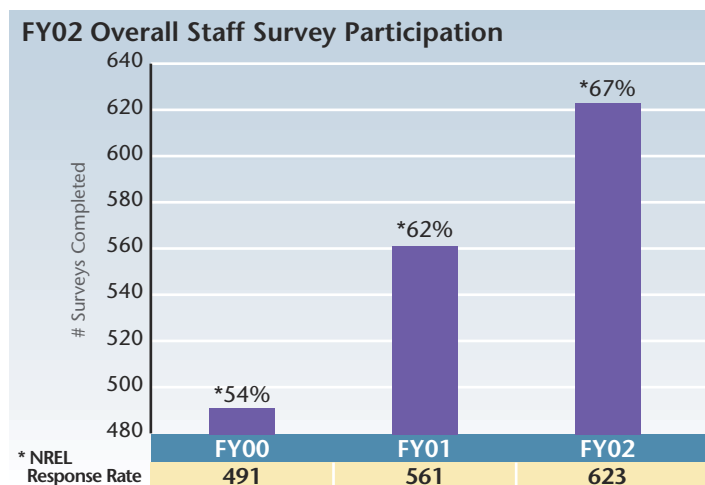
A six-year comparison of new licenses negotiated, total active licenses, and partnerships formed through Cooperative Research and Development Agreements (CRADAs):

Between FY97 and FY02, technology partnerships have resulted in the movement of technology and know-how from the Lab to the commercial sector.

Laboratory-Level Investments in Improvement

Measuring the Work Environment

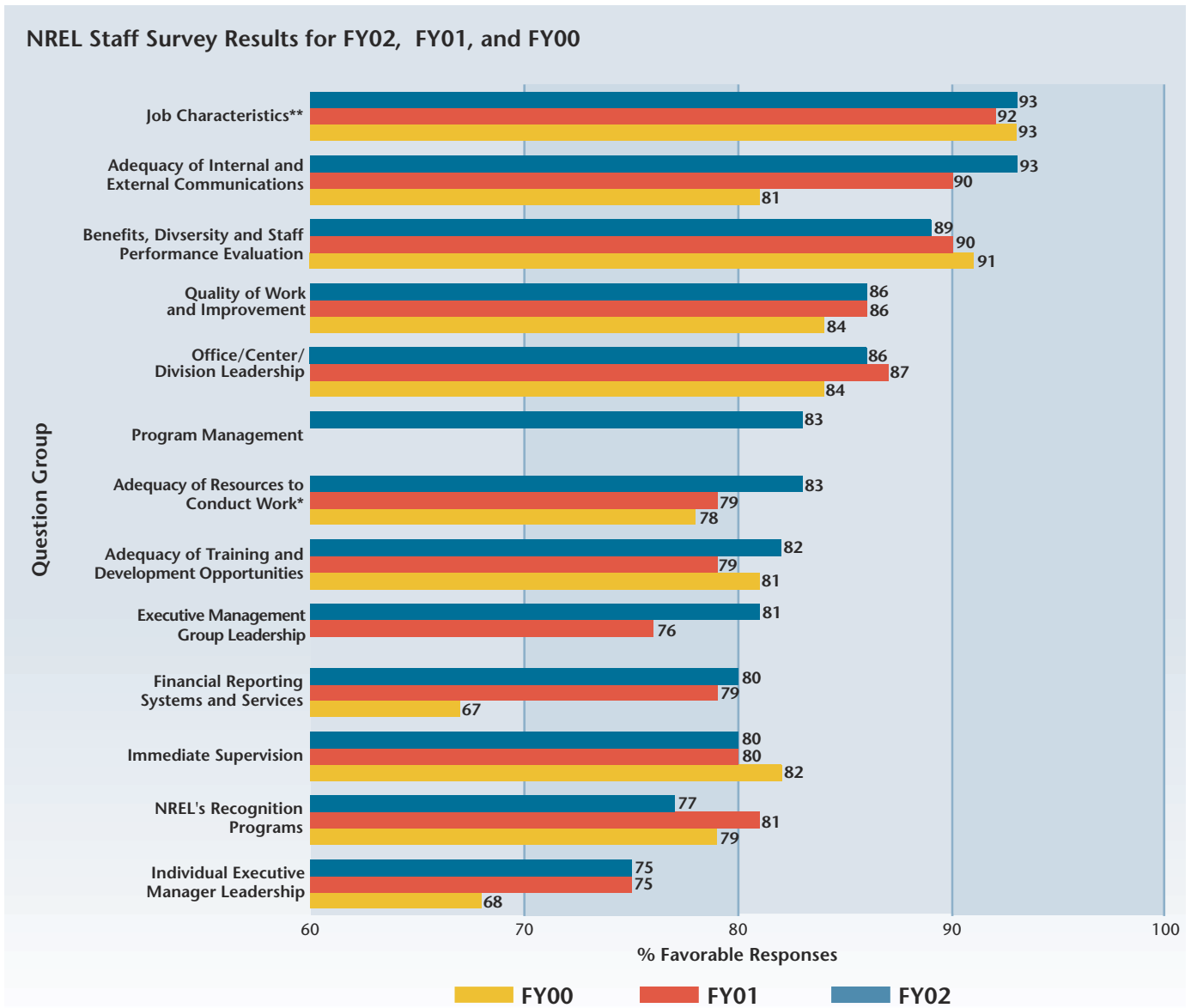
NREL is committed to continuous improvement and uses a number of approaches to measure overall perceptions of performance and progress. One of these is a comprehensive survey that solicits input and feedback from staff on various aspects of NREL's work environment and performance. Initiated in FY00, the [NREL Staff Survey](#) has become an important management tool and an integral part of NREL's overall commitment to ongoing improvement. The steady increase in staff response rates to the survey signifies growing staff confidence in the integrity and usefulness of the survey as a means of expressing their views about their work environment, and for getting ideas considered and acted upon.



FY02 Staff Survey Results

Staff expressed their perceptions in 13 areas (question groups) as noted in the chart below. Most of the question groups have been used in each of the staff surveys; question groups with incomplete data for the three surveys are those that have been added since FY00. Improvements, as measured by staff perceptions, can be observed in nearly all question groups. In particular, perceptions show marked improvements in executive management group leadership, adequacy of resources, and internal & external

communications. The general high percentage of favorable responses across all question groups represents a very favorable result for a survey of this kind within an organization as diverse as NREL. In addition to general trends, survey results lead to specific, Lab-level actions. Focused attention and regular, systematic feedback has helped NREL continue to improve. In addition to Lab-level actions, local actions taken within the research centers and support offices contributed to the outcomes reported in the FY02 survey.



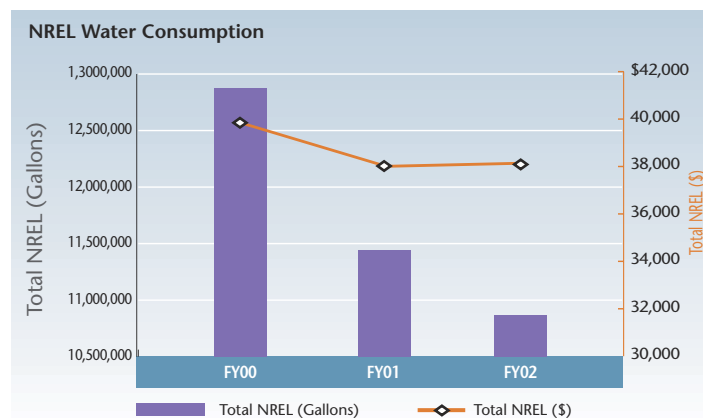
* e.g., facilities, equipment and materials, appropriately trained and skilled people, etc.

** e.g., defined roles, responsibilities, and authorities; sense of accomplishment; interesting and challenging: affects others in some important way; etc.

Sustainable NREL

NREL continued its emphasis on improving the sustainability (maximizing efficient use of all resources, minimizing waste and pollution, and serving as a positive force in economic, environmental, and community responsibility) of its operations and making related investment decisions through the Sustainable NREL initiative.

- The [Sustainable NREL Master Plan](#) was completed. While focused on operational sustainability, the plan is balanced with the pursuit of economic viability, environmental stewardship, and public responsibility. It includes Lab-wide performance objectives, supporting goals, specific implementation strategies, and an overall management plan.
- As early as FY01, NREL exceeded the DOE 2005 and 2010 goals of [reducing energy use](#) by 20% and 25% respectively (using 1990 as baseline). NREL achieved further reductions in FY02.
- The Lab completed [site metering](#) of its DOE-owned facilities, which will provide building-by-building energy-use data. This data will facilitate energy management activities and peak load reductions, as well as facilitate a building occupant energy use reduction program.
- NREL has been recognized as the first federal facility member of the [EPA Climate Leaders partnership](#). NREL established a green-house-gas baseline for the year 1990 and a 10% target reduction goal for FY05.
- Ten percent of NREL's annual electrical usage is supplied by "[green](#)" power. In addition, NREL generates about 50,000 kWh of electricity from grid-connected PV panels per year. Several new projects were implemented in FY02, including the installation of 720 W of PV at the South Table Mountain Site Entrance Building and a grid-tied micro turbine at the National Wind Technology Center.



A four-year comparison of NREL's water consumption:

NREL's water consumption in FY02 was 16% lower than in the FY00 base year.

- NREL installed [water-use reduction measures](#) at 100% of its facilities, including low-flow toilets, faucets, and showerheads, as well as waterless urinals. NREL is on track to exceed federal goals for water consumption at federal facilities.
- Twenty vehicles of NREL's 48-vehicle fleet (leased) are [alternative fuel vehicles](#). For the remaining vehicles, total petroleum-based fuel use in FY02 was less than 500 gallons.
- A formal [Sustainability Policy](#) was developed and implemented at NREL. The new Sustainability Policy has linkages to 12 related policies and 13 Lab-level procedures.
- NREL's Thermal Test Facility won a [DOE FEMP FY02 Federal Energy Saver Showcase Award](#), one of 19 federal facilities honored for demonstrating energy efficiency, water conservation, and renewable energy.

Electronic Processing Initiative

The ultimate goal of the electronic processing initiative is to increase the effectiveness and efficiency of NREL business processes through the reduction of non-value-added work and elimination of redundant process steps by transitioning from manual to automated processes. This multi-year effort initially focuses on identifying process improvement opportunities and then subsequently implementing process and technology solutions to address these opportunities. FY02 efforts were focused on researching technical options and

challenges, benchmarking and upgrading software, and documenting signature and other authorities necessary to enable electronic approval and processing. Process automation candidates were validated and approved by the Electronic Processing Steering Committee and executive management. They are: purchase requisitions, purchase cards, property transactions, travel and expense transactions, and timesheets. A "proof of concept" project was implemented that provides automated notifications to purchase requestors upon the entry of the purchase request into the Oracle system.

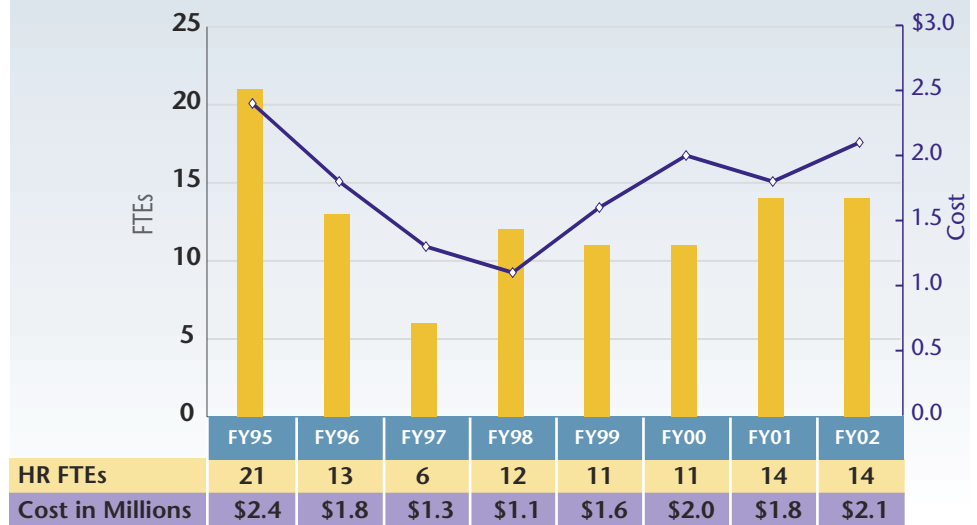
Snapshots of NREL's Performance

Human Resources Services Management

Significant Contributions

- Integration of HR processes has resulted in more effective management of human resources issues. Performance appraisals, compensation increases, and employee relations that were conducted as separate processes in the past are now integrated. Performance issues are identified earlier so that they can be proactively worked to successful conclusion.
- A new electronic compensation tool for managers was implemented to facilitate compensation planning and provide immediate access to employee information and reports.
- An orientation presentation and reference notebook were redesigned and implemented to improve new NREL staff's first impressions of the Laboratory and enable them to become productive in less time.

Human Resources FTEs and Cost

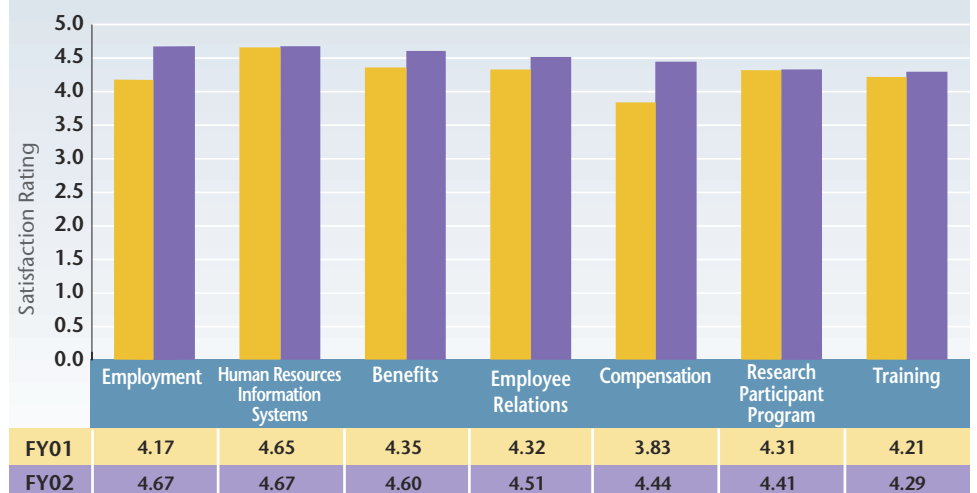


Measures of Success

A two-year comparison of responses from Human Resources survey:

Responses from the second annual Human Resources electronic "customer survey" measure key HR areas such as accuracy, timeliness, customer service, and quality of information. FY02 responses show improvements in all areas over FY01 levels (response range is 0–5 with 5 being the best possible rating).

Survey Measures Effectiveness of HR Functions

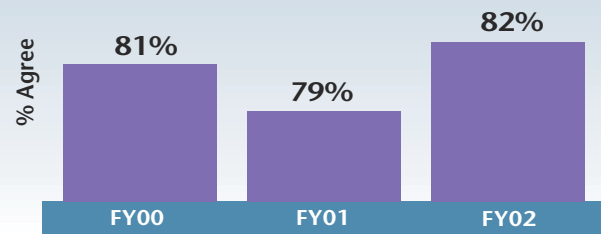


Human Resources Services Management

A three-year comparison of NREL's training and development:

FY02 NREL Staff Survey results indicate that the training programs delivered in FY02 resulted in a 3% improvement in staff's overall satisfaction with the Lab's training and development programs.

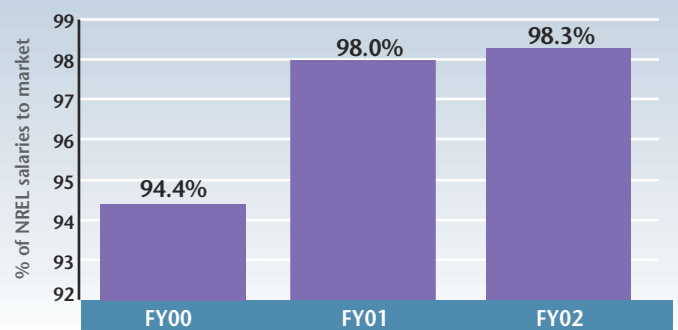
Increased Staff Satisfaction with NREL's Training and Development Programs



A three-year comparison of NREL salaries:

To attract and retain the high-quality, technical and support personnel required to execute its mission, it is critical that NREL salaries be at, or near, market as a key element of total compensation. NREL continued to improve in market comparability, a key component of a stable and effective workforce.

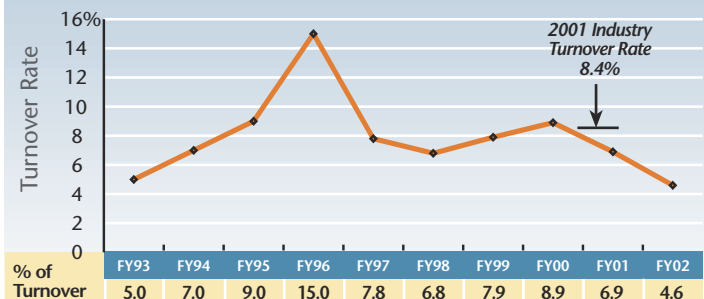
Average NREL Salaries Compared to Market



A ten-year comparison of NREL turnover rates for regular employees:

NREL's turnover rate is significantly below the industry average. NREL's continuing efforts to improve the work environment for staff, the Lab's compelling mission, and the challenges and growth opportunities presented all contribute to staff retention.

NREL Turnover Rates for Regular Employees



A three-year comparison of NREL's key staffing metrics:

FY02's cost to hire reduction was due in part to a general weakening in the economy, but was also a result of implementing an electronic resume database to streamline processing time, and improvements in managing airfare costs. While the number of placements remained relatively stable, the average days to placement decreased in FY02 due to the availability of local candidates, and streamlined processing between the recruiter and the hiring manager.

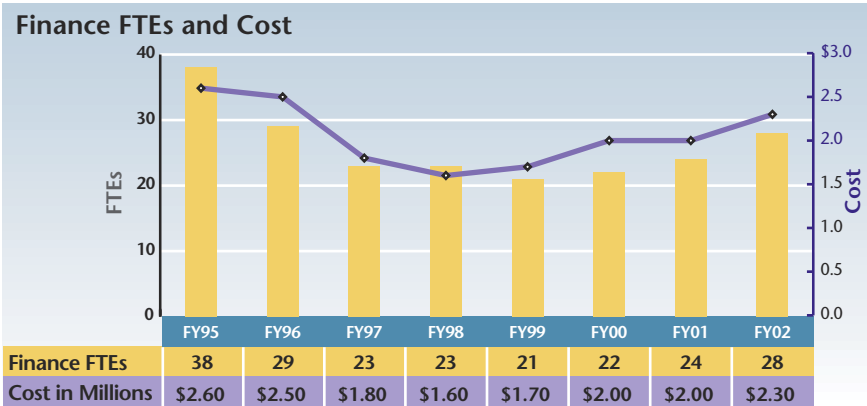
Key Staffing Metrics

	Number of Placements	Average Days to Placement	*Total Cost to Hire
FY00	181	59.6	\$6,161
FY01	122	65.5	\$8,720
FY02	124	57.1	\$3,157

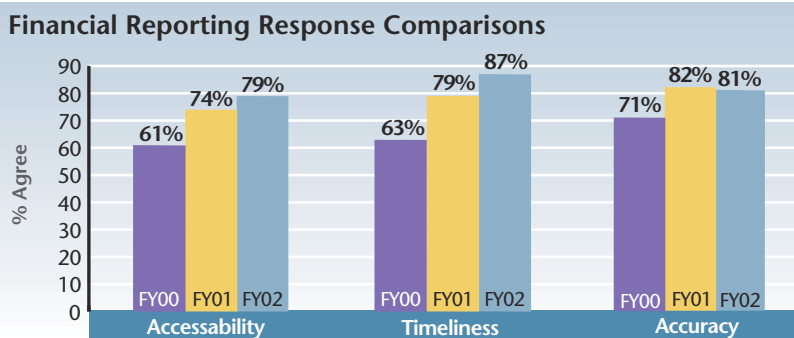
* Includes interview travel, advertising, relocation, and HR time.

Significant Contributions

- Continuing its positive trend, NREL increased the percentage of payments made electronically from an average of 34% in FY01 to 39% in FY02.
- NREL's document-processing function was made significantly more efficient by the elimination of manually keying more than 6,000 lines of information by electronically uploading vendor data.
- Secure electronic access to W-2 forms was provided to more than 1,000 employees through implementation of new Web-based technology.
- By implementing an electronic business-travel cash-advance system, NREL eliminated 95% of all petty cash transactions.
- NREL completed 78% more audits in FY02 than in FY01, which resulted in significant reduction in the inventory of unaudited subcontracts.
- NREL made \$225 million in payments in FY02, and achieved a 99.9% payment accuracy rate, thereby contributing to DOE's performance in the GAO-required Erroneous Payment Reporting.



- Through strong financial controls, NREL instituted forensic auditing of the Purchase Card (P-Card) program and increased the level of surveillance and scrutiny of P-Card transactions. Approximately 335 unused or underutilized P-Cards were identified and cancelled. Additionally, the Lab's P-Card training is being revised and enhanced.
- Significant improvements made in the timeliness and accuracy of financial reporting continued in FY02 as NREL met or exceeded all financial reporting deadlines with a high level of accuracy.



A three-year comparison of staff survey responses regarding financial reporting:

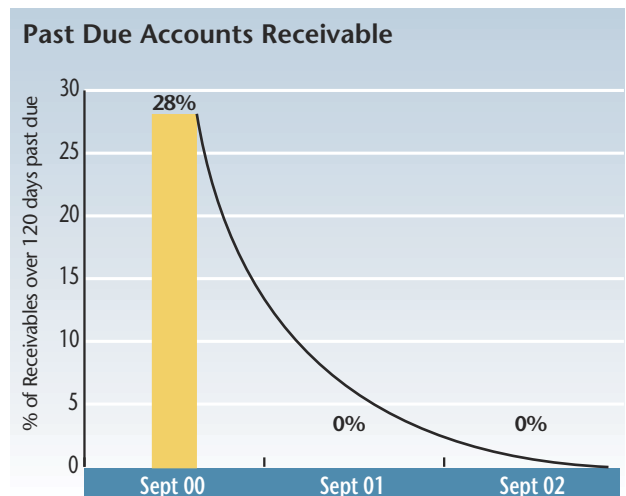
Customer feedback regarding accessibility and timeliness of data continue to improve while data accuracy remains high.

Measures of Success

- NREL's foreign travel approval and routing process was streamlined through an integrated approach that resulted in more effective international program efforts in support of the NREL research mission.
- NREL processed approximately \$6.9 million in P-Card transactions during FY02. The Lab maximized rebates through electronic receipt of invoices and direct electronic payments. This prompt payment process reduced the FY02 overhead by returning \$75 thousand in rebate earnings.

Increased attention to the accounts receivable process has greatly reduced the past due receivables:

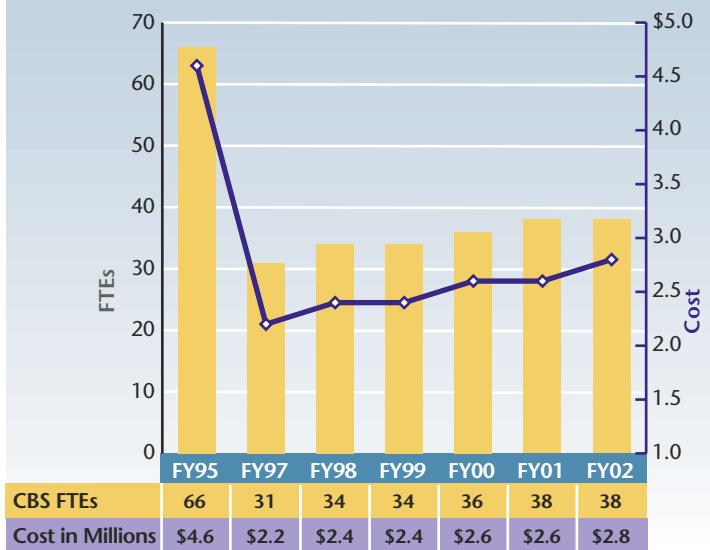
Since March 2002, there have been no past due receivables over 120 days due.



Significant Contributions

- Through extensive review of vendor's request for payment of pre-incurred costs on three separate subcontract actions, NREL recommended and successfully achieved an avoided cost to the Lab and DOE of \$1.6 million.
- Through NREL's increased use of the Pre-Planning Procurement Process, \$93 million was awarded through September 30, 2002, exceeding the \$83 million subcontract award goal established for FY02 by \$10 million.
- NREL again exceeded its goal of 70%, and awarded 73% of all subcontracts competitively.
- Proactively managing the Work-for-Others and CRADA functions has allowed the Lab to exceed its goals regarding Technology Partnership Agreements (TPAs), particularly with other federal agencies. The FY02 goal for new agreements was 33. Forty TPA agreements were awarded.
- A complete review of NREL's P-Card system was conducted in FY02 to ensure appropriate use of P-Cards, managerial responsiveness, and system integrity. The NREL P-Card Program has undergone significant changes in the past year to include a reduction in the number of cardholders, reduced limits on single purchases, a new policy and procedure, heightened management controls, and a new training plan – all of which will contribute to system integrity.

Contracts and Business Services FTEs and Cost



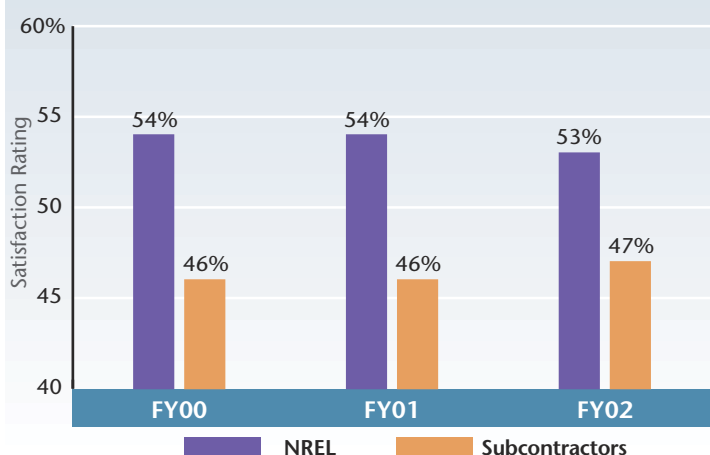
Measures of Success

- All of NREL's Balanced Score Card goals or targets were met or exceeded. These goals have been consistently met or exceeded over the last six years, reflecting continued emphasis on enhanced productivity through reengineering and streamlining processes.

Cost-shared subcontracts continue to provide increased leveraging of DOE R&D funding and comprise a significant component of the NREL subcontract portfolio:

Such cost-shared subcontracts also indicate that others recognize the value of NREL's R&D. In FY02 NREL awarded \$63 million in cost-share subcontracts. Of these awards, 53% were NREL cost-share dollars and 47% were contractor cost-share dollars.

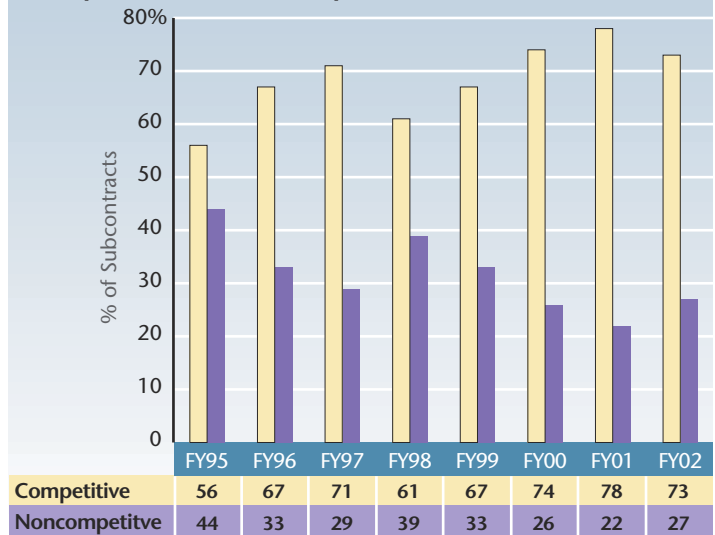
NREL Cost-Shared Subcontracts



An eight-year comparison of competitive vs. noncompetitive subcontract awards:

Competitive awards are based on “best value” (evaluated qualitative merit and evaluated cost or price); noncompetitive awards are actions negotiated with a single source. The FY02 percentage of 73% competitive is a very favorable metric for a Laboratory doing complex scientific and engineering tasks. FY02 dollar goals were 70% for competitive awards (dollar).

Competitive vs. Noncompetitive Subcontract Awards



Subcontract Performance and Results

	FY95	FY97	FY98	FY99	FY00	FY01	FY02
Subcontract Actions	1,100	1,132	1,399	1,470	1,940	1,865	1,752
Productivity (\$ value of Subcontracts/FTE utilized)	\$2.90M	\$3.90M	\$4.20M	\$3.80M	\$3.50M	\$4.00M	\$4.00M
Cost/Spend (Subcontracts & Purchase Orders)	2.9%	1.9%	1.8%	2.0%	2.5%	2.3%	2.5%
Socioeconomic Awards (Small business)	72%	80%	80%	66%	71%	70%	66%

An illustration of metric trends since FY95:

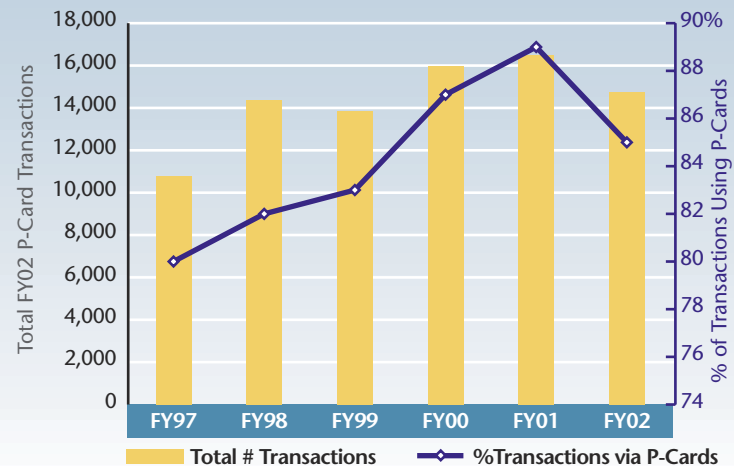
Illustrations of metric trends since FY95 demonstrate that even with the increased number of subcontract actions, the productivity has increased on average 38% and the NREL cost to spend ratio has decreased on average by approximately 25%. Additionally, socioeconomic awards to small,

small-disadvantaged, and women-owned businesses remain at a significantly high percentage (66%) of total subcontract awards. Efficiencies in procurement function operations were passed along to NREL customers and stakeholders in the form of lower procurement costs.

A review of the seven-year trend regarding use of P-Cards since their establishment in FY97:

These trends show a 37% increase in the number of P-Card transactions and a 47% increase in total dollars spent since FY97. Purchase cards continue to provide the means to acquire approximately 85% of NREL’s total number of purchases.

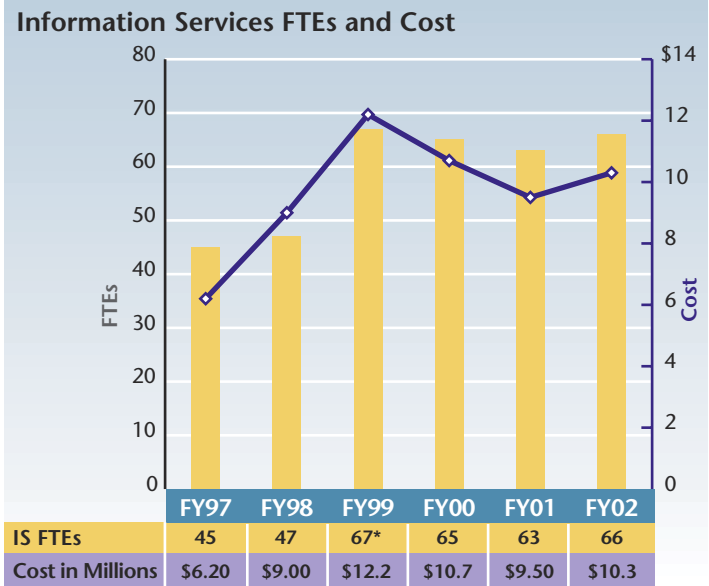
P-Card Performance Trends



Total FTE assigned to P-Card transactions remains constant at 0.5

Significant Contributions

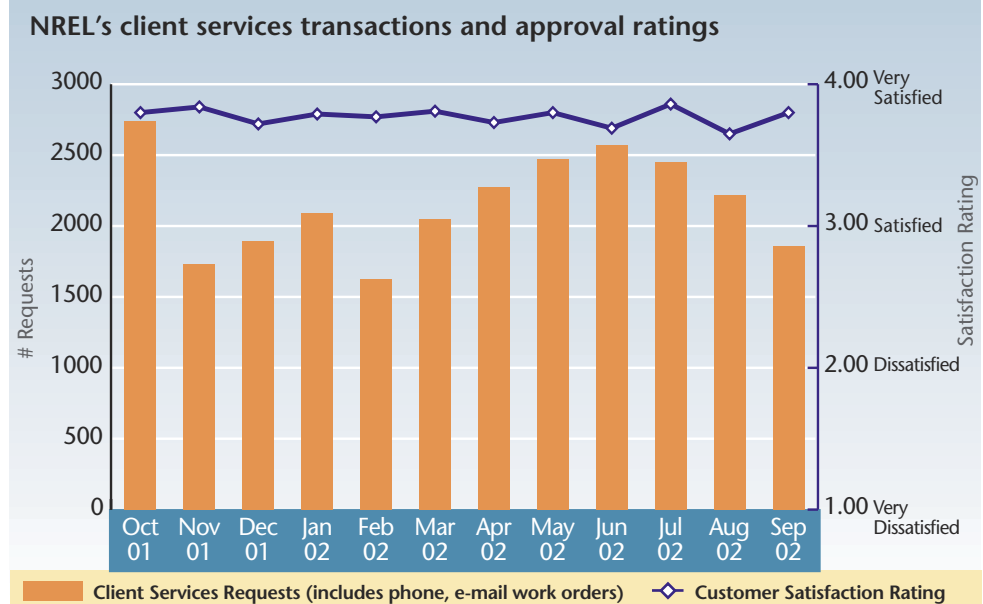
- IT infrastructure availability was managed to ensure network services were available more than 99.6% during business hours versus a target of 99.7%.
- NREL partnered with DOE to conduct a cyber security peer review with the National Energy Technology Laboratory (NETL). The NETL overall review of NREL was favorable and will provide input for future Laboratory improvements.
- A three-year Records Management Program Implementation Plan was developed for implementation in FY02 – FY04.
- NREL's ISI Web of Science service was expanded through the addition of a 20-year back file (1970 – 1990) resulting in significant expansion of research staff's desktop access to key scientific and technical literature.



*Library, Records, and Publications departments were all added to the Information Services Office in FY99

Monthly comparisons of NREL's FY02 client services requests and customer satisfaction ratings:

NREL's Client Services Help Desk processed more than 26,000 transactions, while maintaining a "Very Satisfied" approval rating.

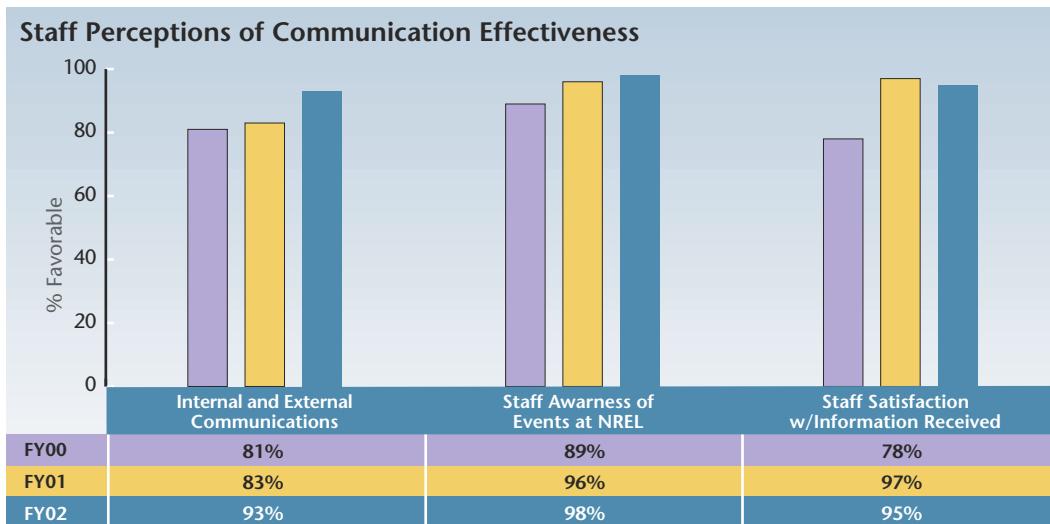


Measures of Success

- NREL received a Certificate of Achievement from DOE Secretary Spencer Abraham, “For successfully completing the transition from paper to electronic technical information reporting three years ahead of the DOE goal, using collaboration and best practices in a fully integrated E-government environment. This DOE-wide achievement ensures that information resulting from the Department’s R&D activities is readily accessible to all appropriate users and supports the advancement of scientific knowledge.”
- NREL achieved commendable results on the Cyber Security Audit by the Office of Headquarters

Security Operations (OHSO). Regarding NREL’s cyber security program, the report noted, “excellent cyber program...one of the better ones we’ve seen...it exceeded expectations.”

- The Business Systems Advisory Group (BSAG) was formed in FY02. It consists of directors from Human Resources, Site Operations, Contracts and Business Services, Laboratory Development, Information Services, Finance, Legal, Audit, Communications, and ES&S. The purpose of BSAG is to prioritize the requests for Integrated Business Systems services (business-related computer applications) to ensure the Lab utilizes its IT resources most efficiently and effectively.

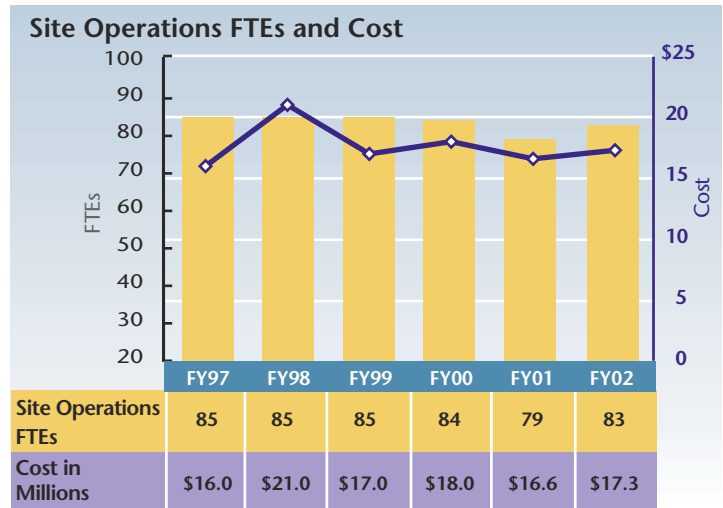


A three-year comparison of staff survey responses regarding communications:

93% of NREL staff responded favorably to internal and external communications overall (a 10% increase over FY01). Effectiveness of communications, as measured by staff awareness of events at NREL, continues to show improvements (98% of NREL staff responded positively to this measure). Staff satisfaction with the information they receive remains very high with a 95% rating in FY02.

Significant Contributions

- The 50% preliminary design review milestone was completed in September 2002 for NREL's proposed 71,000-square-foot Science and Technology Facility, earning at least a silver Leadership in Energy Environmental Design (LEED) rating.
- The 90% design review was completed in September 2002 for NREL's proposed 11,000-square-foot Systems Integration Test Laboratory.
- The charter of the former Architectural Review Board was revised to increase the external committee members' involvement in long-range capital improvement planning and site development. The board's name was changed to the Design Advisory Board to reflect more accurately the restructured charter.
- Leased facilities activities included the conversion of the Renewable Fuels and Lubricants Research Laboratory (ReFUEL), with capabilities needed to develop cleaner fuels for trucks and buses, and the implementation of a phased remediation and conversion of labs to offices in one building of NREL's office complex.
- A DOE Assessment of Load and Energy Reduction Techniques (ALERT) was conducted in six NREL facilities of significance. The audit provided input for areas of future improvement.



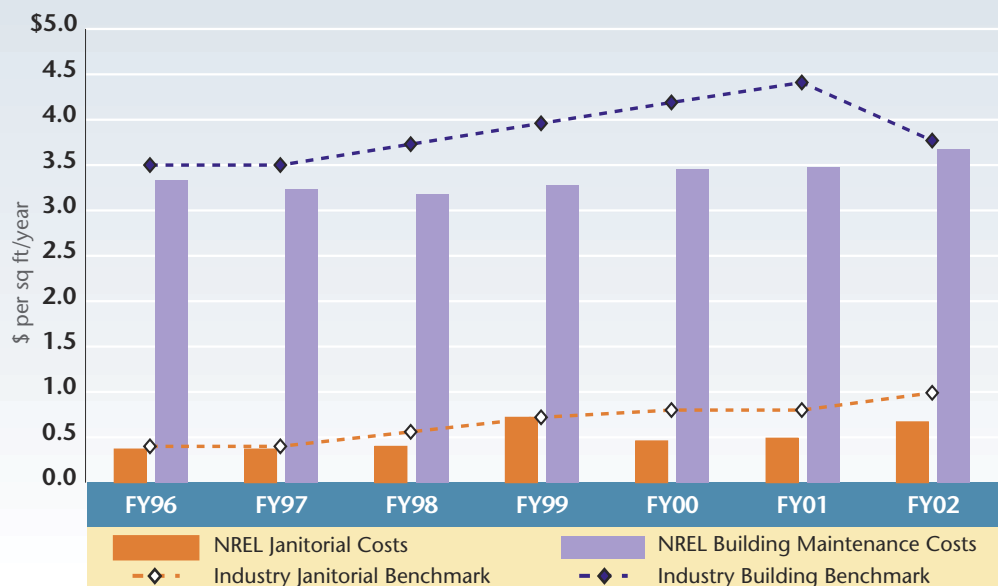
- Ten pieces of major equipment were identified and procured with General Purpose Equipment (GPE) funding. Similarly, 12 projects were selected for General Purpose Plant (GPP) funding from a long list of requests. A major GPP project was to significantly enhance NREL's security. The security enhancement GPP project consisted of six sub-projects to improve the physical security posture of NREL for the post September 11 environment.

Measures of Success

A comparison of NREL's seven-year costs for general facilities operations compared to the industry standard:

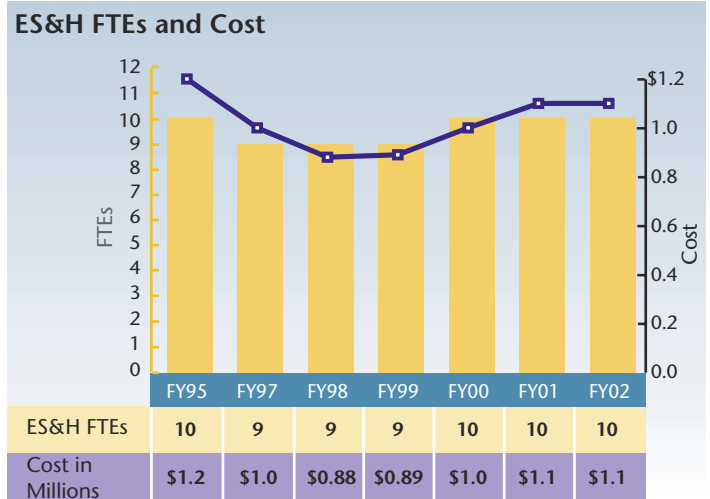
NREL consistently achieves results that meet, and frequently exceed, industry standards for facilities operations.

Facilities Management Benchmarks



Significant Contributions

- ES&H support staff and operating costs were maintained level with previous years, as illustrated to the right, while the volume and types of services provide were increased. These increases were particularly notable in provision of environmental and risk assesment services for new or planned Laboratory activities. This efficient utilization of resources was achieved through focused planning and scheduling of support services, and utilization of cross-organization teams of subject-matter experts.
- Site-level environmental management capabilities were enhanced through completion of the National Wind Technology Center Site-Wide Environmental Assessment (EA) with a Finding of No Significant Impact for planned site developments. The cross-organizational team approach to preparation of the EA resulted in a quality document at a reduced cost. The team approach was carried forward to the South Table Mountain Site-Wide EA initiated in FY02.
- Integration of ES&H with Laboratory management systems was validated through an assessment conducted by an independent consultant. The assessment focused on environmental management and sustainability facets of the Laboratory ES&H program and compared them with appropriate international criteria. The overall integration of ES&H with Lab management systems was determined to be very effective, and useful areas for improvement were identified and acted upon.
- On-site ES&H staff support was provided for the erection and tear down of the Solar Decathlon houses in Washington, D.C. This helped ensure a safe work site for a high-visibility public func-



- tion as well as adding safety concepts to the learning experience of the students participating in the Solar Decathlon.
- Emergency management procedures for the handling of suspect packages and materials were developed and implemented in response to the events of September 11, 2001. These procedures were coordinated with local law enforcement and emergency response agencies and allow the Laboratory to efficiently respond to the potential threats to its staff and facilities.
- Self-assessment processes were improved by increasing the emphasis on observing and critiquing the actual conduct of work activities, rather than relying solely on interviews with staff about how the work should be conducted. This improved approach was successfully applied to a formal assessment of the NREL Safe Work Permit Program.

Measures of Success

- Laboratory ES&H performance objectives were met or exceeded with a training completion rate of 96%, a Safe Operating Procedure maintenance rate of 100%, and 94% of all ergonomic injury cases being successfully managed.
- Environmental and property risks were successfully managed, as demonstrated by no losses being incurred, no notices of violation being received from state and local regulatory agencies, and no stop-work notices being issued.

Laboratory ES&H Performance	FY97	FY98	FY99	FY00	FY01	FY02
Training Completion Rate	50%	82%	88%	91%	95%	96%
Successful Ergonomic Case Rate*	N/A	N/A	69%	91%	93%	94%
Fire and Property Loss	\$0	\$0	\$0	\$0	\$0	\$0
Environmental Loss	\$0	\$100k**	\$0	\$0	\$0	\$0

* Percentage of ergonomic injuries resolved without lost workdays or invasive medical treatment.

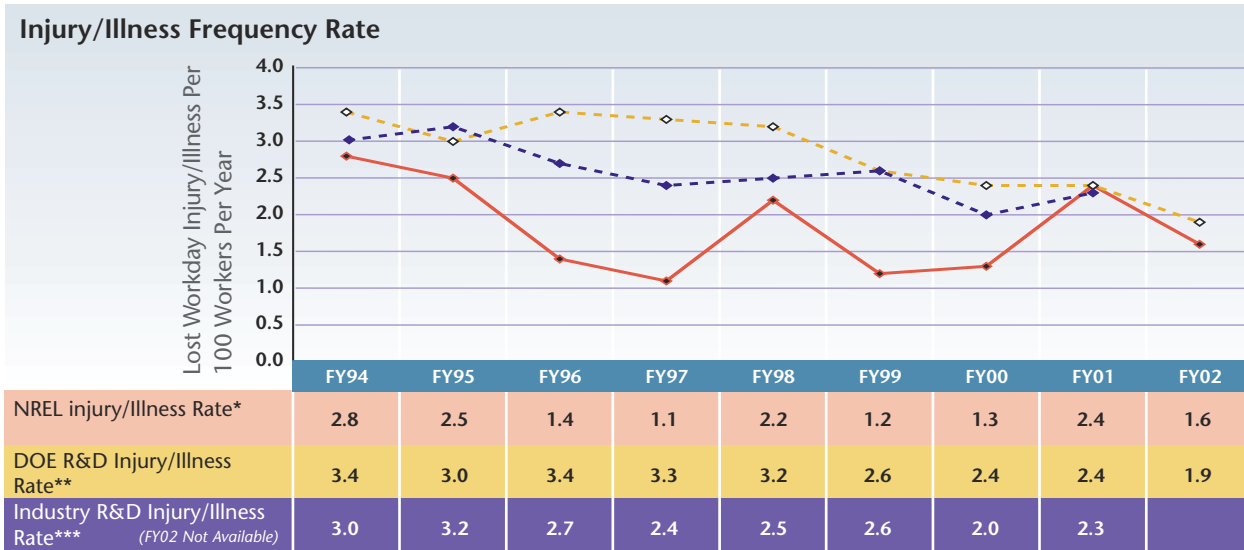
** FY98 cost is for remediation of an emergency generator diesel fuel spill conducted as a best-management practice. No remediation was required per state regulations.

Environment, Safety, and Health

• The severity of injuries and illnesses has been successfully managed through a long-term program of objectives and tools coordinated by the NREL Safety Council. This program was initiated in the early 1990s when it was determined that cumulative trauma disorders (CTDs, also known as ergonomic injuries) were not only the most frequent type of injury, but also the most severe in terms of potential for lost work time, medical costs, and pain and suffering. A proactive approach was initi-

ated and continually refined via the Safety Council that eliminated CTD hazards through formal training, evaluation, and equipment updating activities; and prompt reporting and aggressive management of CTD injuries when they did occur. This long-term, two-pronged approach to CTD management has successfully controlled both the frequency and the severity of injuries, improving the well being of NREL workers and reducing the operational and financial impacts to the Laboratory.

Injury/Illness Frequency Rate



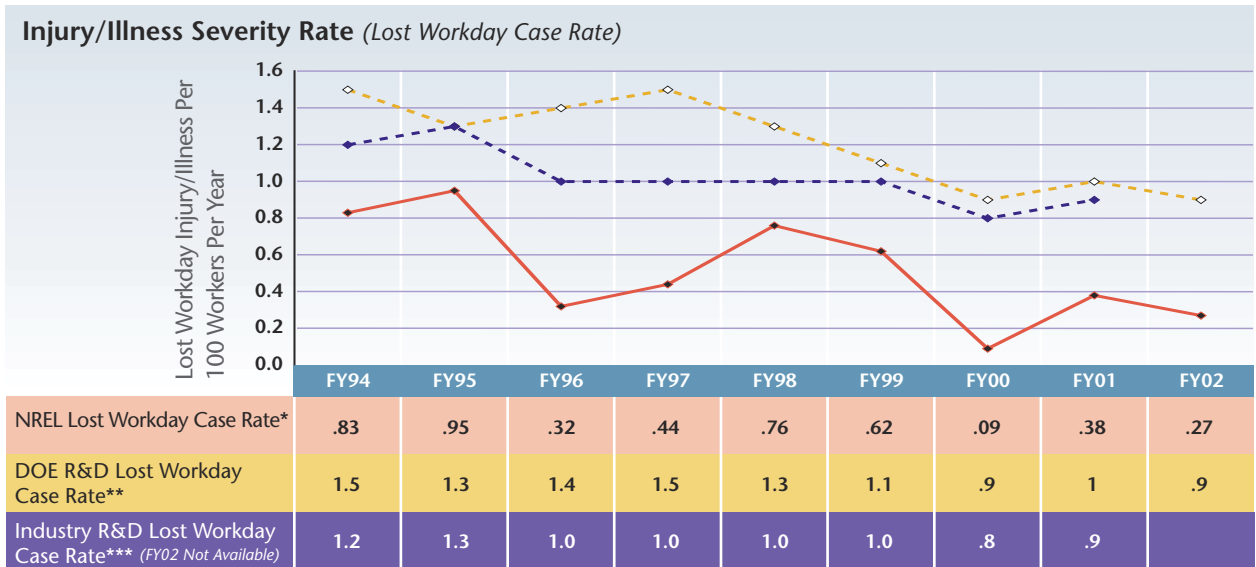
A nine-year comparison of NREL’s injury/illness frequency rate:

NREL emphasizes reporting all injuries regardless of how minor they appear in order to ensure they receive proper and timely medical management. While this “over reporting” approach can drive up the frequency rate of injuries and illnesses, NREL still continuously maintains an injury/illness frequency rate below that of the DOE and private industry R&D complex, as illustrated above.

* **Bureau of Labor Statistics (BLS) formula** – number of recordable injuries and illness per 100 workers per year. Includes all workers on NREL sites (employees, agency temporaries, subcontractors, and volunteers).

** **BLS formula** – average rate for all DOE R&D operations. Typically does not include all workers on site.

*** **BLS formula** – average rate for private industry R&D operations (SIC code 8730)



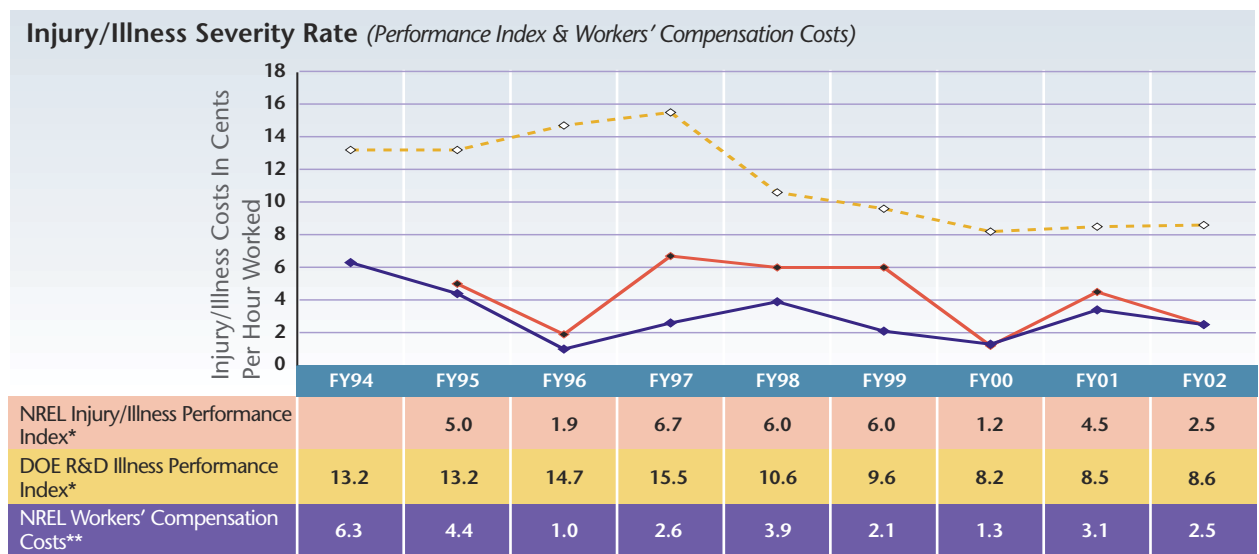
A nine-year comparison of NREL's lost workday rate:

The rate at which injuries result in lost workdays is an indicator of injury severity. As illustrated above, NREL not only maintains a lost workday case rate significantly lower than the DOE and private industry R&D complex, but has also driven this rate to ever lower levels over the past nine years.

* **BLS formula** – number of injuries and illnesses resulting in lost workdays per 100 workers per year. Includes all workers on NREL sites.

** **BLS formula** – average rate for all DOE R&D operations. Typically does not include all workers on site.

*** **BLS formula** – average rate for private industry R&D operations (SIC code 8730)



A nine-year comparison of NREL's Workers' Compensation cost rate:

Another indicator of injury severity is the cost incurred for medical services, lost time, etc. This cost can either be estimated via the DOE Performance Index (PI) formula, or directly calculated via actual Workers' Compensation expenses. The chart above illustrates that the NREL PI is well below the DOE R&D complex average, and that the actual Worker's Comp costs demonstrate the same continuous downward trend as the PI. (Note: Comparative Workers' Compensation cost data is not available for the DOE & R&D complex or private industry, although a cost of 25 cents per hour worked is generally considered to be a good performance in private industry.)

* **DOE formula** – approximate rating of severity of injuries and illnesses in cents per hour worked. No direct comparison to private industry.

** **Actual Workers' Compensation costs in cents per hour worked.** Comparison data not available for DOE and private industry performance of 25 cents or less is considered good.



NREL National Renewable Energy Laboratory
Laboratory Development Office
1617 Cole Boulevard, Golden, CO 80401-3393
www.nrel.gov

NREL/MP-33786
March 2003



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