



National Renewable Energy Laboratory Business and Operating Results FY 2001

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 that of DOE and EERE is solid

U.S. Department of Energy

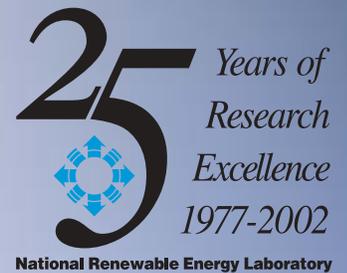
To foster a secure and reliable energy system that is environmentally and economically sustainable . . . and to support continued U.S. leadership in science and technology.

Office of Energy Efficiency and Renewable Energy

To strengthen America's energy security, environmental quality, and economic vitality through public-private partnerships that promote 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

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) is a leader contributing to the U.S. Department of Energy's (DOE) mission to advance the nation's energy security while addressing environmental requirements. Work conducted at NREL focuses on the identification and development of a wide array of energy sources and types, as well as on transforming the nation's approach to energy use, efficiency, and conservation. To enable NREL to execute its mission with distinction, support products and services must be provided to the Laboratory 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.



Table of Contents

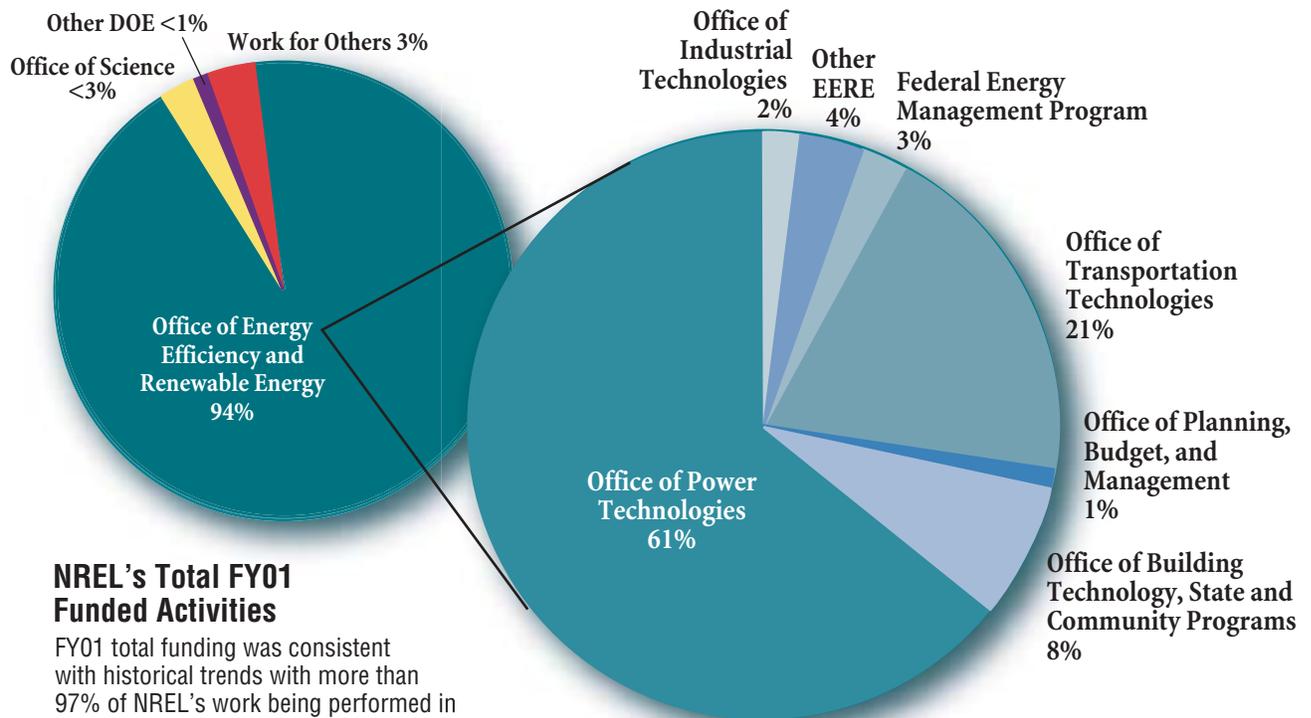
NREL Funding Profile	3
Performance-Based Management	4
Snapshots of NREL's Performance	
Laboratory-Level Management Outcomes	5
Laboratory-Level Improvement	7
Technology Transfer	8
Financial Systems Management	9
Contracts and Procurement	11
Site and Facilities Management	13
Environment, Safety, and Health	15
Human Resources Management	16
Information Services Management	17
Research Recognition	19

NREL Funding Profile

NREL performs research and development, and manages programs and projects primarily in support of the goals and objectives of two DOE organizations: the Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Science (SC). On March 18, 2002, EERE Assistant Secretary David Garman announced a new organizational structure. Future NREL performance reports will reflect this new organizational structure. However, during the period covered by this report (FY01), the EERE organizational structure was as follows: Office of Power Technologies (OPT), Office of Transportation Technologies (OTT), Office of Building Technology, State and Community Programs (BTS), Office of Industrial Technologies (OIT). NREL's work supported each of these EERE offices and the remainder of this report reflects the

organizational structure that was in place during FY01. NREL also manages programs and projects for EERE's Federal Energy Management Program (FEMP) and EERE's Office of Planning, Budget, and Management (OPBM), as shown in the figure below. For the Office of Science, NREL primarily supports the Office of Basic Energy Sciences (BES) by performing research in the materials, chemical, and biological sciences that pertain to the exploitation of solar and other renewable energy sources. NREL also performs collaborative research in development and commercialization of renewables for the Office of Nuclear Non-proliferation and National Security (NN). The program is aimed at rechanneling the work of scientists from the former Soviet Union to peaceful research, development, and demonstration activities.

As a DOE national laboratory, NREL's mission and activities are integrally linked to those of DOE. Historically, more than 97% of NREL's funded activities have been in support of two DOE offices—the Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Science (SC). This trend continues in FY01.



NREL's Total FY01 Funded Activities

FY01 total funding was consistent with historical trends with more than 97% of NREL's work being performed in support of DOE's Office of Energy Efficiency and Renewable Energy, Office of Nuclear Non-proliferation and National Security, and the Office of Science. An additional 3% of NREL's funding came from non-DOE sources, including industrial partners.

NREL's FY01 Funding from EERE

While 90% of NREL's FY01 EERE funds supported work conducted in the power, transportation, and building sectors, the Laboratory also conducted and contributed to important work that addresses energy issues of all sectors.

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 producing results that are significantly important to achieve NREL's vision and the mission of DOE. NREL's critical outcomes are DOE's highest-level expectations of NREL. The Laboratory's critical outcomes 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 strives to balance priorities, make investments, and create a work environment that promotes success in each of these areas.

NREL's six critical outcomes are:

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

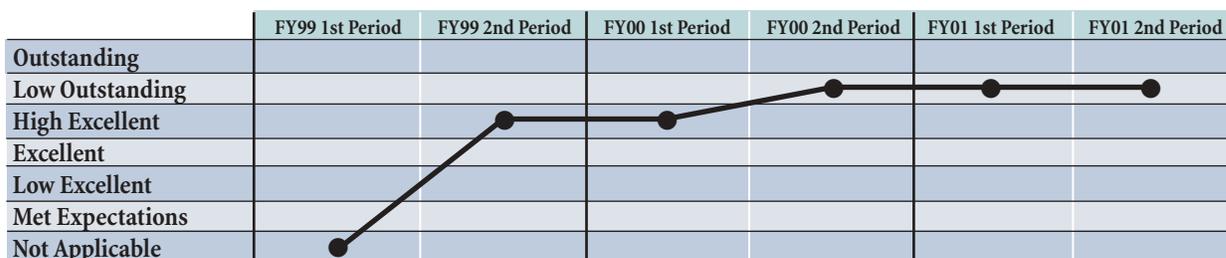
Protect the safety and health of the NREL workforce, the community, and the environment.

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.

FY01 Laboratory Performance Evaluation

Effective management and continuous improvement creates a work environment in which NREL staff can excel in each of the Lab's critical outcomes. Improvement in support-function productivity and efficiency enables NREL to effectively meet mission objectives. DOE's evaluation of NREL's performance for both performance periods of FY01 resulted in an overall Laboratory Performance Rating of "Low Outstanding," continuing a trend of excellence.



Snapshots of NREL's Performance

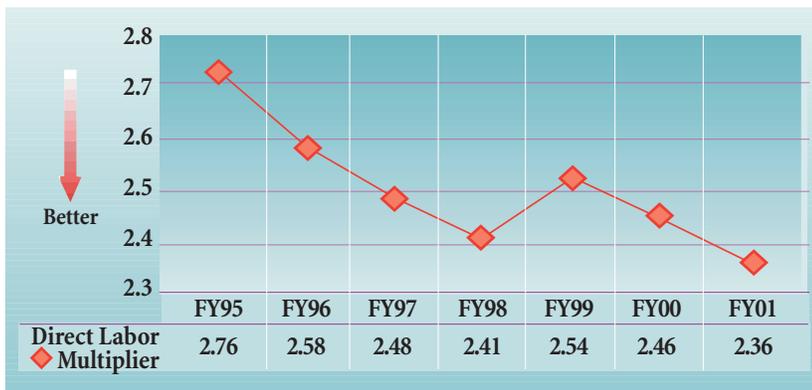
Laboratory-Level Management Outcomes

NREL's fiscal performance meets or exceeds established goals while operational support remains productive and efficient. Outcomes of effective management, emphasizing results and improvements, are demonstrated below.

Measures of Efficiency

Operating Costs per Research FTE

Operating cost per research Full-Time Equivalent (FTE) is an important measure of cost effectiveness and overall operating efficiency. NREL's operating costs per research FTE have been reduced 14.6% in real terms since FY95. The slight increase in FY99 is attributed to management transitions resulting from contract recompetition. Operating costs include labor, facilities overheads, recharge costs, and other indirect costs.

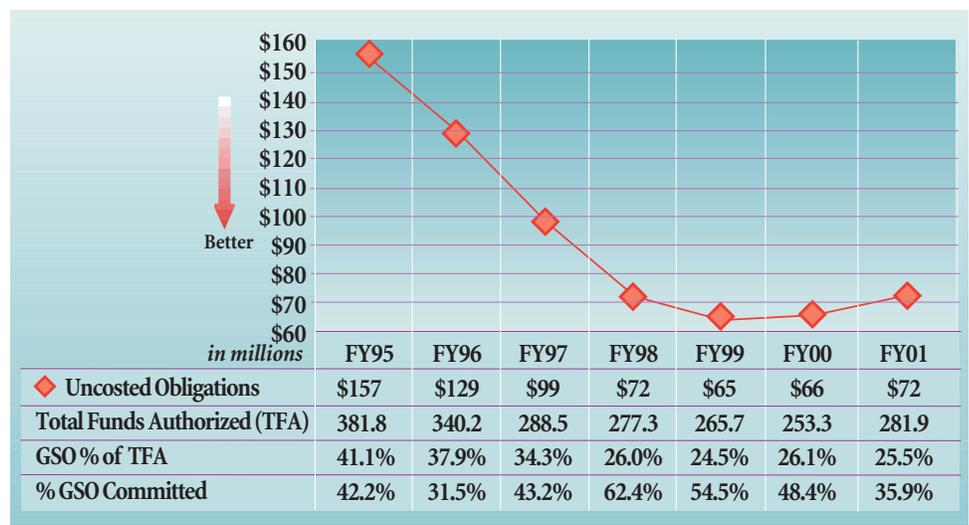


Direct Labor Multiplier

NREL achieved a labor multiplier of 2.36 in FY01, exceeding its target of 2.42. Proactive management and timely response to changing requirements and priorities enabled the Lab to exceed its goal. NREL also provided support for material acquisitions at a lower cost than planned, with an actual rate of 5.2% compared to the planned 5.5% 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 each fiscal year. Effective program management has resulted in a decrease in GSO balances of more than 54% since FY95. The \$72M of uncosted obligations in FY01 represents 25% of the total funds available to spend.



Laboratory-Level Management Outcomes

Measures of Productivity



Ratio of Research to Support FTEs

The ratio of research (direct) to support (indirect) Full-Time Equivalents (FTEs) has increased more than 18% since FY95. This result 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.

Research to Support Ratio in Dollars

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 27% improvement in the research support ratio since FY95.



Enhanced Fiscal Management:

- **Collection of federal accounts receivables** was improved significantly, reducing past-due balances from \$176,000 to \$0. Through increased monitoring and follow-up, all past-due balances were fully collected.
- The **percentage of payments made electronically** by NREL increased from 30.6% to 34% in the first six months of FY01.
- The **rebate earned from higher payment productivity basis points on NREL's purchasing card** increased from 36.80 points in October to an average of 44.80 points. This increase was a result of more aggressive payment practices, including use of electronic invoices and paying electronically.
- **Overall cash management** was improved, and DOE CFO requirements were met. NREL reduced the amount of excess federal funds on hand by improving its cash management performance and by increasing the number of days that the cash balance was less than \$10,000. NREL's performance rate was 29.3 days per month, an improvement from an average of 25.8 days per month in the prior period.

Laboratory-Level Improvement

NREL's FY01 Staff Survey results confirm progress is being made toward improving various aspects of NREL's work environment. NREL successfully completed the administration of its FY01 Staff Survey, with 561 complete responses. This represents a 62% response rate, an increase from a 54% response rate in FY00, the first year of the staff survey.

This increase in response is indicative of increasing staff confidence in the integrity and usefulness of the survey as a means of expressing their thoughts about NREL and its work environment.

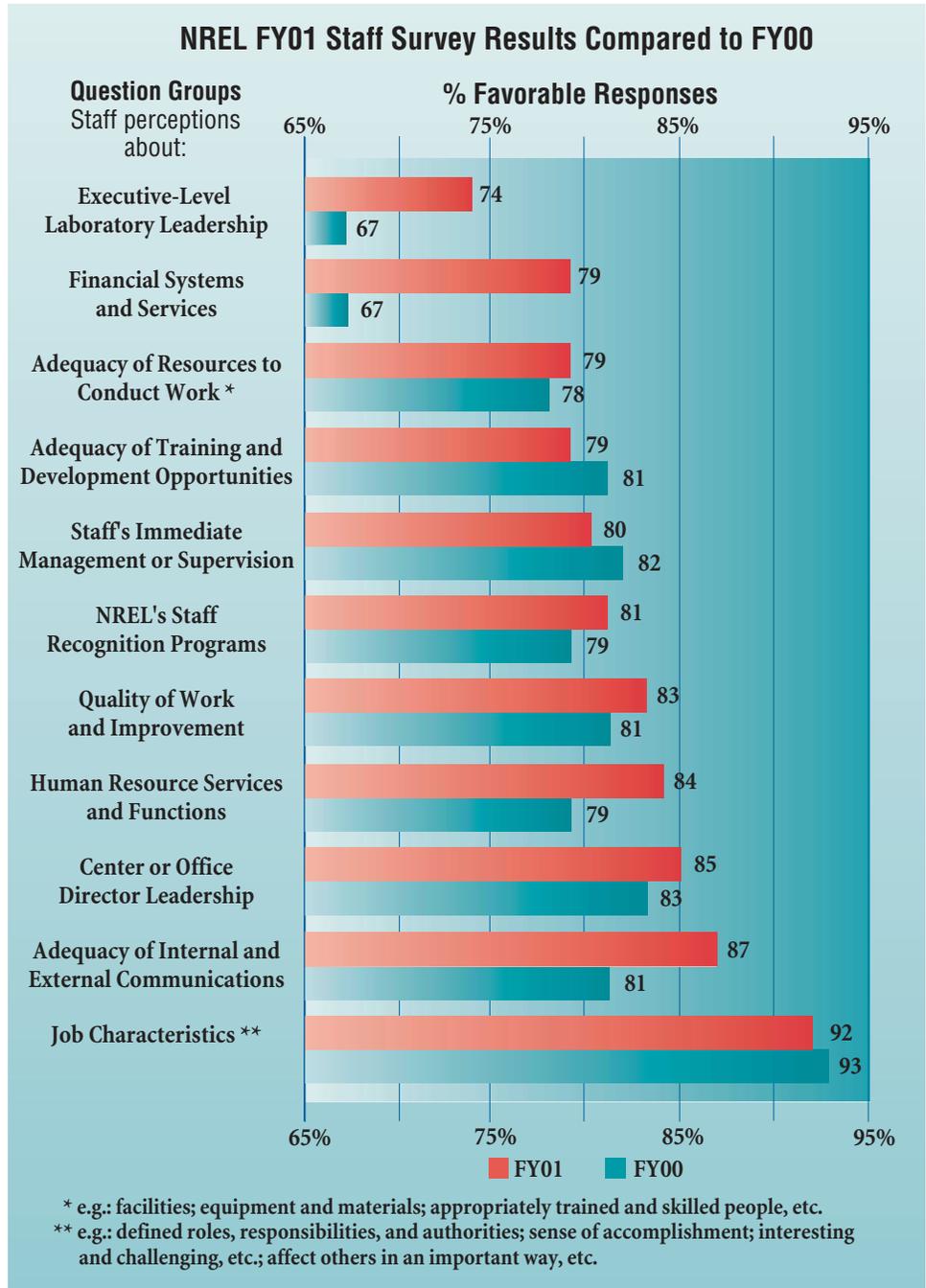
Survey results validate staff confidence in management taking appropriate action on survey results, with 77% of respondents believing management will act on priority issues.

Trends in NREL's work environment are measured by the aggregate response for each of the 11 "question groups" that comprised the annual staff survey. The percent of favorable responses for each of these question groups is presented in the adjacent chart for both FY00 and FY01.

Improvement, as measured by staff perceptions, can be observed in nearly every category measured by the survey. In particular, improved perceptions about executive-level Lab leadership, financial systems and services, human resource services and functions, and internal and external communications at NREL show dramatic improvements.

NREL initiated several Lab-level improvement projects that included these areas during the past fiscal year. In addition to Lab-level actions, local actions were taken within the research centers and support offices, which also contributed to the outcomes reported by the FY01 survey results.

NREL's annual staff survey has become a useful tool in helping to drive improvement in the Laboratory's work environment.



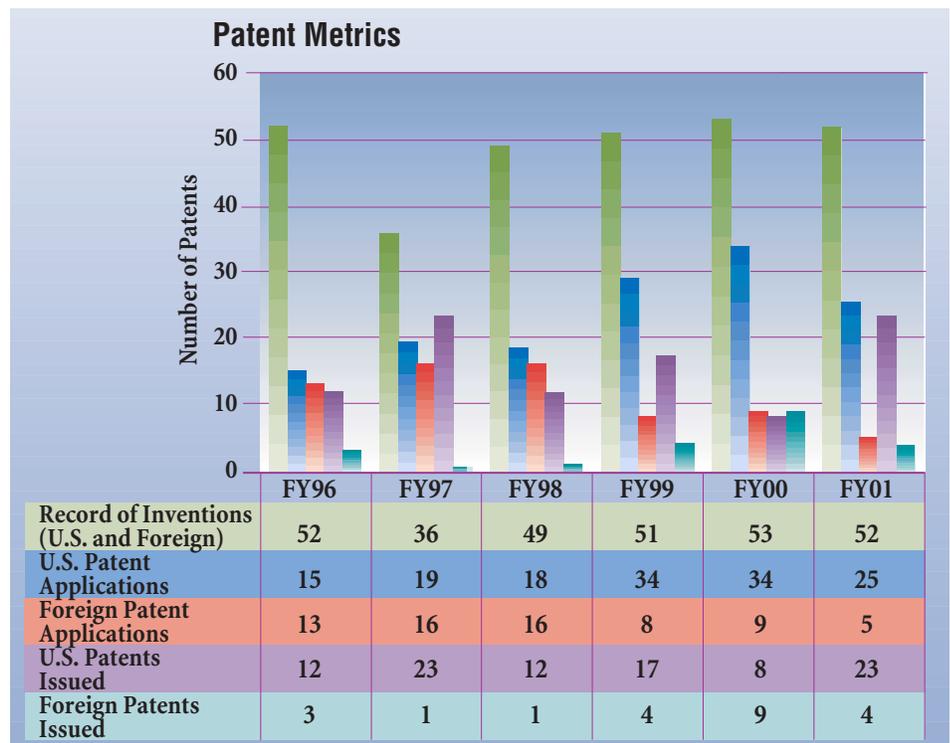
Technology Transfer

Significant Contributions

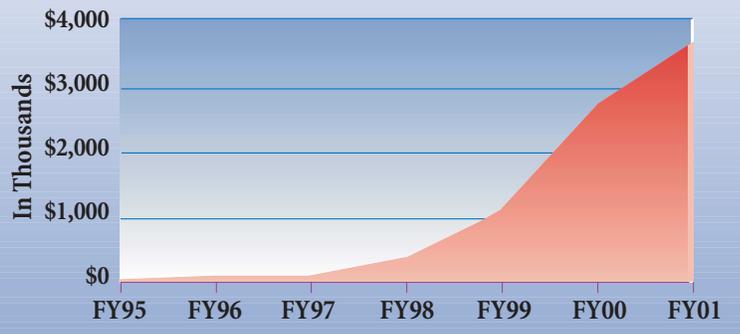
- **Development of a National Alliance of Clean Energy Business Incubators** was led by NREL. This collaboration among select business incubators provides business and financial services to clean energy entrepreneurs. Strong market interest made it possible for NREL to add four new members to the incubator alliance. The alliance now has 10 members in eight states, and is currently supporting 12 clean energy start-up companies. Interest and visibility of the alliance remains high, with approximately 15–20 inquiries per month directed to NREL.
- New mechanisms, developed to enhance technology transfer efforts, include:
 - **Technical Services Agreements Approach Developed.** NREL and DOE developed a proposed work-for-others process for Technical Services Agreements (TSAs). TSAs cover technical consulting and services on specific work areas that are limited in scope to less than 12 months and \$100,000 in funding. The streamlined agreements allow NREL to more quickly and cost-effectively assist public and private partners in implementing NREL technologies and software.
 - **New Market Analysis Approach Introduced into Patent Decisions.** A new approach to market screening was developed to supplement inventor information. The market analysis helps determine the market timeline, a macroview of the market, potential licensees, and alternative applications of the technology. In addition to supporting better patent decisions, this approach allows the Lab to prioritize new technologies and assign resources to maximize licensing opportunities.
 - **Industry Experts Used for Technology Evaluation.** The Laboratory uses industry experts to evaluate NREL intellectual property (IP), the markets, and potential licensees. Several companies were identified with potential interest in NREL's IP, and nondisclosure agreements were initiated in order to take the licensing discussions to the next level. This proactive approach has produced rapid and high-quality results. Based on the success of this effort, the Laboratory anticipates additional similar studies in the future.
- NREL's **Industry Growth Forum** provides needed resources and support to private-sector companies focused on energy efficiency and/or renewable energy technologies and markets. As a result of the 13th Industry Growth Forum, nine investors are engaged in financing discussions with participating companies. In addition to potential investor financing, participating companies benefit from business strategy and operations feedback. These interactions can provide a critical link for moving small companies from technology developers into viable growing businesses.

Measures of Success

A six-year comparison of new annual patent applications. NREL continues to leverage its intellectual property through patents, patent applications, and licenses to fulfill Laboratory and DOE mandates.



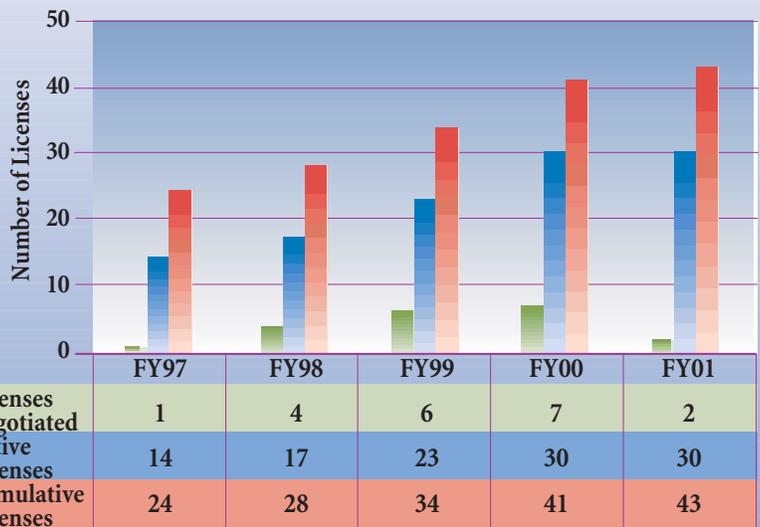
Cumulative Bayh-Dole Revenue Growth



A seven-year review of cumulative revenue received through the Bayh-Dole Act for successful commercialization of NREL technologies. From modest beginnings in FY95, Bayh-Dole revenue has grown significantly to provide an important source of funds for strategic investment at NREL.

A five-year comparison of new licenses negotiated, total active licenses, and partnerships formed through Cooperative Research and Development Agreements (CRADAs). Between FY97 and FY01, technology partnerships have resulted in the movement of technology and know-how from the Laboratory to the commercial sector.

License Metrics

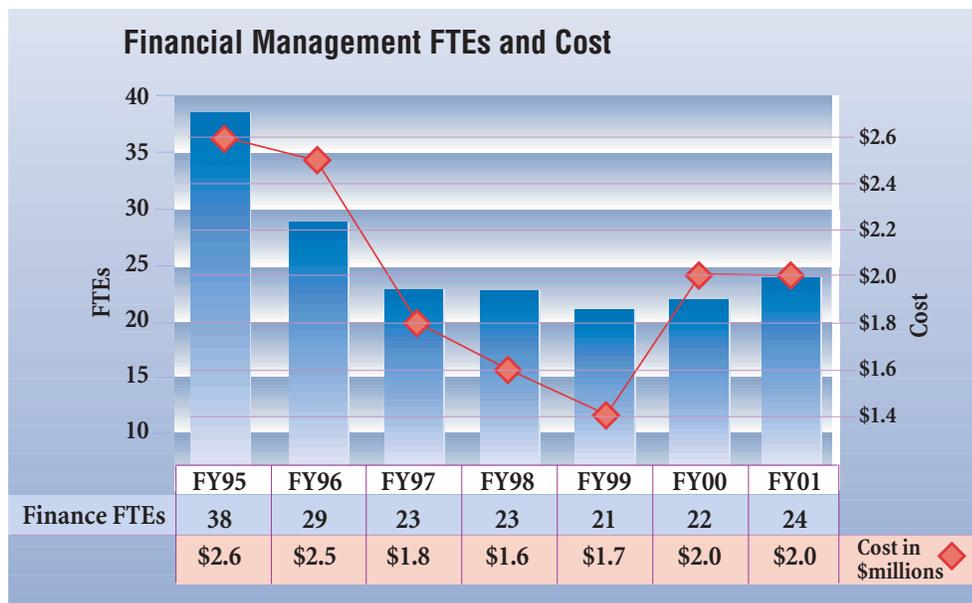


Financial Systems Management

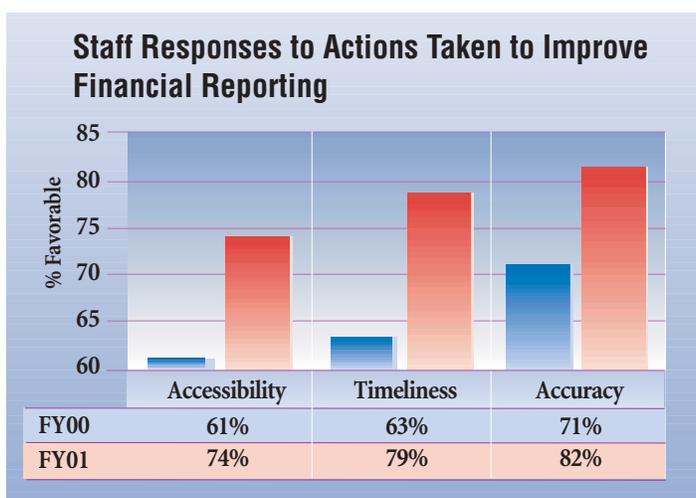
Significant Contributions

- **Timeliness and accuracy of financial reports were enhanced**, supporting the priority to maintain excellence in organization, program, and project management. A quality-assurance process for accurate and timely financial information was instituted resulting in the following:
 - Financial reporting issues were identified; regular communication for the report-user community was initiated; training modules were developed and implemented; software systems were successfully converted; and performance metrics for tracking results were implemented.
 - Month-end data quality was greatly enhanced by implementing a new cross-systems data verification process; the number of reports available electronically was increased to better meet project manager needs, including detail and summary information for funding, costs, and FTEs; and a continuous improvement process for financial reporting was implemented.
 - NREL met or exceeded its goal of processing all monthly financial reports by the sixth workday of the month.
 - NREL continued to be 100% timely in monthly Financial Information Systems transmission to DOE, meeting a critical DOE requirement for submission by noon of the fourth workday each month.

- Significant **improvements in several financial systems** were achieved, including a major upgrade to the financial reporting tools for NREL project managers. Improved timeliness and reliability of financial reports, provided (for the first time) cost and FTE information within a few days of the close of each month-end. End-user report access was greatly streamlined through a new preprocessing option, which saves several hundreds of project manager hours each month.
- **Electronic cash-management tools** were implemented, providing a cost reduction in transaction processing through the use of electronic payments, better internal control of transaction reporting and user access, and check verification for fraud detection capabilities. Savings were achieved through timelier electronic processing of purchasing card payments, resulting in greater rebates to the Laboratory.
- The **process for closing out capital projects** was improved, allowing the Laboratory to complete the closeout of 11 outstanding projects and returning more than \$60,000 to the Treasury.
- A **new integrated planning system** was implemented, tying the one-year budgeting process to the planning and performance evaluation process. As part of this effort, NREL identified the costs associated with each of the support organizations on a functional cost basis, as well as an organizational basis, and used the Lab's critical outcome performance measures structure as an overarching framework.



Measures of Success

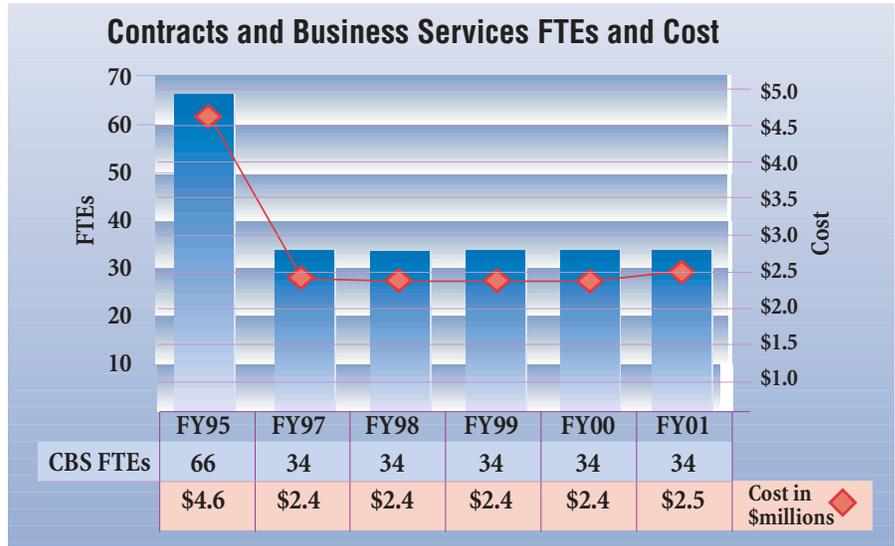


A two-year comparison of Staff Survey responses regarding financial reporting. The timeliness of data availability was significantly improved to the fifth workday of the month, a reduction of 3.5 workdays. As a result, favorable impression of financial report accessibility, timeliness, and accuracy improved 13%, 16%, and 11% respectively. Results from the FY01 Staff Survey also indicate that the actions taken resulted in an improvement of 12% in the overall favorable response regarding financial products and services, increasing from 67% favorable in FY00 to 79% in FY01.

Contracts and Procurement

Significant Contributions

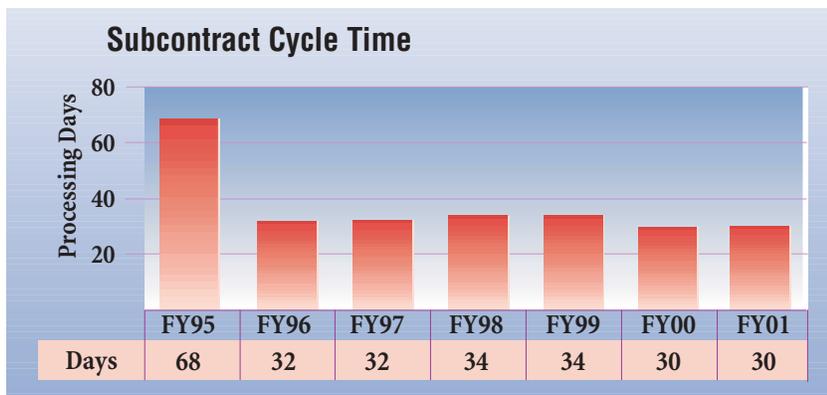
- All DOE Balanced Scorecard goals or targets were met or exceeded. These efficiencies in procurement functions/operations were passed along to NREL customers/stakeholders in the form of lower procurement costs.
- NREL's planned subcontracting goal of \$95 million was exceeded by \$8 million (8.4%). This achievement was accomplished through implementation of NREL's Advanced Procurement Plan and use of streamlined subcontracting processes.
- Cost-shared subcontracting increased, providing greater leverage of DOE R&D funding. Of the total subcontracts awarded



this period, 35% of dollars awarded were cost-shared subcontracts with the DOE/NREL contribution amounting to \$36 million and the subcontractor share amounting to an additional \$28 million. For every DOE/NREL dollar invested, the subcontractor provided an additional 78 cents under cost-shared subcontract arrangements, which are up from 75 cents during the previous reporting period. This results in significant leveraging of DOE/NREL research dollars.

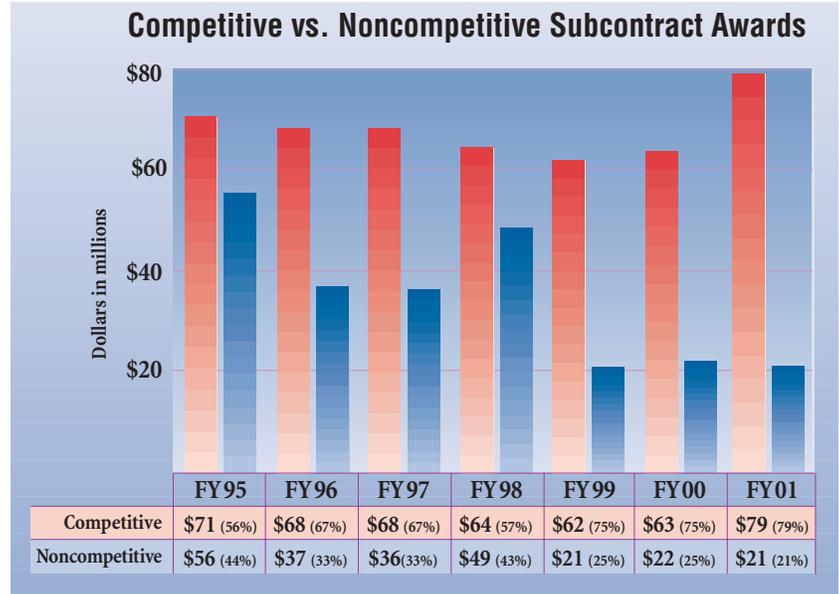
- An advanced procurement plan was completed, enabling timely placing of project subcontracts so that project milestones can be met per project plans. By implementing this plan, the Lab was able to place 63.5% of estimated annual subcontract plan value, 13.5% ahead of plan.
- The Minority Enterprise Educational Development Award was awarded to NREL, highlighting partnerships with minority businesses for subcontract awards. DOE also recognized the Lab for exceeding its small-business goals for the past five years.
- A Personal Conflict of Interest Procedure was developed and implemented. Employees agreed not to make or influence any decisions on behalf of NREL if their personal interests were incompatible with the interests of the Laboratory or the government. Staff received training on this procedure to familiarize them with the new procedure, form, and certification requirement.
- A procurement system approval was obtained, and NREL's procurement authority increased to \$1 million per action. This outcome demonstrates the confidence in, and integrity of, NREL's procurement systems. It also enables the Lab to conduct procurement activities in a more timely and cost-effective manner with a higher level of service to meet program needs.

Measures of Success



A seven-year comparison of the cycle time for executing subcontracts. This cycle-time reduction of 56% since FY95 is a result of process improvements and reengineering efforts at NREL during the past several years. The budget supporting these functions also has decreased significantly (44%) since FY95.

A seven-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 trend regarding subcontract awards reflects an increasing emphasis on competitive awards rather than noncompetitive. The FY01 percentage of 79% is a very favorable metric for a research and development Laboratory doing complex scientific and engineering tasks. FY01 goals were 70% for competitive awards (dollars) and 60% for competitive awards (actions).



Subcontracts Performance and Results

	FY95	FY97	FY98	FY99	FY00	FY01
Number of Subcontract Actions (<i>funded</i>)	1,100	860	1,198	1,291	971	1,408
Productivity (<i>Dollar Value of Subcontracts/FTE Utilized</i>)	\$2.9M	\$3.9M	\$4.2M	\$3.8M	\$3.5M	\$4.0M
Cost/Spend (<i>Subcontracts and Purchase Orders</i>)	2.9%	1.9%	1.8%	2.0%	2.5%	2.1%
Number of Closeout Actions/Staffing	346/4	417/2	537/2	669/2	613/2	618/2
Socioeconomic Awards	72%	80%	80%	66%	71%	70%

An illustration of five separate metric trends during the past several years. These numbers demonstrate that even though the number of subcontract awards has increased nearly 28%, the productivity has increased an average of 38%, and the NREL cost-to-spend ratio has decreased overall by 38%. Also, the number of closeout actions has increased 70% with a 50% decrease in closeout staffing since FY95. Additionally, socioeconomic awards to small, small-disadvantaged, and women-owned businesses remain at a significantly high percentage (70%) of total subcontract awards. Efficiencies in procurement function operations were passed along to NREL customers and stakeholders in the form of lower procurement costs.

Performance Trends: Purchasing Cards

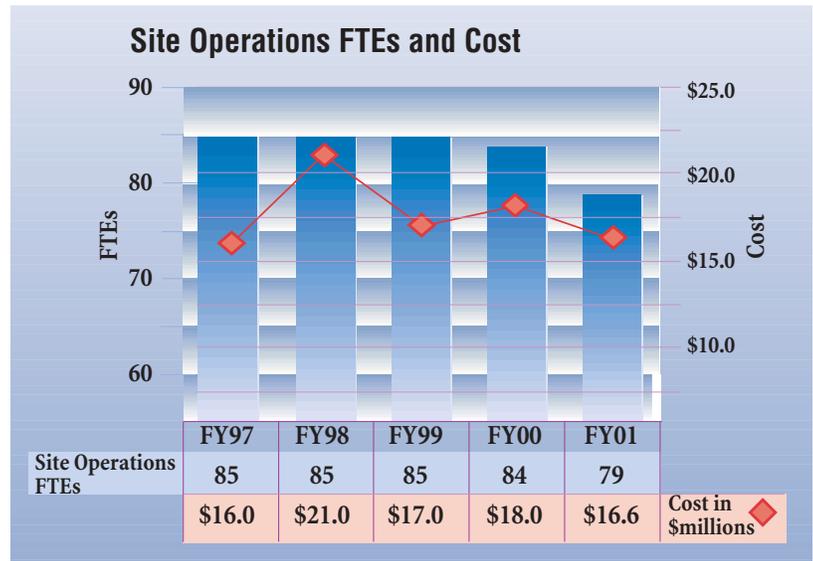
	FY95		FY97		FY98		FY99		FY00		FY01	
	P-card	PO										
Number of Transactions	0	9,000	10,800	1,875	14,395	1,940	13,868	1,567	16,000	1,345	16,518	1,028
Average Dollars/Transaction	0	\$3,300	\$435	\$5,200	\$460	\$9,300	\$473	\$8,500	\$473	\$6,378	\$461	\$8,366
Total Dollar/Transaction	0	\$30.0M	\$4.7M	\$9.7M	\$6.6M	\$18.0M	\$6.6M	\$13.3M	\$6.9M	\$8.5M	\$7.6M	\$8.6M
FTEs	0	22	0.5	3.5	0.5	3.5	0.5	3.5	0.5	3.5	0.5	3.5

A review of the six-year trend regarding use of purchasing cards since their establishment in FY97. These trends show a 53% increase in number of transactions and a 62% increase in total dollars spent. The number of Full-Time Equivalents involved in the Purchase-Card System has remained the same during these significant increases in use and dollars spent. Also, the use of purchase orders has decreased by 45% since the Purchase-Card System was established.

Site and Facilities Management

Significant Contributions

- An **external design review process for construction line-item projects** was implemented and successfully used to evaluate the conceptual design for NREL's Science and Technology Facility (S&TF) project.
- In conjunction with the DOE, the **NREL Emergency Operations Center** was activated during the September 11 terrorist incidents, and appropriate Lab responses were identified and implemented.
- **Modifications to the Field Test Laboratory Building (FTLB)** were made, improving efficiency while maintaining necessary ES&H controls. These conversions will provide easier access to equipment and capabilities, while supporting increased scope and flexibility requirements of project activities.
- **Installation of a public address system** was completed, providing the ability to make timely announcements to all NREL-occupied facilities in Colorado. This system provides another means to communicate emergency management instructions and inform staff of other important NREL events. The system provides the capability to make announcements at all buildings or at selected facilities as needed. The value and effectiveness of the system was demonstrated on September 11.
- NREL's **ability to manage on-site energy-consumption** was enhanced using improved data, which is collected on a building-by-building basis. As a means of further improving the Lab's energy management, the project was expanded to include smaller energy-consuming buildings and add process-energy metering. By installing additional electrical metering at its main energy-consuming facilities in FY02, NREL will be able to assess peak loading and average consumption and better manage the Lab's energy use.



Measures of Success

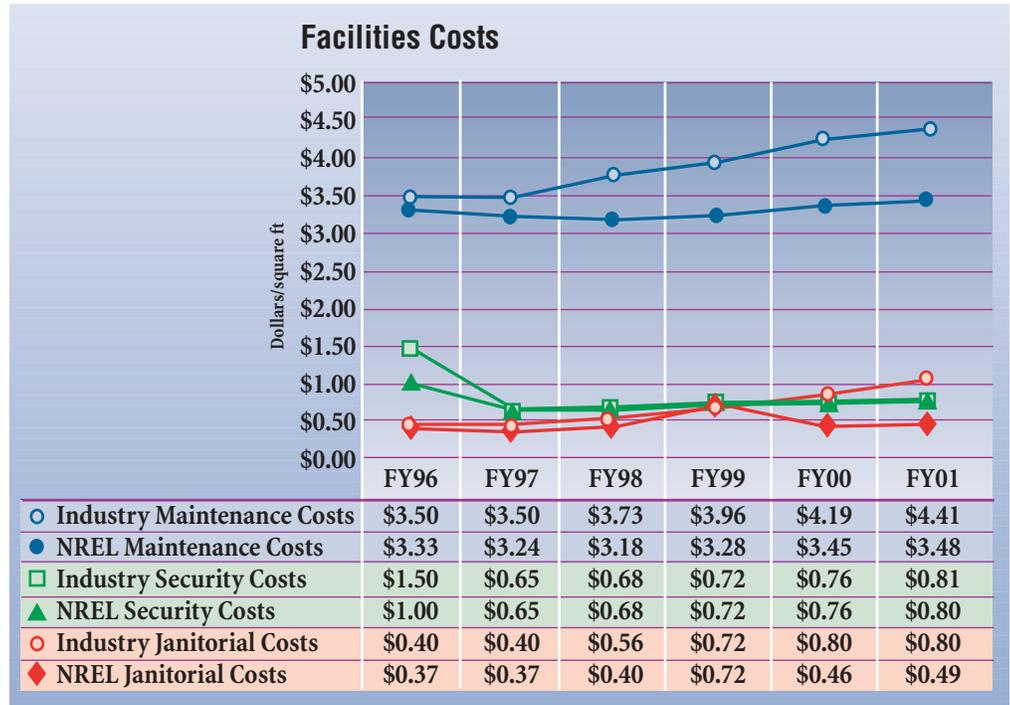
Facilities Operations Performance and Results

	FY97	FY98	FY99	FY00	FY01	Target/Source
Preventative Maintenance backlog (% late vs. total activities)	16%	19%	16%	15%	17%	<45% /DOE Benchmark
Construction safety (Lost-time accidents/100,000 hours)	0	0	0	0	0	<10.0 /Industry Benchmark
Construction Project Budget Management (% on budget vs. total)	100%	100%	100%	100%	100%	>95% /NREL Benchmark
Staff Move Rate (% staff moved vs. total staff)	19%	29%	23%	21%	20%	<50% /Industry Benchmark
Property Management* (% of unlocated property of total inventory)	N/A	0.21%	N/A	0.34%	N/A	<2.00% /Required by DOE Regulations

A comparison of NREL's six-year performance and results for general facilities operations, which also are compared to industry standards. NREL has consistently achieved results that are better than the DOE or industry standards.

* Property management inventory completed every other year.

A comparison of NREL's six-year costs for general facilities operations, which also are compared to the industry standard. NREL has consistently achieved results that meet and frequently exceed industry standards.



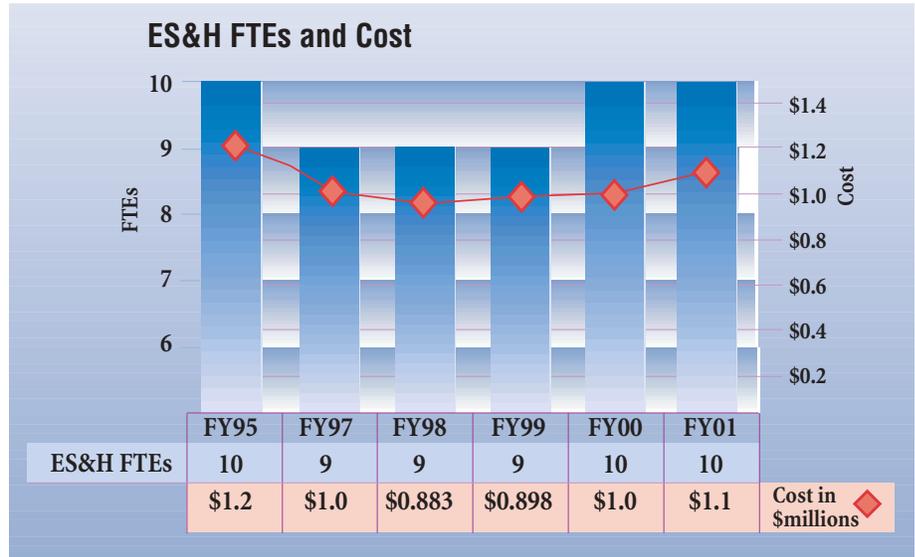
Sustainable NREL

- NREL management initiated a formal **Lab-wide sustainability activity** during FY01, setting Laboratory goals to exemplify sustainability. This effort included maximizing efficient use of all resources; minimizing waste and pollution; and serving as a positive force in economic, environmental, and community responsibility. The resulting NREL sustainability management framework and draft Master Plan incorporate the spectrum of sustainability activities, which include building energy, land use, transportation, water, materials use, and waste. Highlights of progress in the primary areas of building energy (NREL Energy Management) and transportation energy include:
 - NREL already meets the Executive Order 13123 (2010) goal for building energy-use efficiency (39% below current requirements).
 - NREL's most recent new building, the Thermal Test Facility, has achieved a measured (metered) energy cost savings of 63% compared to a 10CFR435 (federal building energy code) compliant base-case building.
 - Proposed NREL new construction projects (including the Science and Technology Facility and System Interconnection Test Laboratory) are being designed using energy modeling, which will provide a 50% energy-use reduction compared to a 10CFR435 compliant base-case building.
 - NREL committed to a three-year contract for the purchase of green power in FY01. The annual purchase will be nearly 2 million kWh/year or 10% of the Lab's annual power use.
 - The NREL management transportation energy commitment is to convert 100% of its fleet to alternative-fueled vehicles. NREL is well on its way to meeting this commitment with 20 of its 48 nonexempt vehicles alternative-fueled, which exceeds current Environmental Protection Act requirements.

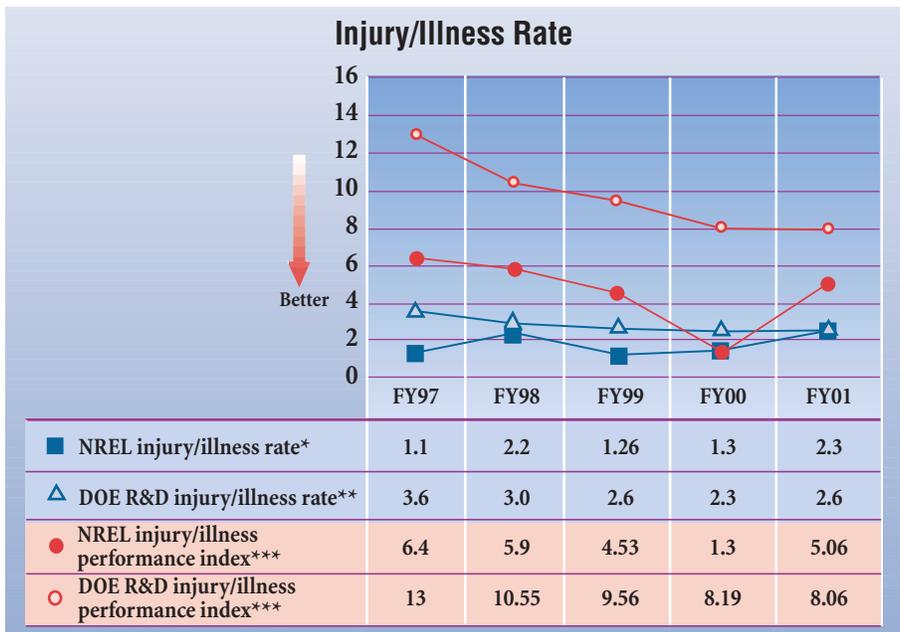
Environment, Safety, and Health

Significant Contributions

- A **Risk Assessment Database** was developed, providing a common tracking point for Lab-wide risk-management activities. The database improves worker ability to monitor and maintain the desired level of risk, and promptly provides task-specific hazard information for use during emergency situations.
- A **cross-organizational team** was used to prepare content information for the National Wind Technology Center (NWTC) Site-Wide Environmental Assessment (EA). This approach reduced both subcontractor costs and the time required for writing the document, as well as improved quality and usefulness as a long-range planning and management tool.
- A **Chemical Safety Panel** was established to better utilize worker knowledge in the control of chemical-related hazards. The panel, which reports to the NREL Safety Council, coordinated a detailed and productive self-assessment of the Chemical Safety Program during FY01.
- **ES&H program self-assessments** were revised to validate the programs against the best-management practices in private industry. The self-assessments now go beyond simple compliance audits and focus on management-system effectiveness, resulting in “real-world” baselining and identification of opportunities for process improvement.



Measures of Success



A five-year comparison of NREL's injury/illness rate. NREL is below the DOE R&D rate in this area in FY01. Below, Laboratory ES&H performance is measured against applicable industry and DOE baselines.

* **Bureau of Labor Statistics (BLS) formula** — number of recordable injuries and illnesses 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 doesn't include all workers on site.

*** **DOE formula** — relative rating of frequency and severity of injuries and illnesses. No direct comparison to private industry.

Laboratory ES&H Performance

	FY97	FY98	FY99	FY00	FY01
NREL Workers Compensation Costs*	\$0.07	\$0.03	\$0.02	\$0.04	\$0.035
Fire and Property Loss	\$0	\$0	\$0	\$0	\$0
Environmental Loss	\$0	\$100K**	\$0	\$0	\$0
Training Completion Rate	50%	82%	88%	91%	95%

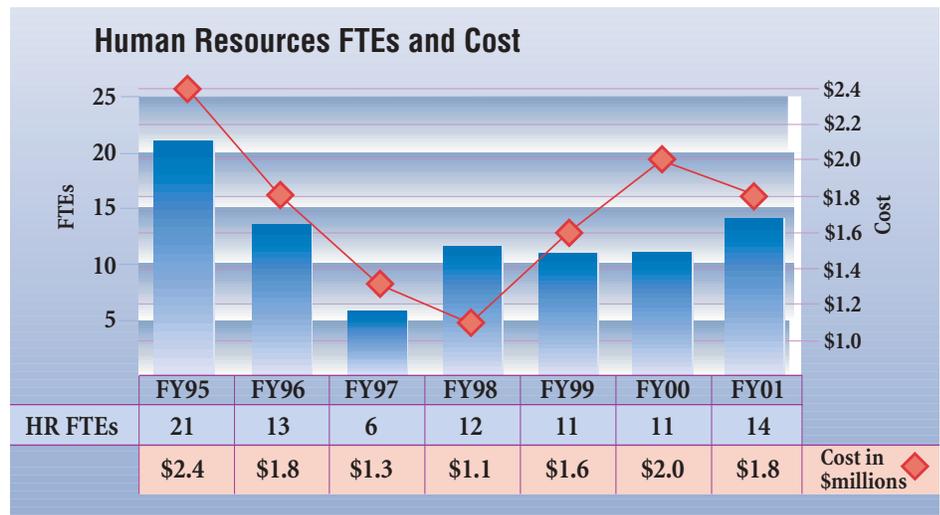
* Private industry formula — workers' compensation costs in dollars per hour worked. Private industry performance of \$0.25 or less is considered good. Comparison data not available for DOE R&D operations.

** FY98 cost is for remediation of process development unit emergency-generator diesel fuel spill. No remediation was required per state regulations.

Human Resources Management

Significant Contributions

- **Training and development opportunities** were improved during FY01. Focus group interviews were conducted to supplement FY00 Staff Survey data to assess needs and expectations regarding training. In addition, a Training Communications Plan was established and courses were offered at NREL's Washington, D.C., office. As a result, the favorable impression about the adequacy of training, and its meeting the needs of staff, improved 11% from FY00. In FY00, 64% of staff reported that the training and development programs available at NREL were "adequate." In FY01, 75% of staff indicated that NREL has adequate processes and programs to support their career and professional development.
- The **Minority and Women Chambers' Coalition Diversity Leaders Award** was awarded to NREL. This award recognizes companies that have incorporated diversity, affirmative action, and equal opportunity into their workplace.



Measures of Success

- **Human resources services and functions** were effectively managed to support the Lab in meeting mission and organizational needs and objectives. Key performance measures indicate NREL is doing the right things to attract, retain, and develop its staff.
 - **Salary Percent of Market:** All NREL salaries averaged 94.4% of market for all job categories in FY00; and in FY01, that figure had increased to an average of 97.7% of market. This metric is one measure of NREL's competitiveness in the marketplace, and is the result of effective management of salary. This is an important tool used to ensure the best talent is at the Lab working on DOE's priorities.

- **Benefit Value Rating:** NREL’s baseline benefit value rating (value of NREL’s benefits package as a percent of the values of comparable organizations) was established in FY01 at 91.5%. NREL is managing its benefits package to balance costs with features such that “best value” is provided to staff, the Lab, and DOE. Improved benefits included an increase in the dental plan maximum, availability of the Kaiser HMO, addition of a prescription drug plan in the PPO, and a decrease in the out-of-pocket expense rate.
- **Turnover:** The Laboratory turnover rate for FY01 was 6.88%, compared to 8.9% for FY00. Many factors influence this reduction in turnover, some of which NREL proactively addressed. 1) NREL demonstrated its commitment to staff by improving management training and retaining quality managers, a factor that influences staff’s decisions about remaining with an organization. 2) Significant enhancements were made in the Lab’s compensation and benefits program. FY01 Staff Survey results indicate that the NREL benefits package now meets the needs of 92% of staff. 3) NREL made a commitment to monitor and continually enhance its work environment, which was measured through the annual staff survey. Results of the FY01 Staff Survey clearly indicate that improvement was made, and that staff recognized it.
- **Time to Fill Positions:** The number of placements and days-to-placement performance measures accurately reflect that a significant portion of NREL’s hiring was delayed or placed “on hold” until FY02 federal budget uncertainties were resolved.
- **Cost of Hire:** The types of positions most recently filled were senior, experienced, and strategic hires in fields with very limited availability vs. more entry-level hires made in FY00. Employment markets for these senior staff are more competitive, requiring greater effort (cost and time) for a successful hire. Additional travel expenses were incurred because more out-of-state candidates were interviewed vs. more local candidates in FY00.

Key Staffing Metrics

	Number of Placements	Average Days to Placement	*Total Cost to Hire
FY00	181	59.6	\$6,160.84
FY01	122	65.5	\$8,719.64

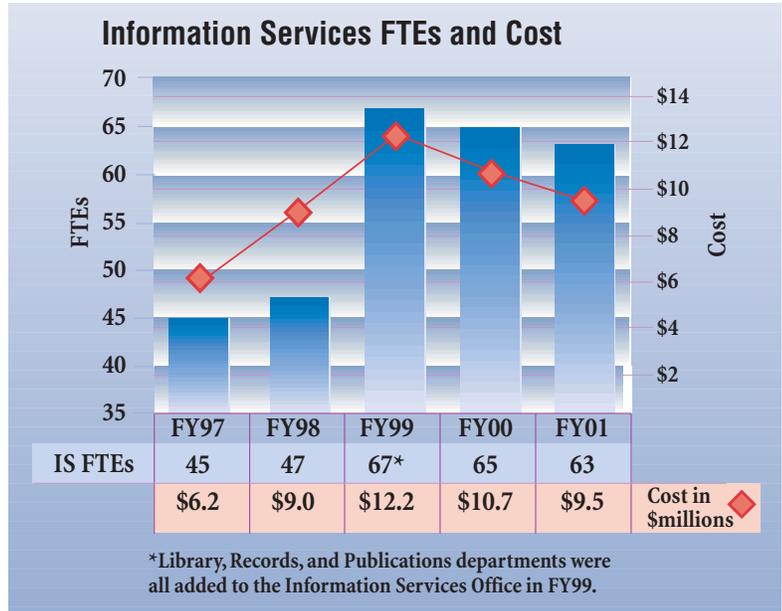
* Includes interview travel, advertising, relocation, and HR time. Results for these measures are driven by a change in the nature of NREL’s FY01 hires.

Information Services Management

Significant Contributions

- NREL’s **IT infrastructure** was effectively managed and maintained, ensuring that network services were available more than 99.9% during business hours — exceeding the Lab’s goal of 99.7%.
- NREL’s **Client Services help desk** processed more than 25,000 transactions in FY01, while maintaining “very satisfied” customers (based on surveys where responses could range from “very dissatisfied” to the best score of “very satisfied”). Detailed work instructions, which provide procedural documentation to support the provision of consistently high-quality service, were created (along with a process to maintain them) to ensure proper procedures are followed when performing duties on the IT infrastructure.
- **Cyber-security incidents** were effectively managed and controlled resulting in no cases of downtime for NREL’s IT infrastructure. NREL experienced only three viruses on desktops, four reportable cyber-security incidents, and no intrusions during FY01. To protect cyber-security resources and to further develop NREL’s cyber-security program, NREL responded to 77 Computer Incident Advisory Capability advisories, and performed more than 30 updates to virus patterns on all NREL desktops.
- Investments were made in NREL’s information technology system, **enhancing and building capabilities:**
 - NREL’s bandwidth to the Internet was doubled.
 - A high-speed tape backup system was installed to improve performance and availability of NREL’s UNIX and NT environment.
 - A dedicated and secure T1 communication line to NREL-DC was installed, enabling remote desktop configuration and more effective and efficient IT support.

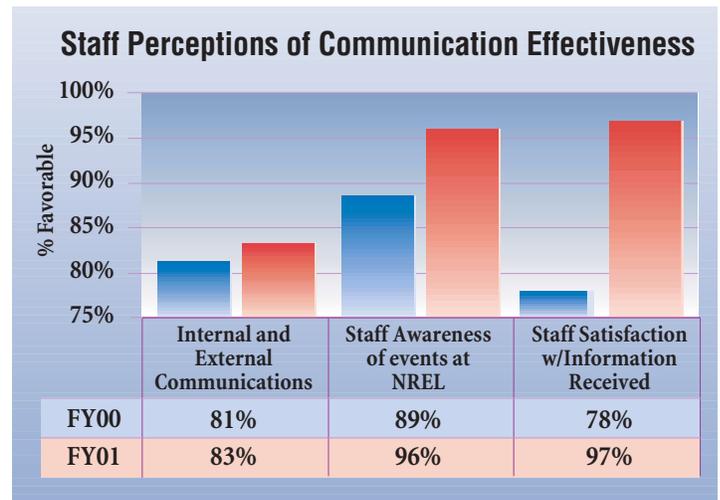
- PC configuration management processes were automated to distribute and install software patches, bug fixes, and virus updates electronically.
- Increased availability of library resources with addition of (ESBCO & Ullman's) software to PC desktops.
- Memorandum of Understanding was established with Government Printing Office (GPO), which allows the Federal Depository Library Program to electronically link to NREL scientific and technical publications.
- Photographic Information eXchange (PIX) equipment was replaced with a high-performance scanning system to enhance the quality and resolution of available image files.
- Approximately 9,000 PIX images were transferred to a new Storage Technology TimberWolf system.



Measures of Success

- Based on FY01 Staff Survey responses, actions were taken to build on a Laboratory strength regarding the usefulness and value that staff place on electronic communications. E-mail guidelines were developed, a Director's Web page was created, and NREL's policy regarding electronic communications was updated. The goal of these actions, to enhance the effectiveness of Laboratory communications, was successfully achieved.

A two-year comparison of Staff Survey responses regarding communications. Overall favorable perceptions of internal and external communications improved to 83% favorable in FY01. Effectiveness of communications, as measured by staff awareness of events at NREL, improved nearly 7% from FY00. Staff satisfaction with information received increased 19% from FY00.



Research Recognition

Research Recognition Benchmarks

NREL's average number of R&D 100 awards, peer-reviewed publications, and patents awarded per 100 technical staff are used as indicators of the recognition NREL R&D and NREL staff receive. NREL's performance compares favorably to the average of the DOE national laboratories.

	Benchmark			
	NREL Average per 100 Technical Staff* FY93-FY99	DOE Lab-System Average per 100 Technical Staff** FY93 - FY99	NREL Average per 100 Technical Staff FY00	NREL Average per 100 Technical Staff FY01
R&D 100	0.60	0.18	1.08	0.93
Peer-Reviewed Publications	63.23	62.88	83.45	61.42
Patents Awarded	2.01	1.64	2.88	7.10

* Technical Staff = Number of Scientists and Engineers

**Labs used for benchmark: Ames, ANL, BNL, LANL, LBNL, LLNL, ORNL, PNNL, SNL

External Awards Received by NREL in FY01

Three R&D 100 Awards

Awards received in FY01 were: Current Interrupt Charging Algorithm – NREL Partners: Recombination Technologies and Optima Batteries, Inc.; Triple Junction Terrestrial Concentrator Cell — NREL Partner: Spectrolab, Inc.; DRWiN Electronically Scanning Antenna — NREL Partner: Paratek Microwave, Inc.

Energy@23 Awards

The Turbine Advanced Airfoils and the Variable Conductance Insulation Catalytic Converter were selected from the list of 100 scientific and technological innovations nominated for consideration and developed by DOE between 1977 and 2000. The highest-ranked innovations demonstrated benefits to the public, a contribution to U.S. competitiveness in the global marketplace, and the potential for significant growth.

Bright Light Awards

NREL received awards for UNI-SOLAR Triple Junction Amorphous-Silicon Solar-Electric Module Roof Shingles and the Advanced Turbine System Program. The award honors five consumer-oriented innovations, selected from 23 discoveries developed between 1999 and 2000.

Federal Energy & Water Small Group Award

NREL staff won the 2000 Federal Energy & Water Management Small Group Award from the Federal Interagency Policy Committee and DOE in recognition of work done by the Laboratory and the NWTC for the Navy's San Clemente Island Wind Generation plant.

OIT Best Technology Award

NREL's project on developing biomass characterization tools for the forest products industry was given this industry-selected award. Industry already is using NREL's calibration methodology to develop better controls for their processes. Analytic information generated by NREL's methodology is also being used for predicting performance of forest products.

ASHRAE Technology Award

NREL staff members were selected as the first-place winner of an American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Technology Award in the Alternative and/or Renewable Energy Use category for the Otto Van Geet residence in Idaho Springs, Colorado. The ASHRAE Technology Awards program recognizes successful application of innovative design, which incorporates ASHRAE standards for effective energy management.

American Institute of Architects (AIA)

Two of NREL's high-performance commercial buildings, the Zion National Park Visitor Center and the Bighorn Home Improvement Center, were given the American Institute of Architects (AIA) award. The AIA is the largest professional society of architects in the world and its Committee on the Environment selects only 10 projects each year to award as the best examples of green architecture worldwide.

Representative of the Year Award

NREL received this award from the Federal Laboratory Consortium, recognizing the Lab's activities with three industrial partners that led to the package of licenses, Cooperative Research and Development Agreements (CRADAs), and work-for-others surrounding the NREL Tandem PV technology.



25 *Years of
Research
Excellence
1977-2002*

National Renewable Energy Laboratory

This year marks the 25th anniversary of NREL (formerly the Solar Energy Research Institute—SERI). As we reflect on what has been achieved during the past 25 years, it is evident that staff innovation, dedication, commitment to quality, and perseverance have made this Laboratory what it is today—a world-class resource for renewable energy technology. This anniversary year is a wonderful time for us to recognize the people, science and technology, and accomplishments that have formed a strong foundation on which we will continue to build our vision for NREL.



National Renewable Energy Laboratory
Office of Quality and Assessment
1617 Cole Boulevard, Golden, Colorado 80401-3393
www.nrel.gov

NREL/MP-390-31349 March 2002



Printed with renewable-source ink on paper containing at least 50% wastepaper, including 20% postconsumer waste.