



**National Renewable Energy Laboratory  
One-Year Plan  
Fiscal Year 2001**

**DRAFT**  
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## **I. NREL CONTEXT**

### **Mission**

To lead the nation toward a sustainable energy future by developing renewable energy technologies, improving energy efficiency, advancing related science and engineering, and facilitating deployment.

### **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.

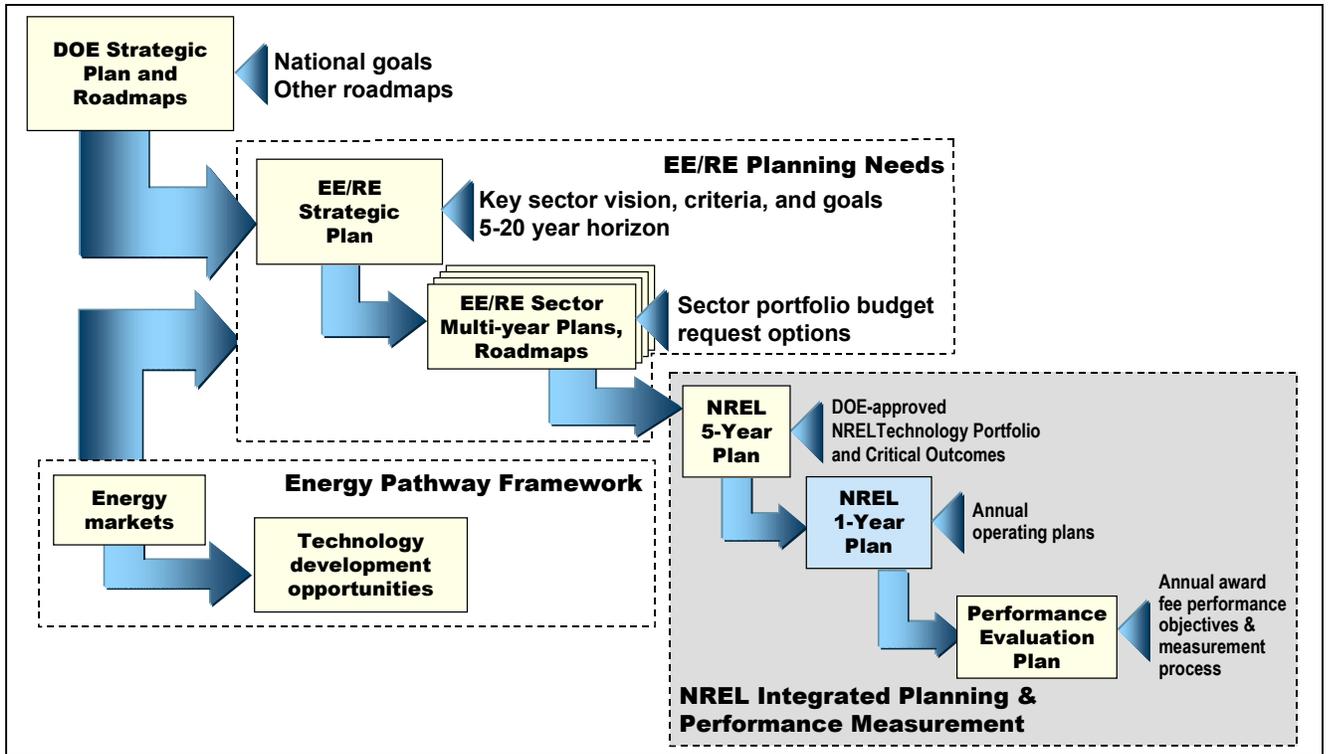
### **Relationship to DOE and Other Organizations**

NREL is a Federally Funded R&D Center (FFRDC), and as such is a strategic advisor and partner with DOE, assisting DOE with the full range of activities from research and development through technology demonstration to facilitating deployment of these technologies into global markets. NREL is responsible for integrating the expertise and viewpoints of industry, academia, and DOE, and collaborates with many different organizations in accomplishing its mission. A contractor-operated laboratory owned by the U.S. Department of Energy, NREL is managed by Midwest Research Institute of Kansas City, Mo.; Battelle Memorial Laboratory of Columbus, Ohio; and Bechtel Corporation of San Francisco, Calif.

DOE's Office of Energy Efficiency & Renewable Energy has primary responsibility for Laboratory activities and stewardship responsibilities for the long-term development of the Laboratory. Locally, the Laboratory's contract is managed by DOE's Golden Field Office.

### **Integrated Planning and Performance Measurement Framework**

NREL planning is intended to promote integration across programs and organizations, align NREL plans with DOE strategy and plans, and capture and consider market and stakeholder input. The Laboratory's strategic foundation is articulated in NREL's Five-Year Plan, developed in close consultation with DOE and other stakeholders. The One-Year Plan translates strategy into actions during the plan year to move the Laboratory closer to its vision. The One-Year Plan provides the framework for annual program and organization planning. It defines performance objectives and the tasks to achieve those objectives, allocates resources, and serves as the basis for defining how performance will be measured. More details covering approach, staffing and budgeting, milestones, and schedule are provided in the annual operating plans for individual programs, strategic initiatives, and offices and centers. The One-Year Plan can be viewed as the executive summary of these more detailed plans. The Performance Evaluation Plan describes the critical outcomes, performance objectives, and performance indicators, as well as presenting a description of the processes and mechanisms to be used for evaluating performance and awarding fee.



The integrated planning and performance assessment framework for NREL follows these conventions:

- **Critical Outcome:** A critical outcome is a long-term, strategic goal stated in terms of the results that are expected to be achieved in an area that is of significant importance in achieving the vision. It is a statement that captures the essence of the desired end state to be achieved.
- **Performance Objective:** An attainable goal that when achieved, will lead toward the critical outcome.
- **Key Task:** A near-term activity undertaken to accomplish a significant building block in achieving a performance objective.
- **Performance Indicator:** The evidence of achievement of, or progress toward, a performance objective. In some cases, composite indicators are used. Composite indicators represent the weighted compilation of a collection of independent measures each of which represent a significant element associated with achieving the performance objective.

## II. PERFORMANCE PLAN

### Science, Technology and Deployment Facilitation

#### ***Critical Outcome [1.0]***

Conduct energy research, development, demonstration and facilitation of deployment activities leading to viable technology options that span energy pathways from supply through conversion and delivery to end-use applications

Moving renewable energy and energy efficiency technologies from concept to commercial adoption is the core of NREL's mission. This critical outcome captures the results the laboratory produces through the programs it conducts for DOE. In FY00, the Laboratory placed emphasis on conducting quality R&D programs, providing leadership in planning and managing programs, and on increasing the effectiveness of its technology transfer activities in conducting all programs and projects that DOE places at NREL for execution (see list on page 20). In FY01, we will continue to emphasize excellence in science and technology and program management.

The following three performance objectives and key tasks will be the focus in FY01.

***Performance Objective 1.1 (Bull)*** Produce high-quality, externally recognized scientific research and development results.

#### ***Key Tasks***

- Implement program work plans and DDRD projects to promote advances in science and technology.
- Publish the results of technical work in peer-reviewed publications and present results at conferences.
- Nominate and steward meritorious technical accomplishments through review processes leading to external awards such as the R&D 100 award.

#### ***Measuring Performance***

The distinctiveness of NREL capabilities and the quality of its technical products will be measured through external and internal peer and program reviews and by the external validation of its work as evidenced by the number of external awards and the number of papers selected for peer-reviewed publication or presentation. To assess performance relative to these latter measures, NREL will undertake the following:

- Summarize the results of internal and external peer and program reviews.
- Develop and utilize a composite measure based on types of peer-reviewed publications, set targets for number of papers weighted according to the value of the publication, and monitor progress during the year.

- Develop and utilize a composite measure based on types of awards, set targets for number of awards weighted according to the value of the award, and track nominations and awards during the year.

The outcomes of the key tasks, together with the composite measures established through these efforts, will be used to assess performance on this objective using the following performance indicators:

***Performance Indicator 1.1.1*** Results of external reviews show that NREL's technical products are of high quality.

***Performance Indicator 1.1.2*** Recognition by the external scientific and technical community as measured by comparing NREL performance against benchmarks in a) external awards and recognition, b) peer reviewed publications, and c) number of patents awarded.

***Performance Objective 1.2 (Garrett/Pietruszkiewicz/Bull)*** Demonstrate leadership in planning, managing, and communicating about programs to support DOE objectives and advance viable technology options from concept to commercial application.

### ***Key Tasks***

- Support DOE in developing stakeholder supported roadmaps and program plans and aligning plans with Government Performance and Results Act performance objectives.
- Develop and implement Annual Operating Plans and project plans for all NREL programs (see list on p. 20).
- Report program accomplishments and status of key milestones at NREL monthly reviews and as required by EE's Strategic Management System.
- Manage subcontracting activities to obtain best-in-class capabilities and meet or exceed competitiveness targets set with DOE-EE.
- Provide technical and analytical support to EE's Strategic Management System.
- Expand relationships with key trade organizations.
- Assess key markets for renewables, e.g. Green Power markets and Distributed Energy Resource markets.

### ***Measuring Performance***

NREL's ability to manage programs to meet DOE priorities, produce relevant outcomes, and manage programs on schedule and within budget will be measured by demonstrated delivery of key milestones to schedule and budget, as evidenced by DOE feedback on the impact of program accomplishments, and through the results of program reviews. In order to measure performance, NREL will:

- Work with DOE to identify appropriate key strategic milestones that move DOE-EE's strategic technical agenda forward when accomplished.

- Track program accomplishments and develop the assessment of the impact NREL has had on EE's strategic sector milestones for integration in the overall assessment of NREL's performance.
- Track competitive versus sole source subcontracts for both Laboratory Operations and Programs.

The outcomes of the key tasks, together with the data compiled through these measurement activities, will comprise the input to be used to assess performance on this objective using the following performance indicators:

**Performance Indicator 1.2.1** Performance against established programmatic AOPs demonstrates NREL's ability to impact customers' strategic objectives and advance viable technology options from concept to commercial application.

**Performance Indicator 1.2.2** NREL's ability to effectively manage programs will be measured by performance against predetermined "key" sector milestones.

**Performance Indicator 1.2.3** The level of competitive procurements for the Laboratory meets or exceeds predetermined target levels.

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| <p><b>Performance Objective 1.3</b> (<i>Pietruszkiewicz, Bull</i>) Demonstrate stewardship of NREL's intellectual property and enhance the effectiveness of NREL's technology transfer.</p> |
|---|

### **Key Tasks**

- Develop a technology transfer plan that lays out NREL's strategy and a framework for technology transfer activities.
- Track key technology transfer products and events.
- Transfer intellectual property to private industry via licensing agreements.
- Evaluate the impact of technology transfer activities, e.g. CRADAs and work-for-others (WFO) agreements, incubator alliances, etc.
- Raise awareness of NREL-developed technologies through communication products.

### **Measuring Performance**

NREL performance in technology transfer will be measured by identifying various technology transfer methods that represent different stages of deployment, and identifying and tracking specific targets related to each method. Examples of potential methods include licensing patents, establishing CRADAs and WFO agreements, producing publications and websites.

**Performance Indicator 1.3.1** Technology transfer activities meet or exceed established goals.

## Leadership

### *Critical Outcome [2.0]*

Provide the leadership to promote NREL's national and international standing, ensure intellectual excellence and foster responsible stewardship of the DOE resource.

In FY00, we moved forward with two key initiatives -- Bioenergy and Distributed and Hybrid Generation, developing stakeholder support, integrating capabilities across laboratories, and enhancing NREL's technical capabilities to be responsive to emerging requirements. This included inventories and gap analyses of capabilities in Bioenergy and Distributed Energy Resources, as well as a Bioenergy Strategic plan and a Distributed Energy Resources Strategy. We worked closely with EE and U.S. industry representatives to establish a Natural Gas - Renewable Energy Alliance to pursue opportunities to work together to promote clean energy technologies. We initiated a dialogue with the National Energy Technology Laboratory to identify areas where the two labs can work together to benefit DOE objectives. We will continue these efforts in FY01.

NREL hosted and presented at the first Renewable Energy Policy Forum, which informed Congressional decision-makers and their staff regarding lessons learned and future implications of past and present policies in the areas of renewable energy and energy efficiency. The half-day session fostered important discussions of energy R&D and technology transfer policies affecting the future of the nation among 70 high-level congressional stakeholders.

NREL worked with others to establish the first renewable energy and energy efficiency technology business incubator alliance with the Austin Technology Incubator in Texas. NREL is working to establish similar alliances in California and other states.

In FY00, we began baseline analyses that would position us to take a leadership role among DOE laboratories in sustainability issues. We worked with Public Service Company of Colorado to site a large-scale wind turbine and negotiated an increase in NREL's green power in return. Working closely with GO and DRO, we obtained commitments from regional government facilities to purchase 10MW of green power through the WindSource program. In FY01, we will develop and begin to implement our plan, a long-term view that will move NREL further along a "sustainable" path.

In FY01, we will further expand the visibility of the corporate partnership in providing value to NREL and DOE. And, we will put in place mechanisms to increase the impact of deployment facilitation.

**Performance Objective 2.1 (Bull/Garrett)** Demonstrate leadership in advancing initiatives that support the DOE-EE mission.

### **Key Tasks**

- Manage the Laboratory's program development investments to develop new opportunities. Continue to support DOE efforts to integrate and advance major new initiatives, such as Bioenergy and Distributed Power, and enhance opportunities to link applied and basic science programs.
- Support DOE's Distributed Energy Resource Task Force, broaden stakeholder support for DOE's role in distributed power and catalyze the development of partnerships.
- Effectively implement the National Bioenergy Center and demonstrate its value in integrating research efforts across organizations.
- Support communications planning for Laboratory initiatives on bioenergy and distributed generation
- Respond to new initiatives such as the Nanoscale Science Initiative and be awarded funding for research projects.
- Continue to support building the relationship between the renewable and natural gas industries and look for opportunities for collaboration.
- Develop and strengthen relationships within the Office of Science and with lead laboratories and universities that support the Office of Science.
- Support DOE's initiatives such as the Energy Efficiency and Renewable Energy Network and Clearinghouse (EREN/EREC) and Clean Energy for the 21<sup>st</sup> Century through the use of strategic communication approaches (general, technical, outreach, and targeted).
- Through subcontracting and other technology transfer mechanisms, ensure that DOE/NREL technology achievements are understood and effectively implemented.
- Develop the relationship with the National Energy Technology Laboratory.

### **Measuring Performance**

NREL performance will be measured by evidence of progress on key tasks as well as by DOE and stakeholder feedback. NREL will work with GO and Headquarters staff to develop and implement a means of gathering feedback that is part of an integrated data-gathering effort so that a single request can meet the needs for feedback on a number of indicators. The specific indicators to be used to measure performance against this objective include:

**Performance Indicator 2.1.1** Lab-level initiatives yield clear, stakeholder-supported strategies and new DOE or WFO programs that further DOE mission objectives.

**Performance Indicator 2.1.2** Relationships and collaborations with external entities needed to support new and ongoing lab Initiatives are established.

**Performance Objective 2.2 (Truly)** Demonstrate NREL's leadership in mission-related national and international forums.

### **Key Tasks**

- Participate in conferences, professional meetings, and meetings of trade associations that will show NREL leadership to key stakeholders and DOE, and have an impact on NREL's mission.
- Conduct periodic meetings with the National Advisory Council with a focus on future Laboratory strategic directions and national trends and reflect these inputs in the NREL plans.
- Hold forums to discuss the potential domestic and international roles of clean energy technologies and represent at appropriate forums.
- Support high-impact staff assignments to other organizations and agencies that provide mechanisms for advancing the mission.

### **Measuring Performance**

Performance against this objective will be measured in terms of the outcomes of the key tasks. The specific indicators that will be used to measure performance against this objective include:

**Performance Indicator 2.2.1** NREL participation in panels, committees, and other forums has national or international impact.

**Performance Indicator 2.2.2** NREL-convened forums demonstrate the Laboratory's leadership role in mission-related topics of national and international interest.

**Performance Objective 2.3 (Bellows/Garrett)** Establish NREL as a model for measuring and enhancing DOE laboratory sustainability, maximizing efficient use of all resources and minimizing negative impacts on the environment.

### **Key Tasks**

- Develop a detailed, multi-year plan for the Sustainable NREL project.
- Begin to integrate Sustainable NREL concepts and metrics into other NREL plans.
- Identify related appropriate changes to existing NREL policies and procedures and modify them.
- Provide training and communicate with key stakeholders.

### **Measuring Performance**

Performance will be measured initially by evidence of clear and agreed upon baselines and project approach for this change in how NREL does business, and then by achievement of planned tasks towards the highest priority goals of the project.

**Performance Indicator 2.3.1** NREL's plan for enhancing the Laboratory's "Sustainability" has been developed, including establishing quantitative performance baselines and targets.

**Performance Indicator 2.3.3** Stakeholder groups have been identified and appropriately involved in developing NREL's plan for enhancing the Lab's "sustainability."

**Performance Objective 2.4 (Truly)** Demonstrate effective corporate leadership on behalf of NREL.

### **Key Tasks**

- Implement a process to ensure that open management positions are filled with the best available talent.
- Facilitate discussions across partner organizations to share lessons learned and identify best practices that offer potential advantages for NREL.
- Facilitate collaborations among laboratories leading to development of new program opportunities with DOE and others.
- Implement mechanisms that facilitate communications among the technical staff at NREL and the technical staff in partner organizations to share knowledge regarding emerging science and technology opportunities.
- Provide access to partner industry networks to support development of collaborative efforts.
- Provide strategic advice to the Laboratory through Governing Board meetings, Operations Committee meetings, and participation in summits.
- Provide corporate business and management support in analyzing and developing NREL facility options, in improving NREL staff understanding of total compensation (salary and benefits), and in developing strategy and tactics to enhance deployment facilitation at NREL.
- Conduct independent audit and assessments per the 2001 Annual Internal Audit Plan.

### **Measuring Performance**

**Performance Indicator 2.4.1.** The contributions of corporate "subject matter experts," market intelligence, and networks facilitate achieving NREL's defined strategic, operational, and business management objectives.

**Performance Indicator 2.4.2.** Independent corporate assessments and audits are conducted and results are provided to NREL management as input to issue resolution and improvement.

**Performance Objective 2.5** (*Bull, Pietruszkiewicz, Garrett*) Catalyze development of self-sustaining businesses and markets through new and innovative deployment approaches.

**Performance Indicator 2.5.1** A new energy efficiency and renewable energy technology incubator alliance is established.

**Performance Indicator 2.5.2** Domestic and international policy development, and activities resulting in the reduction of barriers encouraging market development, are appropriately supported.

### **Key Tasks**

- Facilitate technology deployment through work for others.
- Lead and participate in Environmental, International, and State and Local initiatives which will further the deployment of renewable technologies.
- Implement the Laboratory's International and Environmental initiatives.

### **Measuring Performance**

Performance will be measured in terms of NREL's ability to influence changes in policy and to establish new market mechanisms that create or build markets for EERE technologies.

### **Laboratory Viability**

#### **Critical Outcome [3.0]**

Ensure the long-term viability of NREL through enhancement of institutional visibility and ensuring retention and development of core scientific and business competencies and facility capabilities.

In FY00, NREL expanded programs focused on retaining staff and conducted baseline measurements of the work environment through an NREL Staff Survey. In response, NREL developed an action plan to address key issues and opportunities. We developed strategic improvement plans to enhance NREL capabilities in specific areas such as Analysis and Computational Science.

We expanded the DDRD program and took initial steps to increase the visibility of the portfolio on supporting key technology areas. We implemented Leadership Training and Skills Training. We worked closely with GO and EE to examine our capital needs and provided the justification needed to increase the amount of GPP/GPE funds available for NREL facilities and equipment. We made progress in working with DOE to define long-term program requirements to inform our site development and capital plans.

In FY01, we will conduct a FY01 NREL Staff Survey and compare the results with FY00 baselines. We will continue to emphasize on building a world-class analysis capability,

strengthening our leadership skills, improving our work environment, and building our computational science capability.

**Performance Objective 3.1 (Bull/Garrett)** Build and sustain the core technical competencies of NREL (capabilities, facilities and equipment).

**Key Tasks**

- Develop an enhanced and expanded Fellows Program to improve the scientific quality of the Laboratory.
- Ensure that NREL science and technology thrusts are well represented in transition materials and NREL plans.
- Develop and implement an overall strategy for maintaining and enhancing NREL's core technical competencies.
- Plan for enhanced research facilities based on well-founded program requirements.
- Complete the development of, and begin to implement, the long-term strategy developed in FY00 for strengthening NREL's scientific computing capability.
- Continue to focus the DDRD program on building/enhancing core competencies and exploring innovative concepts.
- Pursue additional Strategic Hires, as well as additional entry-level staff within the Research Centers.
- Implement strategies for enhancing NREL's competencies in Analysis, Distributed Energy Resources, and Bioenergy.

**Measuring Performance**

NREL performance against this objective will be measured by how well our management of strategic investments and activities build the future of the Laboratory. The specific indicators that will be used to measure performance include:

**Performance Indicator 3.1.1** NREL facilities and equipment plans and budget requests reflect DOE plans and initiatives.

**Performance Indicator 3.1.2** Program and discretionary investments build capabilities strategic to the future of the Laboratory.

**Performance Indicator 3.1.3** Strategic hires are made in NREL research centers.

**Performance Objective 3.2 (Truly)** Develop NREL's staff, strengthen its leadership, and enhance the work environment.

**Key Tasks**

- Continue leadership training begun in FY00. Provide access to a broader suite of training programs.
- Develop directorate succession plans.

- Provide cross-training opportunities or assignments.
- Evaluate NREL's compensation and benefits package "in toto" and recommend changes.
- Evaluate best communication practices at the lab. Reward superior communication practices.
- Implement action plans generated from the NREL Baseline Staff Survey.
- Conduct the FY01 edition of the NREL Staff Survey.

### ***Measuring Performance***

Management assessments of Laboratory performance and of the results of the NREL Staff Survey will be key ongoing means by which NREL will assess the work environment and target areas for improvement. The staff survey will be implemented on an annual basis starting in FY00. Specific performance indicators include:

***Performance Indicator 3.2.1*** Management practices that enhance NREL's ability to attract, develop and maintain a diverse staff are implemented and effective.

***Performance Indicator 3.2.2*** Development programs that enhance management and supervisory skills, succession planning, and build leaders in all parts of the Laboratory are implemented and effective.

***Performance Indicator 3.2.3*** Computer software, administrative, and other skills training programs are available and effectively delivered.

***Performance Indicator 3.2.4*** Initiatives and activities are defined and implemented to further enhance and improve NREL's work environment.

***Performance Indicator 3.2.5*** Internal communications throughout the Laboratory are enhanced.

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| <p><b><i>Performance Objective 3.3 (Garrett)</i></b> Develop a credible and recognized analysis capability that supports EERE's strategic corporate and sector analysis needs.</p> |
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### ***Key Tasks***

- Articulate and invest to enhance NREL's current and planned core analysis capabilities.
- Implement the Analysis Strategy agreed upon with EERE in FY00 to establish collaborations with external analysis capabilities.
- Develop and implement a communication plan to enhance the visibility and influence of NREL's analysis program
- Continue to develop the Internet Platform for analysis and initiate its use internally and externally
- Strengthen cohesion and strategic focus of the Energy Analysis Office (which is separated geographically)
- Host a forum of key decision leaders on analytical issues of importance to EERE
- Perform analyses and develop white papers to support NREL and EERE transition strategies

- Establish a seminar series featuring opinion leaders and leading energy analysts
- Hire at least one entry level analyst to support bioenergy related analyses

### ***Measuring Performance***

NREL will carefully define its analysis niche and build that as a core competency. In order to provide DOE with a robust analysis capability, it will also build bridges to external resources to access best available capabilities. The success of this effort will be measured through the feedback from DOE as well as other stakeholders. Feedback on the understanding of NREL's analysis capabilities and work, and the quality of that work will be sought, relying extensively on external recognition and validation.

Specific indicators that will be used to assess performance against this objective include:

***Performance Indicator 3.3.1*** NREL's core analysis capabilities are strengthened through establishing substantive external collaborations.

***Performance Indicator 3.3.2*** NREL has refocused its in-house analysis capabilities to provide integrated, "world class" analysis services in conjunction with collaborating institutions.

### **Mission Support**

#### ***Critical Outcome [4.0]***

Design, enhance and implement NREL business and management systems and work processes to provide an effective and efficient work environment that enables execution of the mission.

In FY00, the 3-year strategic plan for NREL's information technology architecture upgrade was completed, including a smooth transition to Y2K-compliant and secure systems. NREL developed and began to implement a robust cyber security program. Now regular updates will be made to maintain the information technology infrastructure at a high level of efficiency in support of the laboratory IT needs. New financial systems were implemented, and training was provided on the financial data access tool, BRIO. In FY00, construction of the Solar Radiation Research Facility was completed, as well as moves to occupy the facility. Also, the FY00-phase of the Field Test Laboratory Building modifications was completed. In FY01, the approved Laboratory Operations Annual Operating Plans will be executed. Particular emphasis will be placed on developing measures of internal customer satisfaction with Laboratory support products and services.

**Performance Objective 4.1 (Bellows)** Demonstrate operational and business management effectiveness and efficiency supporting Laboratory objectives, research needs and DOE requirements.

### **Key Tasks**

- Execute approved Annual Operating Plans for Laboratory Operations.
- Establish measures of customer satisfaction for internal support products and services.
- Begin to implement the cyber security plan.
- Complete Title I design of the Science and Technology Facility
- Finalize project priorities for FY01 capital spending, supporting Laboratory goals for maintaining our infrastructure and developing our sites, and implement spending plan.

### **Measuring Performance**

Performance of Laboratory Operations support functions will be measured against requirements and established performance metrics to demonstrate efficiency, productivity, and required compliance in the execution of NREL's mission. Also, the NREL Staff Survey will be administered for FY01, and compared to the FY00 baseline.

**Performance Indicator 4.1.1** Performance of Laboratory operations support functions meets or exceeds requirements and established performance metrics.

**Performance Indicator 4.1.2** All construction projects are managed within schedule and budget.

**Performance Objective 4.2 (Bellows)** Implement programs, projects and management practices that result in improvement in or enhancement of laboratory business, operating, and research systems.

### **Key Tasks**

- Fully implement the Laboratory's Make or Buy Process as a cost and efficiency improvement.
- Demonstrate efficiency gains and productivity enhancements through improvements to Laboratory Operations processes, such as financial data availability, web-based employee services, automated compensation planning, and electronic timekeeping.
- Determine the degree to which Alternative Dispute Resolution mechanisms can be utilized to enhance Laboratory business practices and reduce costs.
- Measure the impact of preventative audit work plus audit recommendations to evaluate their effectiveness against past practices and industry benchmarks; focus particular attention on recommended cost savings.

### ***Measuring Performance***

Performance will be measured by demonstrating that improvements have resulted in more effective and efficient business management practices and operations that enable the execution of mission responsibilities.

***Performance Indicator 4.2.1.*** NREL's make-or-buy program is fully implemented and the results are integrated into the planning and budgeting processes for FY02.

***Performance Indicator 4.2.2*** Improvement initiatives, projects and activities result in more efficient and effective business management practices and operations, and strengthen the Laboratory's enabling infrastructure.

### **Environment, Safety, and Health**

#### ***Critical Outcome [5.0]***

Ensure that NREL protects the safety and health of the workforce and the community, and the environment.

In FY00, NREL ensured a continued high level of excellence in ES&H in all laboratory operations, receiving DOE approval for its implementation of the Integrated Safety Management System. In FY01, the approved ES&H Office Annual Operating Plan will be implemented, which includes ES&H priorities such as development and implementation of an ES&H risk assessment data base, transition of NEPA document preparation responsibilities from GO to NREL, and completion of necessary NEPA support activities such as the NWTC Environmental Assessment. All Centers and Offices across the Lab participate in ensuring a safe workplace and protection of the environment through pursuit of the Laboratory FY01 ES&H goals and inclusion of appropriate ES&H tasks in their Annual Operating Plans.

***Performance Objective 5.1: (McConnell)*** Sustain excellence in safety, health, and environmental protection

#### ***Key Tasks***

- Execute the approved ES&H Office Annual Operating Plan and ES&H elements of Center and office Annual Operating Plans.
- Establish a process and resources for completion of site- and project-specific Environmental Assessments in FY01 and out-years.
- Develop and implement an ES&H risk assessment database.
- All Centers/Offices support achievement of Laboratory ES&H goals through continuous assessment of ES&H risks, preparation and maintenance of Standard Operating Procedures where required, completion of injury prevention activities such as ergonomic evaluations, and maintenance of required ES&H training.

### ***Measuring Performance***

ES&H performance will be measured using target values for multiple ES&H objectives established with the NREL Safety Council. The goal is to meet or exceed DOE and industry baselines as identified in the NREL Business and Operating Results publication.

### ***Performance Indicators***

***Performance Indicator 5.1.1*** Performance for FY01 meets or exceeds DOE and industry baselines as identified in the NREL Business and Operating Results publication.

***Performance Indicator 5.1.2*** An ES&H risk assessment database is developed and implemented.

***Performance Indicator 5.1.3*** Processes and resources are established and implemented for completion of additional NEPA support activities including the NWTC and project-specific environmental assessments.

### **Outreach and Stakeholder Relations**

#### ***Critical Outcome [6.0]***

Provide leadership in building strong relationships and new alliances with local, regional, national and international stakeholders to advance awareness and support of the DOE renewable energy and energy efficiency mission and technologies, foster open communications, and advance science, mathematics, and technology education.

In FY00, NREL's stakeholder strategy was implemented and the Colorado Energy Science Center nonprofit corporation supporting the NREL education programs and Visitors Center moved from concept to an operating entity. Also in FY00, the Education Strategy developed in FY99 was implemented. In FY01, the approved Annual Operating Plans for Communications and Public Affairs, Education Programs, and Stakeholder Partnerships will be executed and enhancements will be implemented such as reinvigorating the speakers bureau and establishing new stakeholder relationships with outside organizations such as the Colorado Association of Commerce and Industry. A major focus will be increasing the visibility of NREL to the external community and establishing methods to measure the results. The Education Program will be effectively conducted and meet or exceed DOE National Laboratory education program standards.

***Performance Objective 6.1 (Harris)*** Build relationships and new alliances and produce communication products, to promote awareness and support of renewable energy and energy efficiency technologies among stakeholders, and enhance the presence of NREL in the local and regional communities.

### ***Key Tasks***

- Develop new customer feedback survey for communications services.
- Achieve recognition for communications product quality from professional associations.
- Execute the approved Annual Operating Plans for Communications and Public Affairs, and Stakeholder Partnerships.
- Implement the FY01 media strategy.
- Implement strategies defined in the Visitors Center outreach plan completed in FY00.
- Reinvigorate the NREL speakers bureau by participating with local audiences.
- Respond to legislative and governmental relations requests through intelligence, analysis, and effective communications with Laboratory researchers and management.
- Enhance the Colorado Executive Outreach program.
- Establish new relationships with outside organizations, such as the Colorado Association of Commerce and Industry, education groups, etc, and maintain current ones.
- Build a Stakeholder Partnerships Web site on the NREL Source.
- Gather feedback from stakeholders regarding general understanding and use of renewables, name recognition, and perceptions of NREL's products and outreach activities.
- Manage stakeholder relationships to advance awareness and support for the DOE renewable and energy efficiency mission and technologies.

### ***Measuring Performance***

Performance will be measured by demonstrating meaningful NREL visibility in local and regional communities, and enhanced visibility of the DOE-EE renewable and energy efficiency technologies. NREL will also demonstrate enhanced stakeholder relationships and networks, and implement an effective media strategy.

***Performance Indicator 6.1.1*** Positive NREL presence in local and regional communities is demonstrated.

***Performance Indicator 6.1.2*** Opportunities to strengthen stakeholder awareness of efficiency and renewable energy technology and enhance Laboratory visibility are created and/or appropriately acted upon.

***Performance Indicator 6.1.3*** NREL stakeholder relationships and networks are established, maintained and enhanced as evidenced by outcomes resulting from stakeholder relationships.

***Performance Indicator 6.1.4*** NREL's media strategy is effectively implemented as evidenced by the number of media mentions.

**Performance Objective 6.2 (Harris)** Implement programs that advance high quality science, mathematics, and technology education.

### **Key Tasks**

- Execute the approved Annual Operating Plan for Education Programs.
- Increase and report the extent and quality of NREL's research and development interactions and partnerships with colleges and universities in the State, the region, and nationally, and in concert with Performance Objective 2.1, implement Master Agreements with selected universities.
- Conduct an array of education programs and partnerships that promote improvement of the science, mathematics, and technology education system.
- Foster diversity by developing a pipeline to NREL for a diverse student population; participating in science, math, and technology education programs for women and underrepresented ethnic minorities; and implementing Phase 1 of the Native American Education Initiative.
- Seek sustaining funding from DOE for NREL's Science and Technology Education Programs
- Articulate the DOE National Laboratory education program standards, and demonstrate NREL's performance with respect to these standards.

### **Measuring Performance**

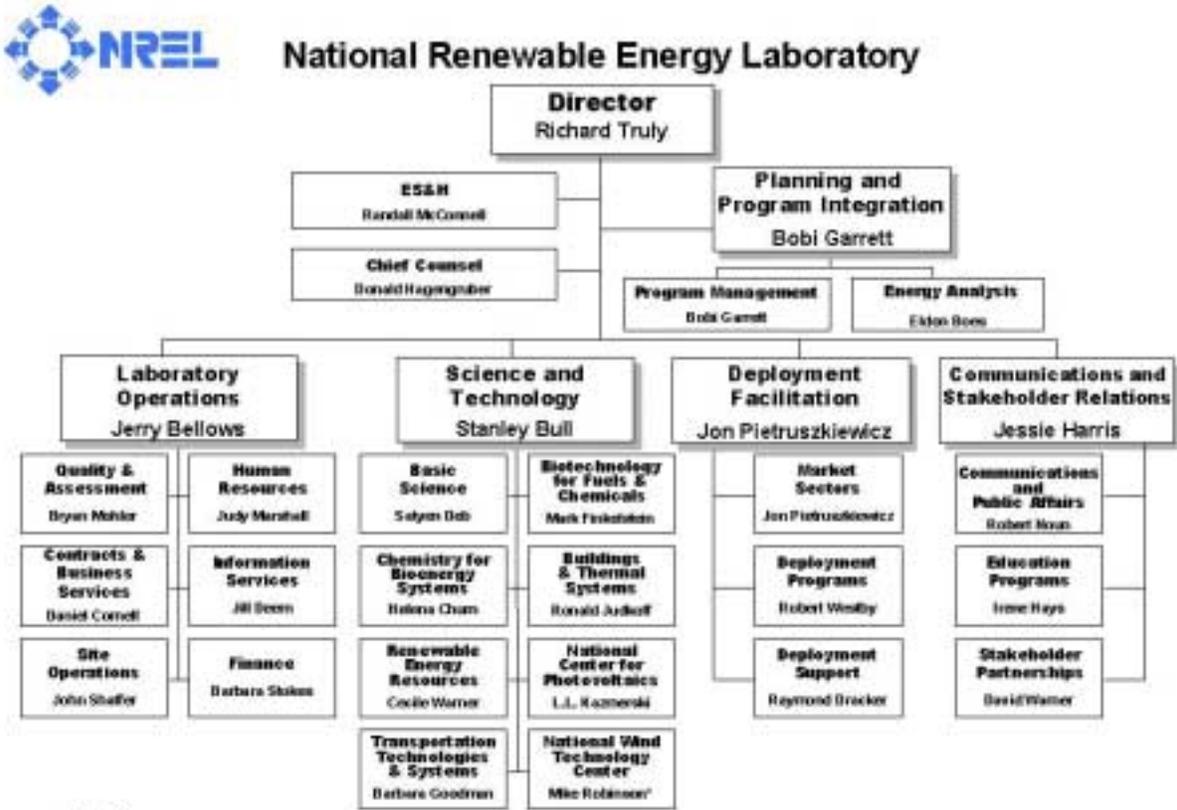
NREL's performance on education programs will be measured by securing DOE and other funding for the Education programs, and by demonstrating that resources are being used effectively to meet or exceed DOE National Laboratory education program standards.

**Performance Indicator 6.2.1** Available resources are effectively utilized for hosting students and teachers at NREL, and for participation in DOE education programs.

**Performance Indicator 6.2.2** Results of education evaluation tools and protocols indicate that NREL education programs are effectively conducted and meet or exceed DOE National Laboratory education program standards.

### III. NREL ORGANIZATION

The current organization structure is shown in the figure below.



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#### IV. RESOURCE SUMMARIES

| <b>FY 2001 Program Funding Forecast</b> |  |   |   |
|---|--|---|---|
| <b>Program</b>                          | <b>FY 1999<br/>Actual<br/>Funding<br/>Authorizations</b> | <b>FY 2000<br/>Estimated<br/>Funding<br/>Authorizations</b> | <b>FY 2001<br/>Estimated<br/>Funding<br/>Authorizations</b> |
| Advanced Industrial Technologies        | 2,383  | 1,330   | 1,434   |
| Analytic Studies                        | 2,386  | 2,945   | 3,600   |
| Biomass Power                           | 8,353  | 5,789   | 8,250   |
| Biofuels                                | 25,414   | 18,100  | 18,110  |
| Building Energy Technology              | 9,671  | 11,956  | 11,350  |
| Concentrating Solar Power               | 3,080  | 7,424   | 7,224   |
| DOE-Other                               | 7,170  | 5,349   | 8,400   |
| Energy Research                         | 4,316  | 4,756   | 4,756   |
| Federal Energy Management               | 7,317  | 5,613   | 6,000   |
| Fuels Utilization                       | 8,739  | 10,026  | 9,700   |
| Geothermal                              | 1,587  | 2,333   | 1,294   |
| Hybrid Vehicles                         | 10,350   | 5,083   | 4,500   |
| Hydrogen Energy                         | 4,100  | 4,820   | 4,770   |
| Information and Outreach                | 4,248  | 4,800   | 5,074   |
| Photovoltaics Energy                    | 50,085   | 48,614  | 51,568  |
| Solar Heat and Buildings                | 2,561  | 1,542   | 1,585   |
| Superconductivity                       | 770  | 750   | 800   |
| Wind Energy                             | 25,465   | 25,620  | 27,800  |
| Safeguards and Security                 | 0  | 0   | 2,077   |
| Work for Others - Federal               | 3,776  | 3,077   | 2,000   |
| Work for Others - Non-Federal           | 4,212  | 3,959   | 4,328   |
| SUBTOTAL OPERATING                      | 185,981  | 173,886   | 184,620   |
| General Plant Projects                  | 1,869  | 750   | 1,600   |
| General Purpose Equipment               | 2,031  | 350   | 2,400   |
| Construction                            | 0  | 0   | 0   |
| Capital Equipment                       | 2,257  | 2,649   | 1,900   |
| SUBTOTAL NON-OPERATING                  | 6,157  | 3,749   | 5,900   |
| <b>TOTAL FUNDING</b>                    | <b>192,138</b>   | <b>177,635</b>  | <b>190,520</b>  |

## FY 2001 NREL Financial Plan Summary

|                              | FY 1999<br>Actual | FY 2000<br>Latest<br>Estimate | FY 2001<br>Cost<br>Proposal |
|------------------------------|-------------------|-------------------------------|-----------------------------|
| <b>Beginning GSO</b>         |                   |                               |                             |
| DOE/EE Operating             | 63,170            | 61,063                        | 47,067                      |
| DOE/EE Cap/constr            | 9,206             | 3,005                         | 1,650                       |
| Subtotal GSO                 | 72,376            | 64,068                        | 48,717                      |
| <b>Budget Authority</b>      |                   |                               |                             |
| DOE/EE Operating             | 185,981           | 173,886                       | 184,620                     |
| DOE/EE Cap/constr            | 6,157             | 3,749                         | 5,900                       |
| Subtotal Budget Authority    | 192,138           | 177,635                       | 190,520                     |
| <b>Total Money Available</b> |                   |                               |                             |
| DOE/EE Operating             | 249,151           | 234,949                       | 231,687                     |
| DOE/EE Cap/constr            | 15,363            | 6,754                         | 7,550                       |
| Total Money Available        | 264,514           | 241,703                       | 239,237                     |
| <b>Total Costs</b>           |                   |                               |                             |
| DOE/EE Operating             | 188,088           | 187,882                       | 188,957                     |
| Inhouse                      | 97,582            | 104,059                       | 104,254                     |
| Subcontracts                 | 90,506            | 83,823                        | 84,703                      |
| % Subcontracts               | 48.1%             | 45.7%                         | 44.8%                       |
| DOE/EE Cap/constr            | 12,358            | 5,104                         | 6,152                       |
| Total Costs (with fee)       | 200,446           | 192,986                       | 195,109                     |
| <b>Ending GSO</b>            |                   |                               |                             |
| DOE/EE Operating             | 61,063            | 47,067                        | 42,730                      |
| DOE/EE Cap/constr            | 3,005             | 1,650                         | 1,398                       |
| Subtotal GSO                 | 64,068            | 48,717                        | 44,128                      |
| Direct Labor Multiplier      | 2.96              | 2.89                          | 2.85                        |
| Program FTEs                 | 417               | 421                           | 440                         |
| Total FTEs                   | 809               | 830                           | 851                         |
| Indirect Costs               | 47,382            | 46,651                        | 48,014                      |

## MAJOR INVESTMENTS

NREL invests to build and enhance core competencies and supporting infrastructure and to analyze, plan, and implement new initiatives that create new or expanded program opportunities for the Laboratory. Major areas of investment are described below.

### *Director's Discretionary Research and Development [DDRD] Program*

Technical innovation is critical to the overall success of the NREL and DOE programs it supports. An important avenue for encouraging innovation at NREL is the Director's Discretionary Research and Development (DDRD) program.

The DDRD program enables scientists to pursue cutting edge science thereby enhancing their scientific expertise and reputations and increasing their value as a resource to DOE and the nation. By being at the forefront of new scientific ideas, the scientists are able to attract new talent to the laboratory and maintain the vitality and viability of the scientific programs. As is the case with industrial leaders, the opportunity to pursue innovative ideas provides the foundation for advancement in technology and promotes creativity in the laboratory environment.

By EE policy, the DDRD program may utilize up to 2% of the Laboratory's annual estimated funding from Appropriations, excluding funding specifically identified for capital equipment or for construction. The specific level of funding is negotiated annually between NREL and the DOE Golden Field Office, in consultation with the EE Office of the Assistant Secretary. With level funding, the ceiling is generally \$3.0 to \$3.5 million annually. Individual projects can be authorized for funding up to \$500,000 for a period of performance up to three years, subject to annual funding authorization. In FY01, NREL is proposing a DDRD ceiling of \$3.2 million and has included \$3.0 million in its cost proposal.

Thirty-three projects were active in FY00, and the period of performance of about two-thirds of these projects extends into FY01. The list of continuing projects is given on page 24. The projects address a wide range of research topics in bioenergy, biotechnology, chemistry, advanced materials for renewable energy technologies, advanced measurement and characterization techniques, distributed and hybrid energy systems, energy efficiency technologies, and energy analysis. These projects are intended to enhance or expand NREL capabilities to carry out its assigned mission or to prove new concepts to the point that they can be considered viable options and are included in DOE programs. Assuming availability of funding, NREL executive management will invite new project proposals in FY01 consistent with the Laboratory mission and DDRD program objectives.

Proposals received in response to the call for DDRD proposals undergo a technical review by a team of three Laboratory experts, followed by a second-stage review by the Laboratory's Research Fellows. The Research Fellows make recommendations to Executive Management on which projects to fund based on technical merit, and the Laboratory Director makes the final selections.

In FY01, DDRD program visibility will continue to be enhanced through staff seminars, poster sessions for DOE, NREL staff and NREL's advisory groups, and expansion of the DDRD site

on the NREL Source to include descriptions of the DDRD portfolio. In addition, NREL will hold the annual review of the DDRD Program with DOE and produce the FY01 DDRD Annual Report by October 31, 2001.

### ***Strategic Initiatives***

NREL conducts assessments of potential opportunities and issues related to the Laboratory's mission, and develops and implements strategies that create new program opportunities for the Laboratory. Annual operating plans are written and reviewed for each initiative/activity to ensure that they are independent of current DOE-funded programs, and periodic reviews of progress and the merit of continued investment are conducted. In FY01, NREL will support laboratory-directed planning and technical liaison activities focused in the following areas:

**Bioenergy.** The Bioenergy initiative focuses on establishing a National Bioenergy Center in partnership with Oak Ridge National Laboratory to provide enhanced support to DOE in implementing the Presidential Executive Order 13134 on Developing and Promoting Biobased Products and Bioenergy. Further, the initiative aims to strengthen links with existing bioenergy programs, better identify NREL opportunities in bioenergy, and make recommendations about bioenergy R&D investments. The investment made in FY00 was used to develop a strategic 5-year plan for Bioenergy activities that was proposed to DOE, to conduct an extensive inventory of capabilities and gaps in the DOE complex, to establish the framework for a National Bioenergy Center, and to build collaborations with partner organizations, particularly ORNL and USDA. In FY01, the focus will be on fully implementing the National Bioenergy Center, conducting the analyses needed to optimize its impact, developing a communication plan to prepare the Laboratory to execute DOE's 5-year plan.

**Distributed and Hybrid Generation.** The Distributed & Hybrid Generation initiative focuses on understanding the evolution of the electricity generation market and on developing an NREL-proposed long-term strategy for distributed power. In FY00, the investment focused on extending stakeholder relationships and validating the NREL-developed strategy with the electric sector. Portions of this strategy have been adopted by DOE. The investment was also used to participate in national forums on Distributed Energy Resources (DER), to build collaborations with other laboratories, and to develop and evaluate the alternatives for establishing a Clean Energy Systems test site at NREL. In FY01, the initiative will continue to support NREL participation in important national forums, to refine the Clean Energy Systems Test Site concept, and to develop new DOE and/or WFO programs consistent with priority opportunities in the NREL strategic plan for the initiative and NREL capabilities.

**Carbon Management.** The Carbon Management initiative focuses on identifying and developing basic and applied research efforts in conversion of low-energy carbon sources into fuels, chemicals and materials. In FY00, investment was directed toward building relationships and pursuing joint proposals to NETL and the Office of Science in carbon management. In FY01, funds will be used to work with other labs to clarify the issues and articulate a science-based carbon management strategy for proposal to DOE. By the end of FY01, it is anticipated that the laboratory will have begun specific multi-year R&D projects funded from DOE or other federal agencies, and will have established NREL's role in collaboration with other DOE laboratories.

**International and Environmental Initiative.** The International and Environmental initiative focuses on developing programs that advance energy efficiency and renewable energy technologies as solutions to environmental problems and as major elements in the energy portfolios of developing nations around the world. In FY00, NREL supported efforts to build new relationships with environmental organizations and with international agencies and foreign governments to create opportunities to deploy renewable and energy efficiency technologies as solutions to environmental problems or to support development aspirations. Collaborations with international governments and non-governmental organizations, as well as funding from EPA and AID were expanded.

**Computational Science.** The Computational Science initiative was started in FY00 to develop an understanding of NREL's current scientific computing capabilities and a strategic plan that would bring computational science at NREL to a level commensurate with our theoretical and experimental sciences. In FY01, the draft plan will be shared with stakeholders and emphasis will be placed on taking the initial steps to implement the plan by establishing a computational science incubator, working with researchers to develop problem solutions using new tools, and beginning to propose more research efforts that have a robust computational science component.

**Natural Gas.** The Natural Gas initiative focuses on identifying common ground between the natural gas and renewable energy industries that will provide the basis for joint efforts in the future. In FY00, NREL supported DOE in building a relationship with the natural gas industry that led to the establishment of a gas industry/renewable industry alliance. It is anticipated that, in the short term, this industry will dominate the growing distributed energy marketplace. Since a healthy distributed energy market is critical to the implementation of renewable technologies, it is important that renewable technologies are included as it develops. In FY01 we will develop and propose concepts for inclusion in DOE's natural gas strategy, strengthen our relationship with the gas industry, and seek funding for projects that involve renewable/gas hybrids.

**Nanoscience and Nanotechnology.** NREL currently conducts research in several areas of nanoscience and technology for the Office of Science and EERE. These areas include: dye-sensitized nanocrystalline solar cells, quantum dots and quantum dot arrays for photovoltaic and photochemical conversion, theory of quantum dots, nanoparticle precursors for materials applications, carbon nanotubes and inorganic fullerenes for hydrogen storage. To build on these existing capabilities and position NREL to participate in the new DOE Nanoscience and Nanotechnology Initiative, NREL will develop materials that describe our current capabilities, identify and propose potential NREL roles in support this emerging DOE initiative, develop collaborations with other laboratories and universities, evaluate potential funding opportunities, and put forth proposals.

**Geothermal.** This initiative is focused on expanding NREL's role within the DOE program beyond its current technical role to take on broader, program management responsibilities. NREL will develop and propose to DOE strategies for revamping the NREL Geothermal Energy Program to increase outside interactions with the U.S. geothermal industry through cost-shared programs. Extensive relationship building with industry, with DOE regional and field offices, and with Sandia and INEEL will be required to execute a successful transition.

| <b>DDRD Projects Expected to Continue from FY 2000 to FY 2001</b>  |
|--|
| <b>Bioenergy, Biotechnology, Chemistry</b>   |
| Carbon Allocation and Partitioning in Woody Plants: A Means to Enhance Bioenergy Conversion and Carbon Sequestration – Mark Davis                      |
| Functional Genomics of Transposon-Tagged Maize Cell Wall Biogenesis-Related Genes – Steve Thomas   |
| Prediction of the Mechanical Properties of Standing Trees – Bob Meglen (anticipated end 9/30/00)   |
| Ionic Liquids as “Green” Reaction Media – Luc Moens  |
| New Biobased Polymers and Chemicals from Carbohydrates and Lignin – Joe Bozell and Steve Kelley  |
| Realizing Biorefineries: Expanding the Sugars Platform Using New Biomass-Derived Sugar Products – Jim McMillan, Rick Elander, and Kelly Ibsen          |
| Photobiological Production of High-Performance, Biodegradable Thermoplastics from Inexpensive Feedstocks by Photosynthetic Bacteria – Edward Wolfrum   |
| Development of Electrocatalysts Capable of Activating C-H and H-H Bonds – Dan DuBois   |
| Comparative Study of the Interaction of Fe(II) and Mn(II) with the Manganese-Binding Site of the Oxygenic Photosynthetic Apparatus – Michael Seibert   |
| Feasibility Studies for a Novel System for Algal Hydrogen Production – Maria Ghirardi and William Jacoby   |
| Photoconversion of Renewable Feedstocks for High-Density Fuels and Energy Storage – Daniel Blake (anticipated end 9/30/00)                             |
| <b>Advanced Materials for Renewable Energy Technologies</b>  |
| Polycrystalline TPV Converters Based on Te-Se Alloys – Kannan Ramanathan (anticipated end 9/30/00)   |
| Low-Bandgap GaInAsN Alloys for Advanced Thermophotovoltaic Energy Converters –Angelo Mascarenhas and Mark Wanlass (anticipated end 9/30/00)            |
| Solar-Grade Polysilicon Feedstock Development – Ted Ciszek   |
| Cadmium Tin Oxide Crystal Growth for Fundamental Studies – Ted Ciszek  |
| Combinatorial Synthesis of Solid State Electronic Materials for Renewable Energy Applications – David Ginley and John Perkins                          |
| Reactive Codoping of Arsenide Phosphide III-V Semiconductors for Improved Electrical Conductivity in Heavily Doped Layers – Mark Hanna                 |
| Development of a New Class of Materials for Semiconductor Applications – Harv Mahan  |
| Electrodeposited Mesoporous Transition Metal Oxides as Ion Insertion Hosts for Lithium Batteries, Electrochromics and Sensors – John Turner            |
| The Effect of the Orientation of the Excited State Dipole on the Efficiency and Polarity of Electron Transfer – Brian Gregg                            |
| Development of New Encapsulants for Ambient (Non-Vacuum) PV Module Encapsulation – John Pern   |
| <b>Advanced Measurement and Characterization Techniques</b>  |
| Time-Resolved Spectroscopy of Photovoltaic Materials with Sub-Micron Spatial Resolution – Steve Smith and Angelo Mascarenhas (anticipated end 9/30/00) |
| Anisotropy in Hydrogenated Thin-Film Silicon Materials – Brent Nelson  |
| Surface and Interface Studies by Second-Order Nonlinear Optical Spectroscopy – Randy Ellingson   |
| <b>Distributed and Hybrid Energy Systems</b>   |
| Advanced Fuel Cell Research – John Turner  |
| Monolithically Integrated PV Modules for Dish Solar Concentrators – Scott Ward   |
| New Capabilities for Worldwide Weather Data Sets – Bill Marion (anticipated end 9/30/00)   |
| <b>Energy Efficiency Technologies</b>  |
| Performance Verification of NREL’s Advanced Airfoils for Cooling Tower Fan Blades – James Tangler (anticipated end 9/30/00)                            |
| Combined Compressor Pump Advanced Prototype – Christopher Gaul   |
| <b>Energy Analysis</b>   |
| A Technology-Policy Expert System – Sam Baldwin and Brandon Owens  |