



Recovery Act Program Plan

Aeronautics Research

**Within the
American Recovery and Reinvestment Act of
2009**

June 15, 2010

Introduction

This is the plan for Aeronautics Research, funded by the American Reinvestment and Recovery Act (ARRA), under the Treasury Account Symbol (TAS) 80-0125.

The changes reflected in ensuing sections result from longer than originally expected times for processing the Aeronautics Program procurement actions, under the complex requirements associated with Recovery Act implementation. The revised completion dates also reflect final data from the negotiated recipient awards, which were not available during the development of the original program plan in May 2009. The milestones and measures have been revised per this higher fidelity of data. To date over 81% of the Recovery Act funds targeted to this program, have been awarded. Activities are expected to continue on this program through calendar year 2011.

Objectives

Program Purpose

NASA's aeronautics research generates innovative concepts, technologies, and capabilities needed to enable revolutionary change to both the airspace and the aircraft that fly within it. This research will lead to a safer, more environmentally friendly, and more efficient national air transportation system. Recovery funds will accelerate research in advanced aircraft technologies and systems, aircraft safety, fuel efficiency, and the Next Generation Air Transportation System.

Public Benefits

Recovery Act funds for NASA's Aeronautics Research Program and will accelerate key research, which will enhance the state of aeronautics for the nation, and provide a foundation for addressing the need for a Next Generation Air Transportation System (NextGen). These funds will also lead to job creation.

Specifically, NASA conducts cutting-edge, fundamental research in traditional aeronautical disciplines and emerging fields to help transform our nation's air transportation system, and to support future air and space vehicles. NASA also maintains a critical set of aeronautics infrastructure, such as wind tunnels, that meet National and public needs. NASA's Aeronautics Research Program addresses research challenges that must be overcome in order to create the Next Generation Air Transportation System (NextGen). This research will help find solutions for increasing the capacity, efficiency, and flexibility of our national air space. At the same time, this research will help address substantial aircraft noise, emissions, efficiency, performance, and safety challenges that must be met in order to design new aeronautical vehicles that can support NextGen.

Notably, given the already-high levels of air transportation safety, NASA's aeronautics research examines the additional solutions and technology to further reduce risk in this complex, dynamic operating domain of the Nations' aviation system. In addition to providing fundamental research on known safety concerns, the Aeronautics Research Program is also working with its partners to address the safety challenges created as the nation transitions to the Next Generation Air Transportation System (NextGen), including significant increases in air traffic, continued operation of legacy vehicles, introduction of new vehicle concepts, increased reliance on automation, and increased operating complexity.

NASA also actively addresses environmental concerns, which directly can benefit the public. As

the number of flight operations at many of the largest airports in the nation continue to increase; environmental concerns over noise and emissions will limit the capacity of those airports, and therefore, of the entire aviation system. As NextGen evolves to handle the projected growth in the national air transportation system, NASA Aeronautics is working to answer major questions that the system will face such as: How will we continue to reduce the environmental impact of aviation (in terms of noise, local and global emissions, and local air quality) despite its very significant growth?, and, What kinds of advanced vehicles will be required to satisfy the forecasted demand and levels of environmental compliance? NASA is ensuring that new generations of vehicles can operate within the NextGen in a manner that is conducive to minimizing the environmental impact of aviation.

For more information on these lines of research and the others that NASA Aeronautics conducts see <http://www.aeronautics.nasa.gov>.

Projects and Activities

Scope

NASA intends to invest \$150 million of Recovery Act funds, into the existing Aeronautics Research Program, to enhance and expand the fidelity of current foundational research activities; ensure the availability of aeronautical test facilities; and conduct integrated system level research activities supporting NextGen. NASA's Aeronautics Research Program is comprised of four programs: Airspace Systems, Fundamental Aeronautics, Aviation Safety, and Aeronautics Test. Research in all programs will be accelerated and enhanced through Recovery funds, some of which will be allocated to Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) activities.

The Aviation Safety program will use these funds to enhance and expand the fidelity of current research activities relating to composite materials and structures experimentation, simulations and flight tests. NASA's flight test capabilities maintained and vehicle health monitoring work enhanced. A potential new research effort may expand available methods for the Validation and Verification of Flight Critical Systems in response to a Joint Planning and Development Office (JPDO)-identified aviation system capability gap. The JPDO, working with the FAA, NASA, the Departments of Transportation, Defense, Homeland Security, Commerce, and the White House Office of Science & Technology Policy, was established to facilitate NextGen activities. Its task is to create and carry out an integrated plan for NextGen, spearhead planning, and coordinate research, demonstrations, and development in conjunction with relevant programs of other departments and agencies, and with the private sector.

The Airspace Systems program will use Recovery funds to accelerate progress and conduct integrated system research to support the requirements and research and development gaps identified by the JPDO for NextGen advancements. Technology concepts could be developed that include assessments of operational solutions and identification of technologies and procedures that will improve operational efficiency of the aviation system. Human-in-the-loop simulations and field demonstration/testing/trials may be conducted to initiate development of human/automation information requirements and decision-making guidelines for human-human and human-machine decision making, as these two important components are combined to operate more efficiently operate aircraft and the airspace system.

The Fundamental Aeronautics program will invest funds to reduce risk, accelerate progress, and initiate integrated aeronautical vehicle system level research in areas that have applicability to future vehicle concepts, reducing the impact of aviation on the environment. Vehicle concepts can be developed and matured to assess the viability of technologies like blended-wing-body

shaping, low emission engine combustors, low noise/vibration rotorcraft-wings, and advanced structures. All of these technologies have the potential to contribute to aircraft efficiency, reduce the use of fuel, or make an air-vehicle quieter. Integrated aircraft systems-level research determines the compatibility and environmental benefits of these technologies. Funding increases could also be used for development and wind tunnel testing of advanced vehicle shaping approaches needed for low-sonic boom supersonic aircraft, to enable community acceptance of supersonic flight over land.

The Aeronautics Test program will invest funds to help protect current and provide additional test capabilities for the aeronautics programs, and will bolster NASA's expertise and capabilities in critical test areas. Construction associated with building new or modification of these test facilities is expected to have a direct benefit on local economies. Funds used for maintenance and facility and equipment upgrades, will improve mission support capability, and enhance productivity.

Acquisition Characteristics

All work will be accomplished with contracts, cooperative agreements, and potentially grants. The recipients of this work will be academic institutions, both non-profit and for-profit organizations, and small businesses. The primary beneficiaries are the general public and its "scientist/researcher" and "engineer" communities.

Major Planned Program Milestones

Many of the Aeronautics Research Program activities are associated with on-going research efforts with no defined end date, rather a continual quest for better scientific knowledge, technology development or of long-term educational value. However, specific research milestones are identified for on-going efforts. The planned activities associated with Recovery Act funding typically will be started between May and June 2009, with the first milestone evaluation at the end of calendar year 2009. The expected completion date of activities associated with Recovery Act funding is typically no later than December 2011.

Note the following milestones are subject to change, based on the complex and highly dynamic nature of research and development-type activities.

Milestone 1: Complete aerodynamic wind tunnel evaluation of the re-design of a scaled free-flight Hybrid Wing Body (HWB) aircraft to optimize fuel-burn.

This type of airplane configuration looks significantly different and is much advanced from today's vehicles. It offers the potential of lower emissions, noise generation, and fuel burn than aircraft currently available in the Nation's aircraft fleet. Wind tunnel evaluation of the modified design of this concept aircraft is a necessary step prior to free-flight evaluation of the design's handling characteristics.

Expected Completion Date for Milestone 1: March 2010

Revised Expected Completion Date for Milestone 1: December 2011

Reason for Change: The changes reflected in ensuing sections result from longer than originally expected times for processing the Aeronautics Program procurement actions, under the complex requirements associated with Recovery Act implementation. The revised completion dates are also reflective of the final negotiated recipient awards.

Milestone 2: Develop and demonstrate an automated test generation package for flight-critical software verification or validation focused on margin to failure modes relative to current operational scenarios.

This research is developing tools used for validating and verifying flight-critical software used in aviation systems. There are challenges for verification and validation for the next generation of flight-critical systems. Advances in technology are placing an increasing strain on the ability to assure the integrity of new and anticipated flight software systems. Additionally, there is a perception that current approaches for the assurance of complex flight-critical systems impose a barrier to innovation. Thus, the NASA Aeronautics Research Program is working on innovative approaches, technologies, and processes to address these concerns. The specific focus is on flight-critical systems (i.e., systems comprising hardware, software and physical systems, used to execute pre-defined concepts of operation or operating procedures, and interacting with human operators including pilots and controllers) that will directly control some aspect of flight and thus must be demonstrated to the highest levels of safety. The objective is to develop techniques, tools, and methods to enable efficient and accurate analysis of safety aspects of software-intensive systems; ultimately reducing the cost of software verification and validation; and enabling in-the-field assurance of composed software-intensive systems.

Expected Completion Date for Milestone 2: September 2010

Revised Expected Completion Date for Milestone 2: September 2011

Reason for Change: The changes reflected in ensuing sections result from longer than originally expected times for processing the Aeronautics Program procurement actions, under the complex requirements associated with Recovery Act implementation. The revised completion dates are also reflective of the final negotiated recipient awards.

Milestone 3: Complete design for the Icing Capability in the Glenn Research Center Propulsion System Laboratory.

The Propulsion Systems Laboratory is a ground-based test facility that can provide true flight simulation for experimental research on air-breathing propulsion systems, i.e., aircraft engines. Currently the facility cannot simulate conditions where icing forms in an engine. Ice formation in an airplane engine can lead to operability issues, temporary thrust loss, and can damage part of the engine. The modifications to this facility will allow NASA and its research partners to better conduct important research in this area, and develop techniques to mitigate engine icing.

Expected Completion Date for Milestone 3: December 2009

Revised Expected Completion Date for Milestone 3: September 2011

Reason for Change: The changes reflected in ensuing sections result from longer than originally expected times for processing the Aeronautics Program procurement actions, under the complex requirements associated with Recovery Act implementation. The revised completion dates are also reflective of the final negotiated recipient awards.

Monitoring and Evaluation

NASA uses multiple methods, processes, and entities for monitoring and evaluating its performance. These same processes and procedures will be used for activities funded under the Recovery Act. NASA's programs are assessed for relevance, quality, and performance. A relevance review assures alignment with national priorities; alignment with the NASA Strategic Plan; impact on related fields of research or technology; and alignment with "customer" (users of NASA data, research results, etc.) needs. Determining quality is generally prospective and assures "best value" for an investment, using peer review processes. Performance reviews

evaluate whether a program is on track to meet its baseline performance commitments (cost, schedule, science/technical deliverable).

Reviews are conducted internal and external to the Agency. Entities such as the NASA Advisory Council (NAC) and the National Research Council perform external evaluations to assess NASA's program content and direction. Additional independent reviews are commissioned by the NASA Administrator or responsible mission organization to review programs for relevance and quality, as well as performance. Reviews are rigorous and methodical, and focused on the program's methods, results, and findings by others in the field with requisite expertise, and independence.

Responsibility for program and project management and their control mechanisms (NASA Procedural Requirements* (NPR) 7120 series), institutional management (NPR 8500 series), and financial management (NPR 9010 and 9120 series), occurs at all management levels of the Agency. NASA's management monitors different aspects of program or institutional performance, at the highest Agency levels, and uses a rigorous structure of program and management reviews for Agency-level decisions. To continue through each phase of development, programs must demonstrate, on an on-going basis and at key lifecycle junctures, an ability to manage in a manner that produces identifiable results, and must document performance against previously defined commitments including multi-year outputs, annual performance goals, milestones, and other metrics, as appropriate.

NASA internally monitors performance through monthly and quarterly reviews, at each management level. At the senior management level, program reviews, accompanied by an independent (internal) assessment, occur across all mission areas (aeronautics, science, space operations and exploration systems), and with an in-depth review each quarter rotating among the mission organizations. Senior management also reviews institutional data (finance, human capital, acquisition, infrastructure), and aggregated Agency measures and metrics, e.g., safety, crosscutting technical and non-technical issues. The data reviewed, and the accompanying analysis, allows the Agency to focus on, and proactively address, issues that could lead to not achieving desired performance goals.

Specific to the Aeronautics Research Program is also the conduct of six-month and annual reviews of the performance of the programs, with subject matter experts participating in the annual reviews. All findings and recommendations are documented. The Aeronautics Committee of the NAC provides annual input reflecting community opinions and recommendations. This information is used to assess progress toward meeting long-range outcomes, develop risk mitigation strategies, adjust priorities, make additional resource allocation, or take other management actions.

Regarding program partners, the Aeronautics Research Program maintains an extensive, competitive process using NASA Research Announcements (NRAs) to solicit proposals from educational institutions, non-profit organizations and industry engaged in foundational research. Details on the NRA process can be found at <http://www.aeronautics.nasa.gov>. When NASA Aeronautics works with government partners, the respective agencies are accountable for cost, schedule, and performance results, reviews occur routinely between and among all parties to ensure commitments are delivered on schedule and within budget.

* The [NASA Online Directives Information System Library](#), ensures access by NASA employees and contractors to the most current documentation.

Performance Measures

Table 1

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| Measure Description | Achieve progress on key development activities that support Fundamental Aeronautics research objectives to enable the design of vehicles that fly through any atmosphere at any speed. |
| Explanation of Measure | <p>NASA completes many research and technology development activities that demonstrate progress toward reaching the program research objectives. The long-term outcomes and additional information on research activities supporting Fundamental Aeronautics can be found at http://www.aeronautics.nasa.gov/fap/index.html.</p> <p>Each quarter a series of activities are tracked for their successful completion. Recovery fund activities will enhance and strengthen the current research supporting Fundamental Aeronautics.</p> <p>NASA will complete 90% of the planned activities supported with Recovery Act funds, which include:</p> <ul style="list-style-type: none"> • Designing, developing, and testing an inlet-fan system designed for aircraft boundary layer ingestion; • Designing, developing, and testing aircraft-engine ultra-high bypass component technology hardware; • Designing and fabricating combustor rig improvements to enable testing of advanced low nitrogen oxide injector designs; • Fabricating and installing a tilt-rotor drive system in the National Full-scale Aeronautics Complex to enable advanced tilt-rotor research, and design and fabricate instrumented blades for use in tilt-rotor aeroelastics research; and • Conducting wind tunnel assessment of aircraft designs optimized for low sonic-boom generation. <p>NASA revised the Aeronautics Program Plan to remove two activities from the scope of ARRA funding. Instead, NASA funded these activities with regular appropriations. Other ARRA investments increased accordingly. The activities removed are: 1) Develop a laminar flow Hybrid Wing Body (HWB) model for assessment at high Reynolds number in the National Transonic Facility (NTF); and 2) Conduct X-48B/C trailing edge modification wind tunnel and flight experiments.</p> |
| Measure Type | Output |
| Measure Frequency | Quarterly |

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| Original Program Target (without ARRA funds) | Zero percent. These activities were not planned for completion in this timeframe. |
| Revised Program Target (with ARRA funds) | 90% |
| Estimated Incremental Change in Performance (due to ARRA funds, estimated on May 15, 2009) | 90% |
| Revised Program Target (due to ARRA funds, estimated on May 31, 2010) | No revisions have been made to the target. |
| Goal Lead | Associate Administrator for Aeronautics |
| Measure Description | Variance from the planned cumulative obligations for the Aeronautics Research Program. |
| Explanation of Measure | <p>A key aspect of the American Recovery and Reinvestment Act is to assure the timely obligation of funds to the intended beneficiaries. NASA plans to make every effort to assure this happens on the plan that it has put forward, which has been designed to also maintain a prudent use of taxpayer funds, and provide key research and development program deliverables to the benefit of the public. An obligation of funds means a binding agreement is made with NASA's contractors and grantees that will result in outlays (or a payment for the services or goods they provided), immediately or in the future. NASA will measure its progress toward the planned obligations to-date, on a quarterly basis.</p> <p>NASA's baseline obligation plan (when available) is posted at www.nasa.gov/recovery.</p> |
| Measure Type | Output |
| Measure Frequency | Quarterly |
| Original Program Target (without ARRA funds) | ±10% |
| Revised Program Target (with ARRA funds) | ±10% |
| Estimated Incremental Change in Performance (due to ARRA funds, estimated on May 15, 2009) | Not applicable. |
| Revised Program Target (due to ARRA funds, estimated on May 31, 2010) | No revisions have been made to the target. |
| Goal Lead | Associate Administrator for Aeronautics |

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| Measure Description | Variance from the planned cumulative outlays for the Aeronautics Research Program. |
| Explanation of Measure | <p>A key aspect of the American Recovery and Reinvestment Act is to assure the timely obligation of funds to the intended beneficiaries. NASA plans to make every effort to assure this happens on the plan that it has put forward, which has been designed to also maintain a prudent use of taxpayer funds, and provide key research and development program deliverables to the benefit of the public. An obligation of funds means a binding agreement is made with NASA's contractors and grantees that will result in outlays (or a payment for the services or goods they provided), immediately or in the future. NASA will measure its progress toward the planned obligations to-date, on a quarterly basis.</p> <p>NASA's baseline obligation plan (when available) is posted at www.nasa.gov/recovery.</p> |
| Measure Type | Output |
| Measure Frequency | Quarterly |
| Original Program Target (without ARRA funds) | ±10% |
| Revised Program Target (with ARRA funds) | ±10% |
| Estimated Incremental Change in Performance (due to ARRA funds, estimated on May 15, 2009) | Not applicable. |
| Revised Program Target (due to ARRA funds, estimated on May 31, 2010) | No revisions have been made to the target. |
| Goal Lead | Associate Administrator for Aeronautics |
| Measure Description | Achieve progress on key development activities that support Aviation Safety research objectives to develop innovative tools, concepts, methods, and technologies that will improve the intrinsic safety attributes of current and future aircraft and of aviation operations. |

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| Explanation of Measure | <p>NASA completes many research and technology development activities that demonstrate progress toward reaching the program research objectives. The long-term outcomes and additional information on research activities supporting Aviation Safety can be found at http://www.aeronautics.nasa.gov/programs_avsafe.htm.</p> <p>Each quarter, a series of activities are tracked for their successful completion. Recovery fund activities will enhance and strengthen the current research supporting Aviation Safety.</p> <p>NASA will complete 90% of the planned activities supported with Recovery Act funds, which include:</p> <ul style="list-style-type: none"> • Strengthening experimental research and systems integration in composite materials and structures; • Providing enhanced materials and structures models, and higher fidelity simulations resulting in the ability to qualify performance prediction uncertainty in realistic environments; • Extending flight research of adaptive control technologies to prevent loss-of-control; and • Defining, integrating, and conducting initial research efforts in verification and validation of flight critical systems to respond to Joint Planning and Development Office (JPDO), an identified gap in key national capabilities. |
| Measure Type | Output |
| Measure Frequency | Quarterly |
| Original Program Target (without ARRA funds) | Zero percent. These activities were not planned for completion in this timeframe. |
| Revised Program Target (with ARRA funds) | 90% |
| Estimated Incremental Change in Performance (due to ARRA funds, estimated on May 15, 2009) | 90% |
| Revised Program Target (due to ARRA funds, estimated on May 31, 2010) | No revisions have been made to the target. |
| Goal Lead | Associate Administrator for Aeronautics |

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| Measure Description | Achieve progress on key development activities that support Airspace Systems research objectives to enable new capabilities for the airspace and airports (airport gates, taxiways, runways, and airport approach airspace) of a Next Generation Air Transportation System (NextGen). |
| Explanation of Measure | <p>NASA completes many research and technology development activities that demonstrate progress toward reaching the program research objectives. The long-term outcomes and additional information on research activities supporting Airspace Systems can be found at: http://www.aeronautics.nasa.gov/programs.asp.htm</p> <p>Each quarter a series of activities are tracked for their successful completion. Recovery fund activities will enhance and strengthen the current research supporting Airspace Systems.</p> <p>NASA will complete 90% of the planned activities supported with Recovery Act funds, which include:</p> <ul style="list-style-type: none"> • Addressing critical gaps in NextGen R&D with specific emphasis on Joint Planning and Development Office (JPDO) identified High Value Focus Areas; • Conducting deeper assessments of safety issues and risks for NextGen concepts; • Developing concept of operations requirements and analysis for government Unmanned Aviation Systems (UAS) access to the NAS in near term and for civil UAS access in the long term, in cooperation with other agencies; and • Building enhanced systems analysis and simulation capabilities to support exploration of NextGen operations concepts. |
| Measure Type | Output |
| Measure Frequency | Quarterly |
| Original Program Target (without ARRA funds) | Zero percent. These activities were not planned for completion in this timeframe. |
| Revised Program Target (with ARRA funds) | 90% |
| Estimated Incremental Change in Performance (due to ARRA funds, estimated on May 15, 2009) | 90% |

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| Revised Program Target (due to ARRA funds, estimated on May 31, 2010) | No revisions have been made to the target. |
| Goal Lead | Associate Administrator for Aeronautics |
| Measure Description | Aeronautics ground test facilities are available and operational in order to support the research, development, test, and engineering milestones of NASA and DoD programs from both schedule and cost perspectives. This metric is known as "on-time availability." |
| Explanation of Measure | <p>NASA completes many research and technology development activities that demonstrate progress toward reaching the program research objectives. The long-term outcomes and additional information on research activities supporting the Aeronautics Test Program can be found at http://www.aeronautics.nasa.gov/atp/index.html</p> <p>Each quarter a series of activities are tracked for their successful completion. Recovery fund activities will enhance and strengthen the capabilities and availability of ground test facilities that support multiple aeronautics programs.</p> <p>NASA will complete 90% of the planned activities supported with Recovery Act funds, which include:</p> <ul style="list-style-type: none"> • Modifications on the 14 x 22 Low Speed Wind Tunnel to enable HWB acoustic shielding characteristics testing; • Adding high altitude ice crystal capability in the Propulsion Systems Laboratory; • Make performance and productivity enhancements to the NTF; • Relocate Ames Research Center Unitary Plan Wind Tunnel make-up-air; and • Repair the refrigeration system at the Icing Research Tunnel. |
| Measure Type | Efficiency |
| Measure Frequency | Quarterly |
| Original Program Target (without ARRA funds) | 94% |
| Revised Program Target (with ARRA funds) | 96% |

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| Estimated Incremental Change in Performance (due to ARRA funds, estimated on May 15, 2009) | Increase of 2% |
| Revised Program Target (due to ARRA funds, estimated on May 15, 2009) | No revisions have been made to the target. |
| Goal Lead | Associate Administrator for Aeronautics |

Transparency and Accountability

NASA uses multiple methods to assure transparency and accountability, and will apply these standard processes and procedures to activities supported by Recovery Act funds. The principle of transparency is applied to program and fund allocation planning methods, and in reporting, both internal and external to the Agency, of progress toward the resultant plans. NASA requires accountability at all levels of management and from all of its cost-sharing and non-cost sharing partners, contractors, and grantees for the timely delivery and quality of products.

Rigor is applied to NASA programs' design, structure, management, and funding to ensure that resources reach the intended beneficiaries and address the programs' purpose directly. Transparent, merit-based criteria and decision-making procedures are employed at multiple steps in this process. Governing documents, such as the NASA Strategic Plan and supporting mission specific plans, guide the activities of these programs and provide the context through which specific science and research objectives are formulated, investigations are solicited, and missions or activities that address them are planned. Missions are prioritized based on expert opinion such as Decadal Surveys on science, available budget resources, technological maturity, and partnership opportunities.

As explained in detail in the Monitoring and Evaluation Section of this Program Plan, NASA will employ multiple methods of review and evaluation of progress toward the goals of this Program Plan. Reviews assure that funds are applied as intended, and that programs meet commitments and objectives. Managers at all levels will be held accountable both via review of their progress and individual performance plans. At NASA, all employee performance plans for Federal managers include elements tied to the program plans for which they are responsible.

NASA will hold contractors accountable for the timely delivery and quality of products. Award fee reviews, where appropriate, will be performed on contracts and past performance evaluations are integral in solicitation criteria. Grants and cooperative agreements are subject whenever possible to deliverables and milestones that must be met in order to receive funding renewal. International and Federal government partners work in accordance with applicable Memoranda of Understanding (MoUs) and agreements, which generally detail schedule and performance commitments.

Contractor and government accounting systems are audited periodically to ensure compliance with government standards. Specific reports that record and track the obligation and expenditure of program funds including contractor monthly and quarterly reports, reports on budget execution and budgetary resources, a year-end closing statement, and the annual Performance and Accountability Report. Additionally, NASA will cooperate with the Government Accountability Office and the NASA Office of Inspector General through various engagements and audits that monitor specific items regarding Recovery Act funds.

To assure transparency and accountability to the public and its key stakeholders, NASA will post its current plans, and outline any revisions to previous versions on the Agency Recovery Act website. Information will be available on key events, the status of on-going activities, outcomes of Inspector General Audits and the accomplishment of and performance toward, annual and long-term Recovery Program goals. Web links will be provided, where applicable to posted solicitations, awards, and grantee performance, among other relevant information. For this important information on NASA efforts surrounding its Recovery Act funds, see <http://www.nasa.gov/recovery/>.

Federal Infrastructure Investments

NASA uses best practices of sustainable design, maintainable design, building commissioning, and safety and security are incorporated, to the maximum extent possible, into the planning and execution of facility projects. Where applicable, NASA will follow the appropriate Agency requirements outlined below.

NASA Facility Project Managers ensure project designs take into account the energy demands, intended use, occupancy, operations, plug loads, and design to earn the ENERGY STAR targets for new construction and major renovation where applicable. ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy to help save money and protect the environment through energy efficient products and practices (<http://www.energystar.gov/>). NASA Facility Project Managers are also responsible for ensuring compliance with Executive Order (EO) 13423, Strengthening Federal Environmental, Energy, and Transportation Management.

For new construction, NASA is striving to reduce the energy cost budget by 30 percent compared to the baseline building performance rating per the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., (<http://www.ashrae.org/>) and the Illuminating Engineering Society of North America (<http://www.iesna.org/>). For major renovations, NASA is aiming to reduce the energy cost budget by 20 percent from pre-renovations 2003 baseline.

NASA has adopted the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) as its performance measure for sustainable development (<http://www.usgbc.org/>). LEED provides a structure for identifying and implementing practical and measurable green building design, construction, and operations. It is NASA policy that all new construction and major building renovation projects meet the minimum LEED Silver rating.