7.1 Analysis and Evaluation Overview

Analysis and evaluation help determine what path to take, whether the program stays on the planned path, and whether a course correction needs to be taken.

Program Managers must stay on top of things, know the status, and take timely action.

The purpose of analysis and evaluation is to ensure that "things are being done right" and, even more importantly, that "the right things are being done." Analysis can be either prospective—determining what to do, or retrospective—determining the value of what has been done.

Program Managers must be continuously aware of the extent to which activities are being carried out efficiently, and are contributing to the attainment of the mission, goals, and objectives of both the organization and the program. Variances indicate the need for problem solving, decision-making, and action.

7.1.1 Monitoring Program Work Performance

The primary methods for organizing program status tracking are:

- *Periodic, usually monthly, program process and management reviews; and*

- *Frequent, usually quarterly, status reports from contractors and field activities.*

Tracking is necessary to ensure that actions that have been planned, initiated, and funded are carried out in a timely and cost effective manner. This means that the three variables—cost, schedule, and technical compliance (quality)—need to be assessed either continuously or at timely intervals. Ensuring that the work is performed on time, at the projected cost, and in accordance with the technical guidance provided by the Program Manager requires close coordination between the Program Manager and the performers. This is done through regular communications with contract awardees, industry, non-profit partners, and the field elements (national laboratories, operations offices, and the Project Management Center), as well as receiving and reviewing monthly and quarterly status reports and conducting management reviews that focus on the status of implementation.

Variations from the plan in any of the three variables—cost, schedule, and technical—need to be identified early so that timely corrective action can be taken. Deviations from the planned path, if allowed to continue, become very difficult or impossible to correct. An example of this is a schedule slippage along the critical path. Insufficient time and resources often prohibit the program, project, or task from catching up.

The Energy Efficiency and Renewable Energy (EERE) Corporate Planning System (CPS) is a primary source of this tracking information on a month-by-month basis. Details of the applicable spreadsheet and reports are provided in the CPS Desk Reference, which may be accessed at: http://eere-intranet.ee.doe.gov/BA/IBMS/pdfs/CPSdesktopReference.pdf). The Planning, Analysis and Evaluation (PAE) team uses the CPS to distribute and keep track of funding that goes to support its projects. The system also is used as an historical record that allows PAE to retrospectively analyze its project spending. Coupled with the newly developed EERE Information System, CPS can provide reports tailored to PAE staff, U.S. Department of Energy (DOE) laboratories, and contractors. The DOE Performance and Accountability Report documents DOE/EERE's annual performance commitments after the annual appropriations process is completed. The report identifies key accomplishments for the fiscal year, in terms of achieving goals or objectives. A quarterly review is conducted to determine whether the progress toward the agreed upon goal or objective is sufficient, or whether additional attention and effort will be needed.

Readers with access to the EERE intranet system may access the CPS at: http://cps.ee.doe.gov. Additional information about the CPS and how it supports the EERE Program Analysis and Evaluation process will be discussed in more detail in Chapter 8, "EERE Information and Business Management Systems."

7.2 Mission and Roles

7.2.1 Mission

Corporate-level analysis and evaluation in EERE is performed by the PAE functional team, a part of EERE's Business Administration unit. PAE provides information to managers to help them make informed choices about how EERE's business should be conducted. PAE's mission is to:provide timely, high quality, independent, credible, and usable information to inform decisions involving technology development and deployment and produce integrated quality Strategic Management System products.

7.2.2 Roles: Corporate Focus and the Strategic Management System

7.2.2.1. Corporate Focus

Analysis and evaluation in PAE are corporate in nature, addressing issues and concerns that are common to all, or a subset of, the EERE Office of Technology Development (TD) programs. PAE's place in the EERE organizational structure is designed to enable it to focus on objectivity, consistency, and other corporate priorities related to analysis and evaluation.

The primary analysis and evaluation responsibilities of PAE are to:

- Provide EERE corporate and program management with integrated, independent information to inform budget decisions

- Proactively manage external requirements on behalf of EERE and TD programs

  — Chief Financial Officer (CFO) and Office of Management and Budget (OMB) Performance Requirements; and

  — Energy Policy Act of 2005 (EPAct).

- Provide corporate approaches to analysis and evaluation that:

  — Inform corporate decisions regarding EERE TD programs;

  — Help plan, manage, and review EERE-wide requests; and,

  — Provide quick access to integrated information and analysis.

7.2.2.2 Strategic Management System

Office of Planning, Budget & Analysis (PBA) Account and Portfolio Managers serve as interfaces and functional experts for Government Performance and Results Act (GPRA) analysis, budget formulation, and planning, implementation, and analysis of PAE projects.

Corporate-level analysis and evaluation are integral parts of EERE's Strategic Management System (SMS). The SMS includes corporate, program, and project-level activities in four integrated phases: Planning, Budget Formulation, Program Implementation, and Analysis and Evaluation. All phases are supported by various underlying analyses. The annual SMS cycle begins with planning, which informs the formulation of the budget. The implementation of the budget then produces goal-oriented results, which are evaluated in order to inform planning as the cycle repeats.

7.3 Program Analysis

7.3.1 Purpose

For information on market, economic, and policy analysis, as well as key data and tools may be accessed at http://www1.eere.energy.gov/ba/analysis.html

The purpose of PAE program analysis is to inform corporate-level decision-making within EERE. The results help decision-makers understand how individual program activities contribute to EERE's goals. The use of economic models provides insights about interactions between energy markets, the general economy, government policies, and ways that EERE technologies may influence these interactions. This information is used to assess policy options and the contributions, under different scenarios, of EERE programs toward achieving DOE goals related to energy, energy security, and the environment. Such assessments inform portfolio decisions, budget formulation, and program management.

7.3.2 GPRA Requirement for Analysis

The Government Performance and Results Act of 1993 (GPRA) was enacted to improve stewardship in the federal government by linking resources and management decisions with program performance. In meeting these requirements, PAE is responsible for analyzing the prospective outcomes, or benefits, of achieving the goals of the EERE programs. This analysis, which is commonly referred to as GPRA or more simply as the EERE benefits analysis or benefits estimate, is conducted annually. The benefits analysis produces estimates of a range of public benefits such as energy costs, reductions in oil imports, and reductions in carbon emissions. Because of uncertainty of future events, benefits are estimated for several scenarios. PAE collects input data from the programs and performs the benefits analysis with the use of two economic models—the National Energy Modeling System model and the Market Allocation model. PAE ensures that the assumptions and methodology used to analyze benefits are consistent and reasonable for all EERE programs.

Figures 7.3-1 and 7.3-2 on the following page illustrate some of the results from the GPRA analysis.
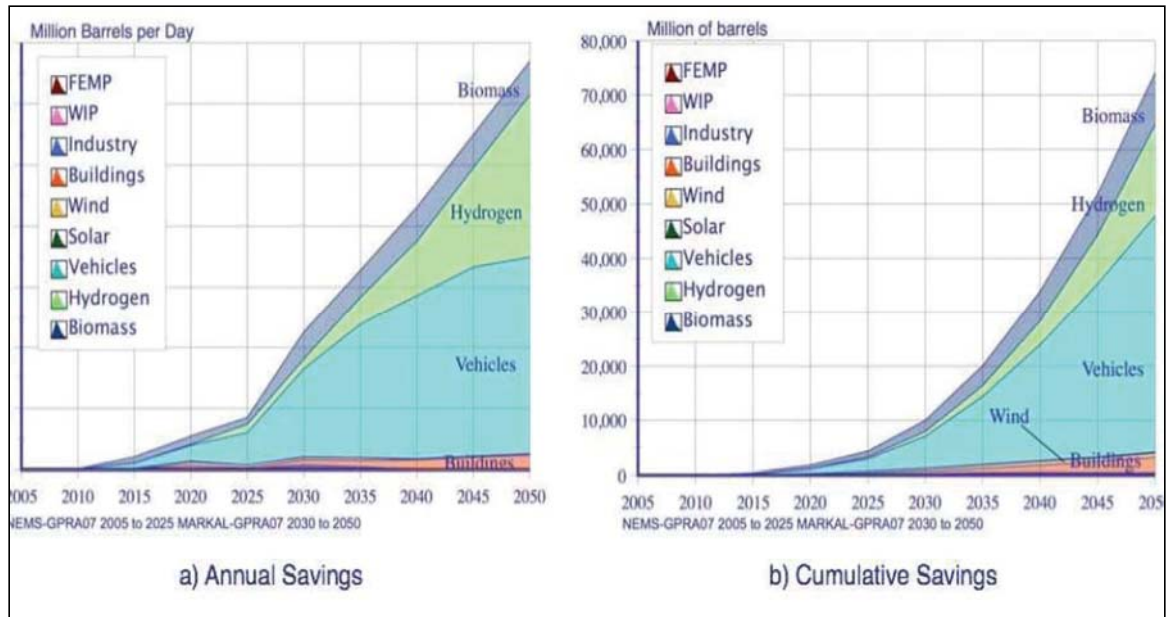
Figure 7.3-1 Individual Program Goal Cases Oil Savings (DOE FY 2007 Budget Request)
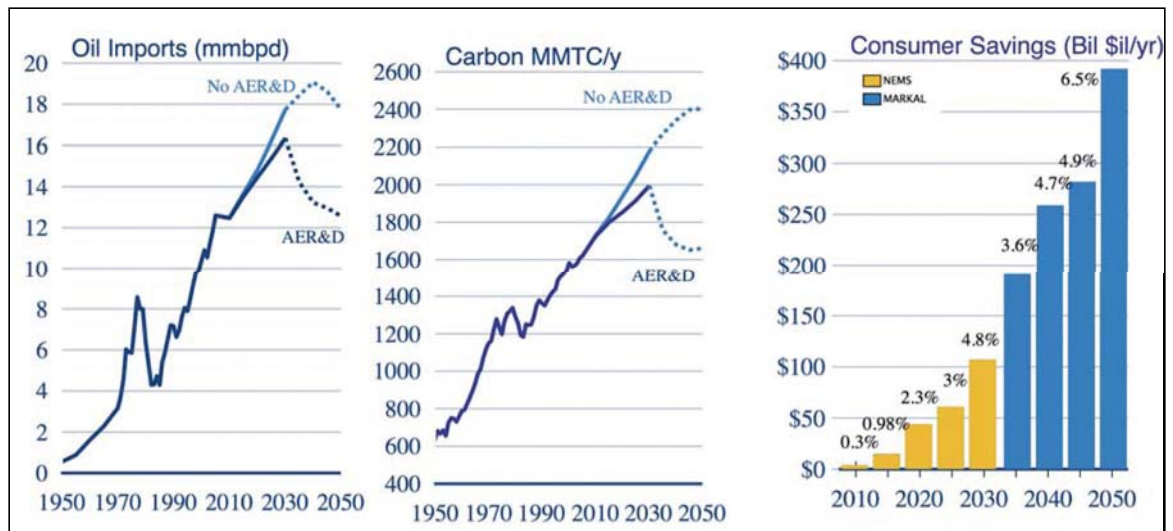

Figure 7.3-2 Projected Benefits of EERE Programs on Oil Imports and Carbon Emissions

7.3.3 Energy, Science, and Environment Program Benefits Analysis

Beginning in Fiscal Year 2006 (FY 2006), the Energy, Science, and Environment program (ESE) began an effort to better integrate its portfolio of science and technology programs including the Office of Science, the Office of Fossil Energy, the Office of Nuclear Energy, the Office of Electricity Distribution and Energy Reliability, and the Office of EERE. As part of this effort, ESE intends for its offices to employ a coordinated annual benefits estimation process with consistent assumptions and methodologies.

7.3.4 Improvements in Modeling

The PAE team is proactively working to improve the input data and models it currently uses, and to develop new models that offer more versatility for analyzing alternative policies and program benefits. For instance, PAE and EERE's Chief Technology Officer are working with the TD programs to improve the treatment of technical risk in these models. PAE also is developing the Stochastic Energy Deployment Systems Model to make technical risk and uncertainty key drivers of the analysis of program benefits. These models, together with conventional models, provide decision-makers and policy makers the best tools for analyzing EERE programs in the context of the broader economy, under different policy scenarios, and while meeting federal requirements for government reporting and accounting.

7.4 Program Evaluation

Program results should be assessed and evaluated to determine whether broader goals and objectives are being achieved.

Program analysis and evaluation is a process for gathering information, studying it, and using what is learned to validate or change broad goals and objectives and/or the means of pursuing them. Periodically, at frequencies depending on the rate of technology evolution, program progress, or when trends or events indicate, the Program Manager should conduct an analysis and evaluation to ensure that the accomplishment of planned activities remains relevant and is on track to achieve the long- and mid-term goals, objectives, and milestones established in the strategic and multi-year plans. Evaluation should focus on the degree to which the program is doing quality research, is effectively achieving its objectives, and the results are relevant. Results of analysis and evaluation should also feed forward to identify possible new courses of action (see the planning stage) and to determine whether better opportunities have emerged. Finally, analysis and evaluation should focus more broadly on the goals and objectives themselves to ensure that both ends and means are correct.

7.4.1 Purpose

The purpose of evaluation in EERE is to inform program-level and portfolio-level decision and planning processes, monitor performance, measure success, increase efficiency and effectiveness, and meet internal and external requirements for an objective, independent assessment. PAE's role is to provide products and services to support the evaluation of programmatic elements. PAE has divided its evaluation functions into two domains: program evaluation and performance monitoring.

7.4.2 Program Evaluation Activities

Peer reviews can be used to obtain greater independence and objectivity.

Program evaluation activities involve studies that quantitatively assess how well a program is working. Program evaluations address questions concerning program rationale, process, impact, or cost-benefit, and ask, "How, who, and why?" using methods such as:

- Evaluation planning;

- Peer review by independent experts;

- Market impact and cost-benefit evaluation studies;

- Evaluation surveys; and

- Tracking systems to monitor program impacts.

PAE experts help programs perform evaluation studies while developing their capacity to oversee evaluation studies themselves.

PAE's program evaluation products and services are depicted in Figure 7.4-1. They include such products as the EERE Peer Review Guide and EERE Guide for Managing General Program Evaluation Studies; and services including evaluation training and expert advice on how to plan and conduct effective evaluations. These products and services may be accessed at the Office of Planning, Budget, and Analysis home page at: http://www1.eere.energy.gov/ba/pba/performance_evaluation.html.

There are numerous examples of how evaluation in practice has helped inform EERE program decisions. PAE has found that 89 percent of TD programs use evaluations to develop strategic plans and formulate budgets. Ninety-four percent of programs use evaluations to identify problems and take corrective actions, while 63% use evaluations to identify more effective approaches to program implementation.
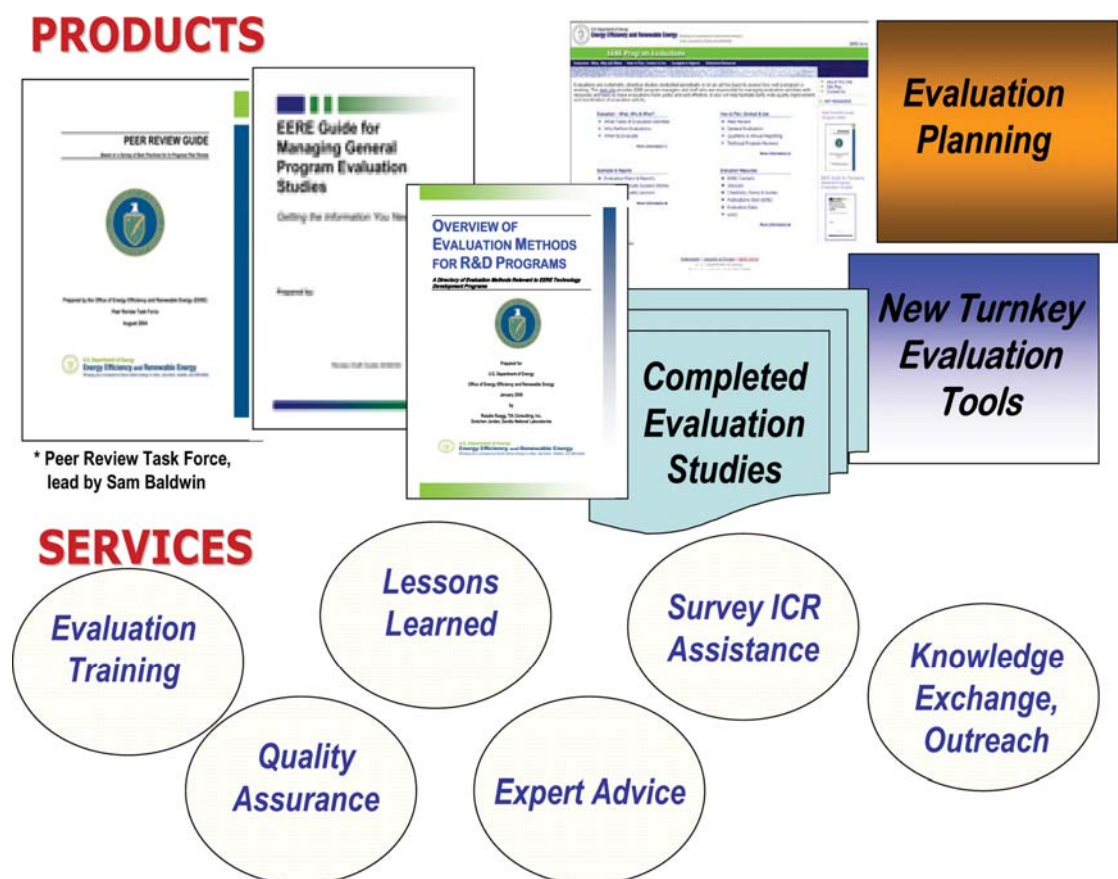

Figure 7.4-1 PAE Products and Services

Two examples can help to illustrate how evaluation is used in EERE. In 2004, the Hydrogen, Fuel Cell, and Infrastructure Technology (HFCIT) program used peer review to improve project-level research efficiency by 5% by discontinuing those projects identified as poor performers. A Federal Energy Management Program (FEMP) evaluation study recommended targeting services more actively at underserved building operations and maintenance (O&M) personnel to increase individual agencies' commitments. As a result, FEMP created an O&M subprogram with educational documents, workshops, and web-based training that increased program effectiveness.

7.4.3 Performance Monitoring Activities

Performance monitoring involves monitoring and reporting program accomplishments, particularly progress toward established goals. Performance monitoring uses information on measurable outputs obtained from routine data collection activities to address the question, "What has happened?"

OMB and DOE require specific reporting of performance through a variety of monitoring systems. OMB requires the use of the Program Assessment Rating Tool (PART), which was developed to assess and improve program performance so that the federal government can achieve better results. A PART review helps identify a program's strengths and weaknesses to inform funding and management decisions aimed at making the program more effective. The PART looks, therefore, at all factors that affect and reflect program performance including program purpose and design; performance measurement, evaluations, and strategic planning; program management; and program results.

DOE's CFO requires EERE programs to submit quarterly milestones and report on progress in meeting those milestones. These performance targets and status reports are tracked in DOE's JOULE system, where programs identify targets in their performance plans and demonstrate annual progress towards long-term program goals. The JOULE targets represent EERE's portion of the Department's annual performance plan, which is also a requirement established by GPRA. Quarterly JOULE reports are developed to enable senior management to understand the progress of their programs, and later used as input to higher-level performance documents to be submitted to OMB.

Program Managers and EERE management must work together to make reviews align with and complement each other.

Through the successful implementation of these performance monitoring systems and program evaluation activities, PAE helps EERE TD programs systematically track their performance while meeting mandated requirements from DOE and OMB. PAE continues to build capacity with the EERE technology programs to establish standard methods for performance monitoring and improve program effectiveness.

7.5 EERE SMS Program Analysis and Evaluation Stage

Program Analysis and Evaluation, as defined for the SMS, includes: analyzing the expected benefits of the programs included in the performance budget request to Congress; tracking, reporting, and analyzing performance measurement data; conducting in-depth evaluations of EERE programs; and providing results of the analyses and evaluations for use in planning and resource allocation. Performance measurement data includes performance measures in the DOE Budget, performance-based contracts, and performance data related to EERE financial operations, human resources, facilities, and customers.

Analysis of performance data will include whether goals were achieved, verification and validation of performance levels, and what external factors may have influenced performance. Performance information will be tracked and reported throughout the year, with year-end results being reported in DOE's Annual Performance and Accountability Report, and in other EERE program evaluations including peer reviews and accomplishments reports. In addition, corrective action plans will be developed and reports generated for those items where reported performance does not meet commitments. This information is required quarterly in JOULE and annually in the Performance and Accountability Report.

Performance measures and evaluation are at the core of the President's Management Agenda's efforts to formally integrate performance reviews with budget decisions to ensure that the federal government is producing performance-based budgets. The SMS program analysis and evaluation products contain information that is critical to the completion of the Administration's performance rating tools, including the Budget and Performance Integration (BPI) Standards of Success, as well as PART and Research & Development Investment Criteria (RDIC).

These tools feed the planning and budget formulation processes by providing common metrics for assessing the performance of multiple programs. Information generated from these tools is best used as a complement to traditional management techniques whereby constructive dialogue is stimulated among Program Managers, Budget Analysts, and Policy Officials. In short, analysis and evaluation play a key role in producing the information necessary for an open discussion about budget and program options in the context of program results and outcomes.

Each of the steps in Figure 7.5-1 is consistent with the Under Secretary of Energy's October 14, 2005 SMS memo. Table 7.5-1 describes each stage in greater detail. Readers with access to the EERE intranet can view the Under Secretary of Energy's October 14, 2005 SMS memo at:

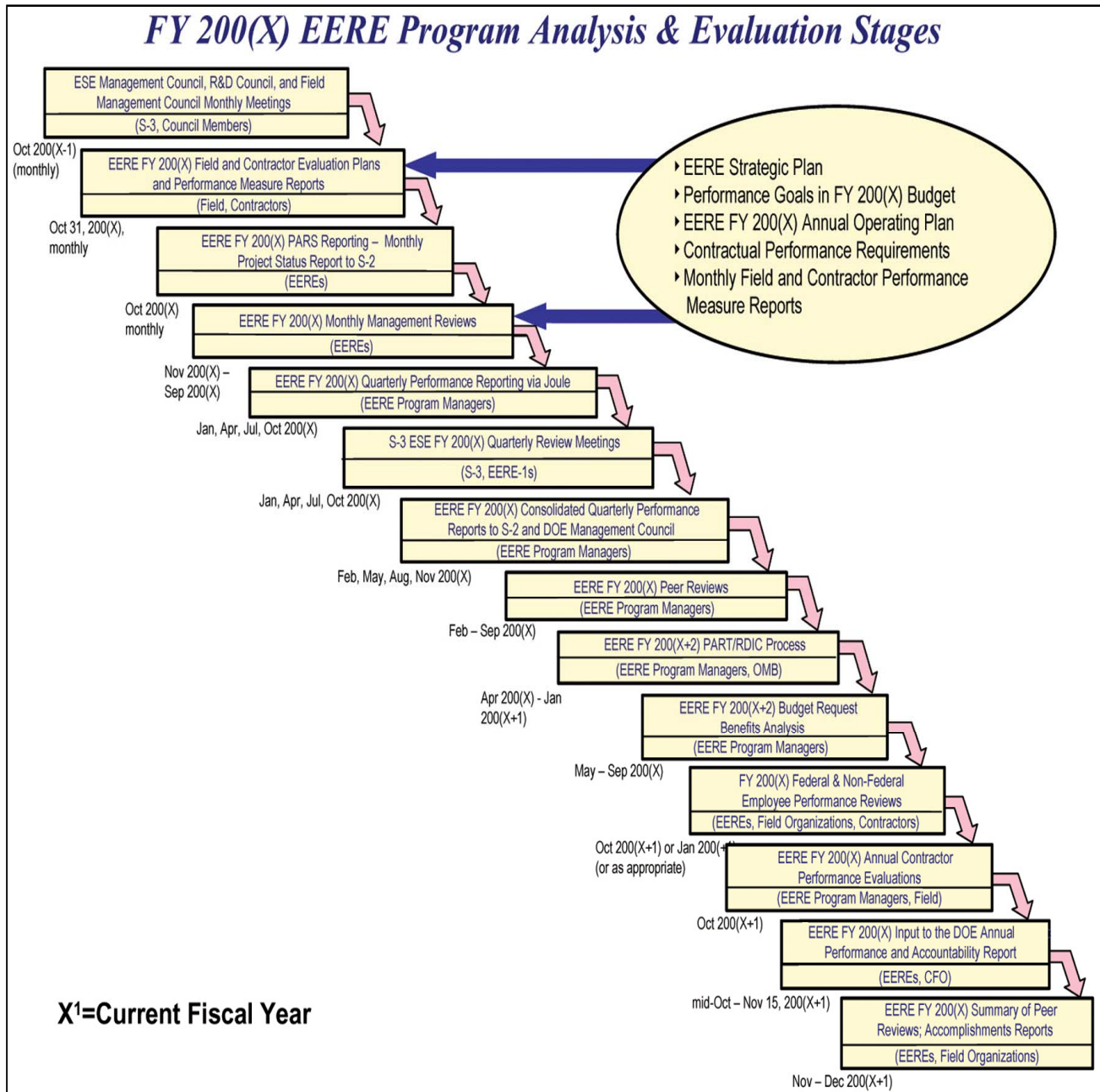http://eere-intranet.ee.doe.gov/BA/IBMS/pdfs/ SMS_Garman20051014.pdf

Figure 7.5-1 Analysis and Evaluation Stage

Ultimately, the development and use of performance information allow each and every federal and non-federal employee to see where their work fits in accomplishing EERE's and Department's goals, and provides a path of accountability between the Department's long-term vision and the daily activities of these individuals.

Program Implementation Stage Key Players	Description	Corresponding EERE Process/Product
ESE Management Council, R&D Council, and Field Management Council Monthly Meetings (S-3, Council Members)	The ESE Management Council is a formal group of senior managers representing each of the Program Offices, including EERE, that report to the Under Secretary that: 1) Provides a formal mechanism to help ESE senior managers deal promptly with cross-cutting management concerns and to identify opportunities for synergy across ESE components; 2) Shares information among members to solve problems affecting members; and 3) Makes recommendations directly to the Under Secretary concerning issues affecting new management policies, procedures, or requirements.	• DAS/TD, DAS/BA, and GO Manager represent EERE at these meetings
EERE Field and Contractor Evaluation Plans and Performance Measure Reports (Field, Contractors)	Evaluation Plans define the bases for evaluating Field organization and contractor performance for the current fiscal year. Each month, Field organizations and contractor organizations submit performance reports that cover the previous month's performance.	• EERE Field and contractor organizational elements prepare these reports for EERE
EERE PARS Reporting – Monthly Project Status Report to S-2 (EERE)	For each month, construction projects will need to enter planned versus actual cost and schedule data, as well as project status and variance explanations, in Project Assessment and Reporting System (PARS). Project performance data from PARS is then summarized and provided to the Deputy Secretary.	• Project data entered as applicable
EERE Monthly Management Reviews (EERE)	Each month, EERE and its staff review the status of all EERE programs as reflected through relevant schedule, budget execution, and performance metrics.	• Budget and Performance Integration (BPI) Monthly Report
EERE Quarterly Performance Reporting via JOULE (EERE Program Managers)	Program performance is assessed quarterly and annually against standards in the DOE JOULE database (red/yellow/green).	• Quarterly Program Assessments
S-3 ESE Quarterly Review Meetings (S3, ASEE)	On a quarterly basis, the Under Secretary for ESE and the PSOs review the status of all JOULE milestones, BPI standards, and other PMA measures.	• EERE programs provide monthly reports of milestones
EERE Consolidated Quarterly Performance Reports to S-2 and DOE Management Council (EERE Program Managers)	Program performance is reported quarterly to the Deputy Secretary and the Management Council in the form of Consolidated Quarterly Performance Reports (CQPR). EERE Programs conduct monthly self-assessments on three aspects of program performance—budget, schedule, and overall performance and progress toward the program goal.	• Program Managers are responsible for preparing the Monthly self-assessments are reported quarterly in the CQPR
EERE Peer Reviews (EERE Program Managers)	Formal internal and external reviews provide an important feedback function and can help move programs in more productive directions.	• Program Managers currently conduct peer reviews
EERE PART/RDIC Process (EERE Program Managers, OMB)	PART is a systematic method of assessing the performance of program activities across the federal government. PART assessments help inform budget decisions and identify actions to improve results.	• GPRA Programs are to be PARTed every three years

Table 7.5-1 SMS Program Analysis and Evaluation Stages

Program Implementation Stage Key Players	Description	Corresponding EERE Process/Product
EERE Budget Request Benefits Analysis (EERE Program Managers)	Program benefits are analyzed annually. Benefits estimates are included in the Budget Request document submitted to OMB. Two ESE-sponsored activities are underway: (1) The ESE Interoffice Working Group focuses on requirements of GPRA and benefits analysis; and (2) The Lab Working Group focuses on portfolio analysis and some benefits analysis at the laboratory level.	• Program Managers represent EERE R&D in these groups and prepares the analyses • PBA currently performs these analyses
Federal and Non-Federal Employee Performance Reviews (EERE HQ, Field Organizations, Contractors))	Federal and non-federal employee performance is reviewed in accordance with applicable rules, personnel policies, and union agreements.	• EERE currently performs these reviews
EERE Annual Contractor Performance Evaluations (EERE Program Managers, Field Organizations)	Contractor performance is evaluated against specific performance goals set forth in performance-based contracts. The evaluation affects fee determination or fee penalties, the exercise of contract options, award term, future contract award, and subsequent performance objectives.	• EERE Program Managers and PMC are involved in the performance-based support contracts evaluation
EERE Input to the DOE Annual Performance and Accountability Report (EERE, CFO)	The DOE Annual Performance and Accountability Report, generally submitted to Congress around March each year, presents information on DOE's financial, management, and programmatic results for the previous fiscal year. Programs provide the input needed to develop the report.	• Programs provide input as applicable and required
EERE Summary of Peer Reviews; Accomplishments Report (EERE HQ, Field Organizations)	The Accomplishments Report summarizes and reports performance and evaluation information with regard to performance tracking and analysis, program and peer reviews, National Academy of Sciences studies, case studies and success stories.	• EERE HQ and the PMC collaborate to prepare the Annual Performance Report • EERE annual Accomplishments Report

Table 7.5-1 SMS Program Analysis and Evaluation Stages (continued)

References

For information on market, economic, and policy analysis may be accessed at http://www1.eere.energy.gov/ba/analysis.html

The following documents may be accessed from: http://www1.eere.energy.gov/ba/pba/performance_evaluation.html:

- *Impact Evaluation Framework for Technology Development Programs (2007)*;

- *Overview of Evaluation Methods for R&D Programs(2007)*;

- *EERE Guide for Managing General Program Evaluation Studies (2006)*; and

- *EERE Peer Review Guide (2004)*. Alternatively, it may be accessed through Appendix D of this Guide.

Appendix C Suggested Practice: Program Progress Review Process;

Appendix E Suggested Framework for Merit Review.

The Office of the Under Secretary of Energy (2005). *Energy, Science, and Environment Strategic Management System for the FY 2008 Planning Through FY 2006 Implementation Stages October 14, 2005, SMS Memo)*. United States Federal Government, USA. Retrieved from: http://eere-intranet.ee.doe.gov/BA/IBMS/pdfs/SMS_Garman20051014.pdf