U.S. Environmental Protection Agency (EPA) & Major Partners' Lessons Learned from Implementing EPA's Portion of the American Recovery and Reinvestment Act: Factors Affecting Implementation and Program Success

Summary of Six Specific Reports

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EXECUTIVE SUMMARY

PURPOSE

On behalf of the U.S. Environmental Protection Agency (EPA), Science Applications International Corporation (SAIC) studied EPA's and its major partners' use and management of the $7.2 billion Congress appropriated to EPA in the American Recovery and Reinvestment Act (ARRA). SAIC studied how EPA and its partners used the $7.2 billion to attain EPA's environmental mission and accomplish ARRA's broader economic goals, while meeting ARRA's additional requirements and tight deadlines. EPA sought to understand major ARRA outcomes and lessons learned as well as states' and funding recipients' perspectives to inform efforts to improve EPA operations and inform EPA and partners' management of other large-scale events such as Gulf Coast Oil Spill or Hurricane Sandy.[1]

Unlike previous reports, this study *did not* measure compliance with ARRA requirements, nor attempt to develop mid-course adjustments. The study aimed to add to existing reviews by capturing how EPA and its major partners worked to attain ARRA's goals. It aimed to capture, consolidate and analyze perspectives and information from states, funding recipients and vendors, who performed the construction or remediation work on the ground.

APPROACH

SAIC and its subcontractor, Toeroek Associates, Inc., reviewed previous studies, analyzed EPA and stakeholder data and interviewed or held focus groups involving over 330 EPA, state and funding recipient officials who worked on EPA ARRA implementation. SAIC and Toeroek aimed to capture EPA, states' and funding recipients' lessons learned, successful approaches and their recommendations for future large efforts with new requirements and significant levels of funding. Since Paperwork Reduction Act regulations limited the number of non-federal employees who could be interviewed, the study used focus groups to encourage informed dialogue involving local officials from different specialties.

The study produced six reports; three on management topics and three on results topics:

Management:

- Cost Estimating processes
- Funds Management processes
- Data Systems Development and/or Enhancement

Results:

- Green Project Reserve (GPR) benefits
- Technological Innovation supported by ARRA
- Leveraging Funds in Local Economies

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[1] ARRA used the term 'prime recipients' when referring to states and tribes and 'sub-recipients' when referring to their *awardees* (e.g., local municipality receiving an award). This report uses the term 'states' when discussing states and 'funding recipients' when referring to 'sub-recipients.'

MAJOR FINDINGS

Challenging Workload

The study confirmed that it took a tremendous amount of extra effort from all stakeholders to attain EPA's ARRA goals. Participants shared that the large number of projects, substantial amounts of money, additional requirements, tight deadlines and sometimes evolving guidance posed significant challenges. EPA and state participants noted that the effort required diligent dedication from their most experienced and most knowledgeable staff. Tight deadlines required top-notch staff who knew how to get things accomplished in the most streamlined manner possible, how to adjust to major changes efficiently, and whom to call when they needed answers quickly. All stakeholder groups remarked that the pace and intensity of ARRA implementation took a toll on their over-committed staff members and required trade-offs against other goals. Nevertheless, stakeholders recognize and value the environmental and economic benefits made possible through the many ARRA-funded projects.

Partnerships Critical

The challenges posed by ARRA forged changes in how stakeholders communicated and worked with each other. More effective communication among all stakeholders - EPA HQ, Regions, states, and local entities - rather than one-way communication from EPA through to funding recipients was an important development. This strengthened partnerships and allowed stakeholders to meet the challenges they faced during ARRA implementation. Participants in the study noted that early, organized and frequent collaborative efforts involving all major stakeholders were crucial in implementing ARRA. This enhanced teamwork between EPA Regions and states allowed for streamlining of existing processes and programs, thus avoiding delays from developing wholly new processes and programs.

Benefits Achieved

Local officials endeavored to maximize projects' environmental, health, economic and other benefits by involving their other local stakeholders in project planning. In addition, ARRA's Green Project Reserve requirement and EPA's goals to encourage new, innovative technologies led local drinking water and wastewater utilities to expand their programs to consider green and innovative technologies.

Conflicting Priorities

Sometimes ARRA priorities conflicted with EPA and state priorities. State officials noted that some of the Green Project Reserve provisions and the timeline required for getting most innovative technologies on-line conflicted with federal goals. Furthermore, the push to obligate and spend funds quickly was hindered by additional ARRA mandates, such as the Buy American and Davis-Bacon provisions. Study participants noted the need to collectively agree on priorities and adopt policies and procedures that reflect those priorities.

Improved Approaches Adopted

ARRA implementation helped EPA and partners identify successful approaches and improve processes, grant procedures, communication strategies and management controls. EPA and many states have permanently incorporated many of these improvements into their programs.

SECTION 1. INTRODUCTION

1.1 BACKGROUND – PURPOSE OF THE STUDY

In February of 2009, Congress passed ARRA, aimed primarily at making new jobs and saving old ones, stimulating economic activity and long-term growth, and fostering accountability and transparency in government spending. Of the $787 billion authorized in the Recovery Act, EPA was given $7.2 billion. EPA distributed the majority of its ARRA funds to states in grants and contracts to support clean water and drinking water projects, diesel emissions reductions, leaking underground storage tank cleanups, Brownfields development and Superfund cleanups. This was a massive undertaking for EPA. The administration of the funds, which were to be injected into the economy at an unprecedented pace, required that EPA develop or revise policies, processes and automated information systems. In the fall of 2011, EPA tasked SAIC and its subcontractor, Toeroek Associates, Inc., to design and conduct a study to capture, verify and analyze the critical lessons learned and successful approaches, policies and procedures of EPA's implementation of ARRA.

Management Topics - EPA asked the SAIC Team to review three specific management activities:

- Cost estimating processes,
- Funds management processes and
- Systems enhancement and development.

Results Topics - EPA also asked the Team to look at three topics geared more towards outcomes than management processes. These include the:

- Green Project Reserve initiative,
- Use of ARRA funds to spur innovative technologies and
- Use of ARRA funds to leverage local economic benefits.

The study's results were intended to help EPA and its partners continue to improve the operations of its programs and help manage any new large projects or programs with additional requirements. EPA has already incorporated many improved processes and procedures from ARRA in its regular programs and has used the study's preliminary results to help manage both the Gulf Coast Oil Spill and Hurricane Sandy response and recovery efforts.

The study resulted in a series of six reports, each covering one of the six topics noted above, plus this overarching summary report, which contains overall findings of the study, highlights of each of the six reports and a description of the goals and methodology for the entire study. For example, the study looked at questions such as the following. What changes did states made to their grants management processes and why? What processes helped states obligate funds in time to meet the tight deadlines imposed by the ARRA statute? Through several years of implementing ARRA-funded projects, what did EPA and states learn? What would EPA and states do differently if given the opportunity again? What can states recommend to EPA? Did 'green' projects generate benefits beyond primary environmental benefits?

The study was based on the data captured in EPA, state and funding recipient tracking systems; existing analyses; and discussions with EPA, state and funding recipients. The study was designed to yield results that could help future decision-makers. **It is critical to note that the study was not an audit and not designed to check whether rules were followed.** This report reflects EPA's intent to share lessons learned

with EPA, state, and tribal program offices to spur positive changes in program/project implementation in the future. Unlike other ARRA assessment reports prepared by the Office of the Inspector General or other EPA program offices, this report includes information directly from the perspectives of funding recipients, including vendors.

Several of the study efforts involved interviews with specific technology vendors. It should be noted that the mention of trade names, specific vendors or products does not represent an actual or presumed endorsement, preference or acceptance by EPA or the Federal Government. Stated results, conclusions, usage or practices do not necessarily represent the views or policies of the EPA.

The remainder of this report describes Background relevant to ARRA implementation, the Methodology used (including charts, study questions and data collection steps) and Findings. The Findings include perspectives from interviewees and focus group participants as well as SAIC analyses and recommendations. Appendix 1 contains a compilation of the six Executive Summaries from the six task studies.

1.2 SUMMARY OF EPA FUNDS DISTRIBUTION, FUNDS MANAGEMENT AND REPORTING FLOW

The funding made available to EPA through the Recovery Act was of historic proportions. It is important to understand the flow of funds from Congress to EPA to recipients and the subsequent flow of project and spending information from recipients to EPA to Congress. Figure 1 illustrates the responsibilities of EPA, states, and funding recipients in the movement and management of ARRA funds, and subsequent reporting on ARRA project status.

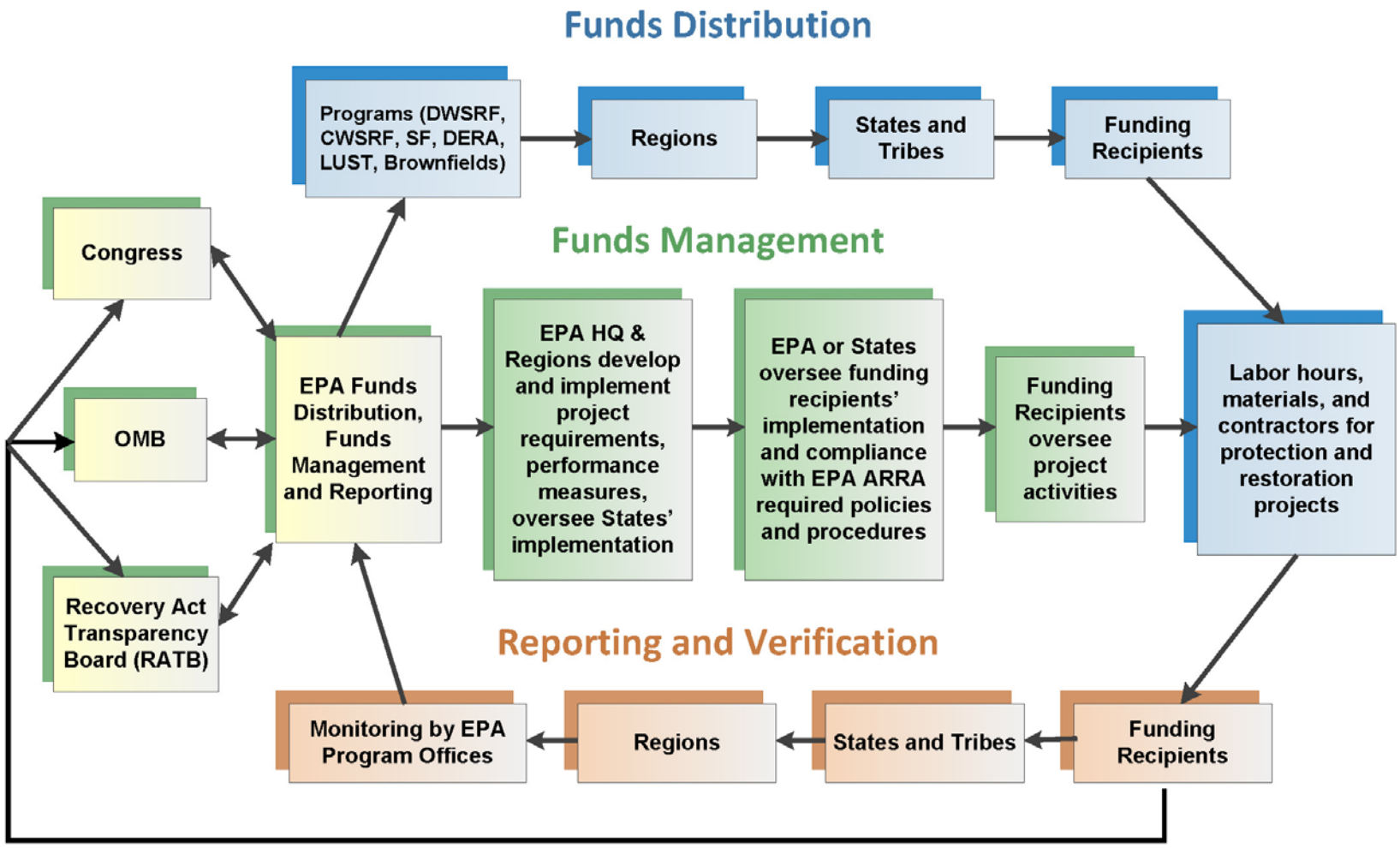
The diagram illustrates three major processes – money flow, money and project management and reporting – that EPA, states and funding recipients managed during ARRA implementation. The diagram highlights specific items that SAIC studied to identify lessons learned. On the chart, the three major processes are color-coded:

In **blue**, the Funds Distribution Boxes trace the *movement* of ARRA funds from Congress to EPA and then out to the six program areas – Drinking Water State Revolving Fund (DWSRF), Clean Water State Revolving Fund (CWSRF), Superfund (SF), Diesel Emission Reduction Act (DERA), Leaking Underground Storage Tank (LUST), and Brownfields.

In **green**, the Funds Management boxes show funds *management* responsibilities for EPA, states and funding recipients.

In **gray**, the Reporting and Verification Boxes depict how *reporting and verification* information flows back to EPA, and eventually to Congress and the White House.

FIGURE 1. SUMMARY OF EPA FUNDS DISTRIBUTION, FUNDS MANAGEMENT AND REPORTING FLOW CONCEPT CHART



1.3 SIX EPA PROGRAM AREAS

SAIC coordinated with EPA to prioritize activities on the six tasks across the six environmental program areas receiving ARRA funding:

- Clean Water Act State Revolving Fund (CWSRF) – $4 billion,
- Safe Drinking Water Act State Revolving Fund (DWSRF) – $2 billion,
- Superfund (SF) – $600 million,
- Brownfields – $100 million,
- Leaking Underground Storage Tanks (LUST) – $200 million, and
- Diesel Emissions Retrofit Act (DERA) – $300 million.

Given funding levels, the SAIC study focused primarily on State Revolving Fund (SRF) projects funded through ARRA, with some lessons learned from the other four programs as well.

SECTION 2. OVERALL METHODOLOGY

This section describes the EPA ARRA implementation process, explains the structure of the study, identifies the general study questions and presents the general data collection methodology. Each of the six reports provides a more detailed description of the methodology used for that particular study. SAIC worked with EPA and used a variety of tools to understand how the EPA ARRA program was intended to work to achieve its aims. EPA outlined the major steps performed in order to plan for, implement and successfully manage the six programs receiving ARRA funds, and thus helped to highlight specific stages in the ARRA implementation process to examine during the study.

SAIC prepared detailed study methodology documents specific to the six evaluation tasks. The methodology, or scoping, documents identified the detailed study questions, presented SAIC's intended approach to access the information sources and analyze the data, and described SAIC's proposed strategy for reporting results. Final reports from each of the six studies are included as separate components of the overall final report and include the methodology for each.

2.1 STRUCTURE OF SAIC ARRA STUDY

The graphic presented below depicts the structure of SAIC's study and the offices and program areas reviewed.

Figure 2 depicts the basic study process, the data sources that SAIC used, specific task topics and products that resulted from the study. The six task topics are grouped in two categories: management and results, based on the objectives of the individual tasks and the associated study questions. In general, the tasks within the Management category focused on EPA funds distribution, reporting and verification processes, and implementation activities. The tasks within the Results category focused on the results of program implementation. The general study objective of each task is described below.

Management Topics – Funds Distribution, Reporting and Verification, and Implementation

Cost Estimating – capture best practices information and understand the factors that caused variations in estimated costs; identify factors that might be most directly related to better cost estimation.

Funds Management – capture, verify and analyze the critical lessons learned, successful approaches and recommendations related to ARRA funds management, particularly relative to the:

- Timely obligation and expenditure of ARRA funds;
- Approaches used to comply with additional requirements imposed by the Recovery Act -- Buy American provisions, Davis-Bacon Act, mandatory reporting, and Green Project Reserve; and
- Grants management process.

Development and/or Enhancement of Systems – capture the lessons learned from system development and enhancements to provide EPA with crucial lessons learned in how best to manage its continuing ARRA system efforts as well as other special efforts such as hurricane response or large environmental disasters.

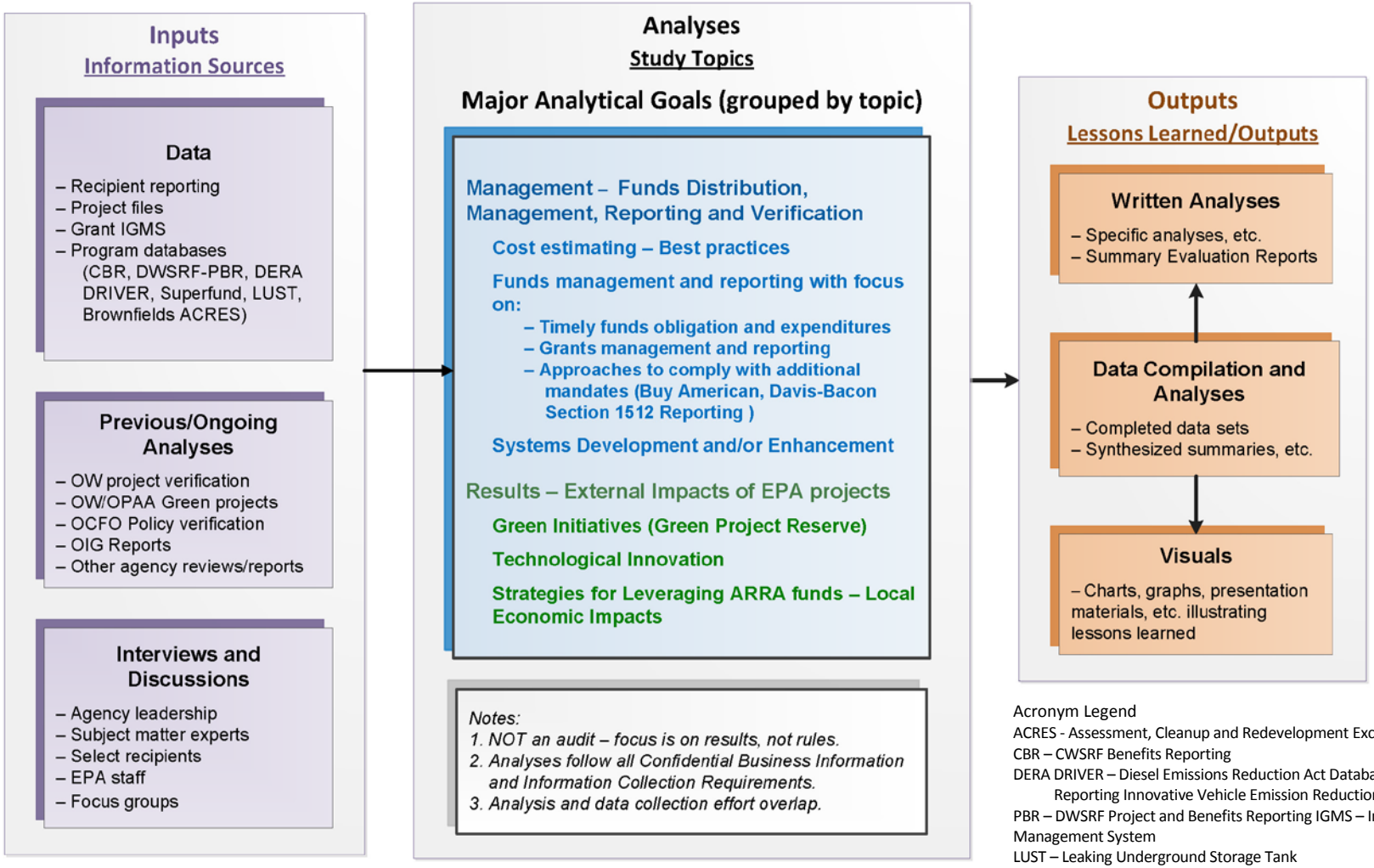
Results Topics – External Effects of EPA ARRA Projects

Green Project Reserve – capture information related to successes, strategies and lessons learned in the ARRA green initiative (20 percent set aside of ARRA SRF funds for green projects); where possible, identify secondary and unanticipated outcomes of GPR projects receiving funding under ARRA.

Technological Innovation – gather and report on information regarding any new or expanded industries or markets fostered as a result of spending under ARRA.

Leveraging ARRA Funds in Local Economies – conduct an economic impact evaluation to characterize the types of economic impacts on local communities from projects receiving EPA ARRA funds that leveraged other resources, including long-term benefits of improved environmental quality associated with each project as well as short-term economic benefits in the local region.

FIGURE 2. STRUCTURE OF SAIC ARRA STUDY



Acronym Legend
ACRES - Assessment, Cleanup and Redevelopment Exchange System
CBR – CWSRF Benefits Reporting
DERA DRIVER – Diesel Emissions Reduction Act Database for Reporting Innovative Vehicle Emission Reductions
PBR – DWSRF Project and Benefits Reporting IGMS – Integrated Grants Management System
LUST – Leaking Underground Storage Tank
OCFO – Office of the Chief Financial Officer
OIG – Office of the Inspector General
OW – Office of Water
OW/OPPA – Office of Water/Office of Policy and Planning Analysis
PBR – DWSRF Project and Benefits Reporting

Table 1 shows the EPA offices involved in each of the six tasks.

TABLE 1. OFFICE AND PROGRAM AREAS EVALUATED BY TASK

Task	Office of Water		Office of Solid Waste And Emergency Response		Office of Air and Radiation	
	CWSRF	DWSRF	Superfund	Brownfields	LUST	DERA
Cost Estimating Best Practices	X	X	X	--	--	--
Funds Management	X	X	X	X	X	X
Systems Development and Enhancement	X	X	X	X	X	X
Green Project Reserve	X	X	--	--	--	--
Innovative Technologies	X	X	--	X	--	--
Leveraging Funds in the Local Economy	X	X	--	X	--	--

2.2 STUDY QUESTIONS

Table 2 provides the study questions associated with each task area.

TABLE 2. EVALUATION/STUDY QUESTIONS FOR EACH TASK AREA

Study Areas	Focus Areas	Study Questions
Cost Estimating	**Cost Estimating Approaches**	What cost estimating approaches do funding recipients use for developing project cost estimates, and why?
	Cost Estimate Timing	What effect does the timing of the cost estimate have on the project outcome?
	Cost Variance Factors	What cost factors influence differences between initial cost estimates and final costs?
	Project Scope Changes	What changes were made to the contract after award but prior to project completion as the result of scope changes such as field change orders?
	Results/Impacts of Cost Changes	What are the results and impacts of changes between initial cost estimates and final costs?
	Lessons Learned	What are the lessons learned in cost estimating practices?
Funds Management	**Policies, Processes and Procedures**	What funds management policies, processes and procedures helped/hindered ARRA implementation efforts, and why?
	Factors	What factors helped and/or hindered funds management policies, processes and procedures implementation, and why?
	Challenges	How were challenges to implementation of policies, processes and procedures overcome?
Systems Enhancement and Development	**Factors for Success**	What factors or changes contributed to developing or modifying systems that met the needed data requirements of ARRA?
	System Development/ Modification Challenges	What were the challenges to developing or modifying EPA's information management systems to meet Recovery Act requirements? What factors created challenges to developing or modifying systems?

Study Areas	Focus Areas	Study Questions
	Leveraging for Future Systems Development	How well did systems development and modification efforts succeed in meeting their ARRA objectives? Which ARRA information management process changes have been and should be leveraged for future use? Are any system development changes applicable to multiple EPA program systems?
Green Project Reserve	**Environmental Outcomes**	What secondary environmental outcomes (positive and negative) are associated with GPR projects?
	Outcomes Extent	What was the magnitude of those outcomes?
	Influencing Factors	What factors lead to projects that show secondary environmental outcomes?
	Lessons Learned	What information or documentation is available to assist municipalities to better assess and predict all environmental outcomes (primary and secondary) associated with potential projects?
Innovative Technologies	**Products and Services**	What types of innovative products or services did the ARRA recipients implement, and why?
	Suppliers, Industries and Markets	How did ARRA funding affect suppliers of innovative technologies and the industries or markets for the innovative products and services identified above?
Leveraging ARRA Funds in Local Economies	**Impacts**	What impact did the selected projects have on the local economies?
	Subsidy Levels	How do subsidy levels affect the extent of local impact?
	Leveraging Levels	How do leveraging levels affect the extent of local impact?

2.3 DATA COLLECTION METHODS

The data collection methods for the six task areas of the study share several common steps. The SAIC Team generally implemented the study in the following five steps. Table 3 indicates how they were used for each specific task. Not all the steps were used in each task; the individual task reports explain the specific data collection steps followed for each task.

1. Reviewed and analyzed information and documents from EPA files, web sites and databases; state web sites and files; and funding recipient files.
2. Interviewed a select number of EPA personnel.
3. Conducted focus groups of selected states.
4. Conducted discussions with selected funding recipients (as needed).
5. Reviewed EPA or state project files.

TABLE 3. DATA COLLECTION METHODS USED FOR EACH TASK

Study Task	Data Collection Methodology Step					
	Reviewed and Analyzed Information and Documents	Interviewed EPA Staff	Conducted State Focus Groups	Held Discussions with Selected Funding Recipients	Reviewed EPA or State Project Files	Analyzed Data to Identify Lessons Learned and/or Best Practices
Cost Estimating Best Practices	X	X *	X	X	X **	X
Funds Management	X	X	X	X	--	X
Systems Development and Enhancement	X	X	--	--	--	X
Green Project Reserve	X	--	X	X	X	X
Innovative Technology	X	--	-	X	X	--
Leveraging Funds In Local Economies	X	--	--	X	X	--

* Interviewed EPA Staff only on Superfund component of Cost Estimating (not SRF or Green Project Reserve staff)
** Conducted file reviews in North Carolina and Montana for Cost Estimating; did not examine files in other states because file review did not provide detailed information.

2.3.1 DATA COLLECTION

Not all tasks used all steps in the same way. The more detailed methodology descriptions in each task report describe how the study was conducted.

STEP 1: REVIEWED AND ANALYZED INFORMATION AND DOCUMENTS

All study tasks included the review of existing information and documents prior to additional data collection efforts. The SAIC Team reviewed and analyzed information and data from the following sources:

- **Existing studies**: The SAIC Team reviewed a number of reports from different sources to extract information on improvements made or needed, lessons learned and successful approaches; SAIC summarized and compiled this information in Appendix 2. Topics Addressed by Existing Studies and Evaluations. SAIC used this background information to develop each task's methodology and study questions. This included reviews of EPA's ARRA implementation activities by EPA's program offices, the Office of the Inspector General (OIG) as well as outside agencies such as the U.S. Government Accountability Office (GAO).
- **EPA and state web sites**: The SAIC Team searched and reviewed documents posted on EPA and state web sites that address ARRA implementation strategies or approaches, or lessons learned.
- **EPA databases** (e.g., federalreporting.gov, CWSRF Benefits Reporting System (CBR), DWSRF Project and Benefits Reporting System (PBR), Integrated Grants Management System (IGMS)): The SAIC Team analyzed data from EPA databases to identify patterns/differences among EPA Regions and states for selection criteria used to identify states for focus groups.
- **EPA and state files**: Based on recommendations from interviews with EPA HQ and EPA Regional personnel (Step 2), the SAIC Team reviewed selected EPA and/or state files containing information relevant to the evaluation questions for each task.

STEP 2: INTERVIEWED EPA PERSONNEL

Information resides with EPA personnel who implemented the changes and have knowledge of what worked, where problems occurred and what improvements were seen. The SAIC Team:

- **Identified key EPA personnel to interview.** The SAIC Team interviewed EPA Recovery Act senior leaders, Subject Matter Experts (SMEs) and other EPA staff. The SAIC Team worked with EPA to develop a list of specific individuals at EPA HQ and EPA Regional offices able to give their perspective on major lessons learned as well likely to fill information gaps and/or clarify existing information due to their positions or roles and responsibilities within the grants programs.
- **Developed an interview protocol** for interviews with EPA staff, and scheduled and conducted pilot interviews with a select number of EPA HQ staff and/or EPA Regional staff. The Interview Protocol Checklist outlined specific steps for the interviewer to ensure that information was obtained and recorded consistently.
- **Conducted interviews (approximately one hour in length).** At the beginning of the interview, the interviewer informed the interviewee that individual responses would not be distributed to EPA,

nor appear in the report in a way that allows specific responses to be associated with specific respondents.

- **Analyzed interview responses and used preliminary findings** to help define additional EPA interviews at the EPA Regional level and to confirm and identify appropriate state focus group participants and funding recipients.

STEP 3: CONDUCTED STATE FOCUS GROUPS

The SAIC Team used a focus group approach with states to obtain information, understand recipients' perspectives and better understand program context not available otherwise (from EPA interviews or existing data). Focus group sessions are facilitated discussions that allow participants to engage in topics of common interest, without having to adhere to a specific set of survey questions. The format encouraged participants to volunteer information about their experiences with ARRA implementation.

- **Identified Potential States for Focus Group Discussions.** The SAIC Team convened state focus groups to meet the needs of three studies based on selection criteria specific to the tasks. Selection criteria included: timing of award, award amount, project size, project location or project completion. States were selected based on these criteria and through discussions with EPA and state staff. Table 4 lists the states included in Focus Group Discussions for each of the three studies – Cost Estimating, Funds Management and Green Project Reserve. SAIC staff determined that it made sense to combine the Cost Estimating and Green Project Reserve Focus Groups, because the same state and recipient personnel could contribute to discussions of both topics. Information gathered during the Cost Estimating/Green Project Reserve focus groups was also used in the Funds Management report, as participants volunteered significant information relevant to funds management processes.

TABLE 4. STATES PARTICIPATING IN FOCUS GROUP

STUDY	STATES INCLUDED IN FOCUS GROUPS	STUDY	STATES INCLUDED IN FOCUS GROUPS
Funds Management	Colorado (Pilot) Missouri New Hampshire New York Texas Virginia Washington	**Cost Estimating** **Green Project Reserve**	Iowa Louisiana Montana New York North Carolina Oklahoma

- **Developed a Focus Group Protocol and Conducted Pilot Focus Group with State Staff.** The SAIC Team conducted a pilot Focus Group with State of Colorado ARRA personnel for the Funds Management Task**.** SAIC invited state staff who were involved with ARRA implementation (e.g., contract management, project management, technical oversight) to participate. The pilot focus group provided the SAIC Team the ability to test the process and discussion topics. SAIC gathered suggestions from state staff on possible projects files the Team could review or funding recipients SAIC could contact for further data collection efforts. The initial pilot focus group with Colorado provided very valuable information on organizational structures and administrative processes. The outcomes from this pilot were applied to the rest of the Funds Management focus groups as well as to the Cost Estimating and Green Project Reserve focus groups.

STEP 4: CONDUCTED DISCUSSIONS WITH SELECTED FUNDING RECIPIENTS (VENDORS, MUNICIPALITIES, CONTRACTORS)

The ARRA-funded projects were implemented at the local level; data collection for some study tasks required direct contact with funding recipients. As indicated in Table 3, this level of data collection was appropriate for all tasks except Systems Development and Enhancement (a study based on data collection from EPA Headquarters staff and records only).

For the Innovative Technologies and Leveraging studies, the SAIC Team spoke with select funding recipients to gain their particular insights regarding their ARRA projects. For Funds Management, Cost Estimating, and Green Project Reserve, states participating in focus groups invited funding recipients to attend the focus groups. While the number of local representatives attending focus groups was limited, they provided a valuable local perspective on the challenges they faced, the strategies they developed, the EPA activities that helped them with regard to cost estimation, and approaches for compliance with the additional mandates (Buy American, Davis-Bacon and reporting requirements).

STEP 5: REVIEWED EPA OR STATE PROJECT FILES

If warranted after interviews with EPA staff or focus groups with state contacts, the SAIC Team reviewed specific project files to research specific fund recipient information that provided additional details to answer the study questions (e.g., cost estimating). Examples of the types of information included differences observed between initial cost estimates and actual project costs.

2.4 DATA COLLECTION CHALLENGES

Across the ARRA study effort, there were several data collection challenges. The detailed data collection methodologies for each task took these challenges into account in the design of the specific approaches for each task. In general, the challenges and basic approach have been summarized in the following section.

Much of the **information gathered in the study effort was qualitative in nature rather than quantitative**. The fidelity of the accumulated information to actual events during ARRA implementation depends on the accuracy of recollections and reporting from an assortment of individuals, all of whom brought their specific, and likely selective, memories to the table. Different individuals placed different emphasis on the myriad of factors affecting ARRA program implementation. SAIC recognizes these challenges but also

understands the importance of and insight that can be gained from documenting these recollections/memories. Therefore, the SAIC Team conducted a large number of interviews and focus groups from a broad base of sources and used a systematic data review process to aggregate similar responses and identify patterns and themes. While the analysis does not provide a representative view of all EPA, state and funding recipient experiences, it identifies trends that highlight especially valuable lessons learned and successful approaches adopted to improve program implementation.

The lack of an **Information Collection Request (ICR) specific to this study** limited the methods SAIC could use to collect information from non-federal employees. It did *not* limit the number of EPA staff that SAIC could contact to discuss the ARRA implementation process; this was particularly relevant for the Systems Development and Enhancement task and the Funds Management task. For tasks requiring input from state and funding recipient contacts, SAIC's approach to use **focus groups** at the state level (described in detail in Step 3 above) and general discussions with the funding recipients (described in detail in Step 4 above) maximized the amount of state and funding recipient input. Where specific conversations/data collection efforts needed to be conducted with state or funding recipient representatives, SAIC limited the data collection efforts to nine or fewer representatives for any set of questions or topic.

Per discussions with EPA, SAIC understands that focus groups that solicit participant discussion around broad topics rather than responses to specific questions do not require an ICR. Similarly, SAIC understands that general discussions with funding recipients for the purpose of clarifying information already provided as part of ARRA reporting requirements are covered under existing ICRs.

Staff turnover at EPA, state and funding recipient offices since the ARRA program was implemented may have limited the number of individual contacts available (and therefore the amount of information) that the SAIC Team could gather. Where staff turnover had occurred, the SAIC Team made attempts to contact the staff who had responsibility for ARRA implementation (but had moved to a new position within the agency) or located alternative staff who could help in piecing together the picture of program set-up and implementation. EPA staff members were helpful in directing SAIC Team members to others in the Agency who could answer questions about ARRA topics.

The EPA ARRA programs were implemented alongside ongoing work funded through annual appropriations. This was an advantage to EPA in implementing the programs since EPA could use and build on an existing set of rules and expertise, but it created a **challenge in trying to differentiate the impact of the ARRA portion**. Without a clear comparison to show what would have happened in the absence of ARRA funding, this study did not attribute outcomes and impacts directly to ARRA but identified how ARRA influenced or contributed to outcomes and impacts. **The studies do not try to show causality per se**. Instead, the case study and interview approach used in this study is intended to generate analyses that captured the lessons learned and successful approaches developed.

Many individuals and offices, when originally contacted about possible participation in the study, were reluctant to participate. Some were concerned that the study was a compliance assessment (especially in for those involved in Cost Estimating). Some responded that they were still catching up from the workload of ARRA. Some people preferred focusing on the future and not reviewing the past, particularly since they believed it unlikely that EPA would get another Recovery Act anytime soon. Some saw it as yet another OIG or GAO audit. And some were concerned that results of such a study might reflect poorly on their programs, state or office. The SAIC Team devoted considerable effort to engaging state and local participation.

2.5 PARTICIPATION ACROSS THE COUNTRY

Five of the task topics – Innovative Technologies, Leveraging Funds in Local Economies, Green Project Reserve, Funds Management and Cost Estimating – involved gathering information from many states and EPA Regions. The map below in Figure 3 shows locations of the case studies for the Innovative Technologies and Leveraging Funds tasks and the states participating in the Funds Management and Green Project Reserve/Cost Estimating focus groups.

FIGURE 3. LOCATIONS OF CASE STUDIES FOR THE INNOVATIVE TECHNOLOGIES AND LEVERAGING TASKS AND STATES PARTICIPATING IN THE FUNDS MANAGEMENT AND GREEN PROJECT RESERVE/COST ESTIMATING FOCUS GROUPS.

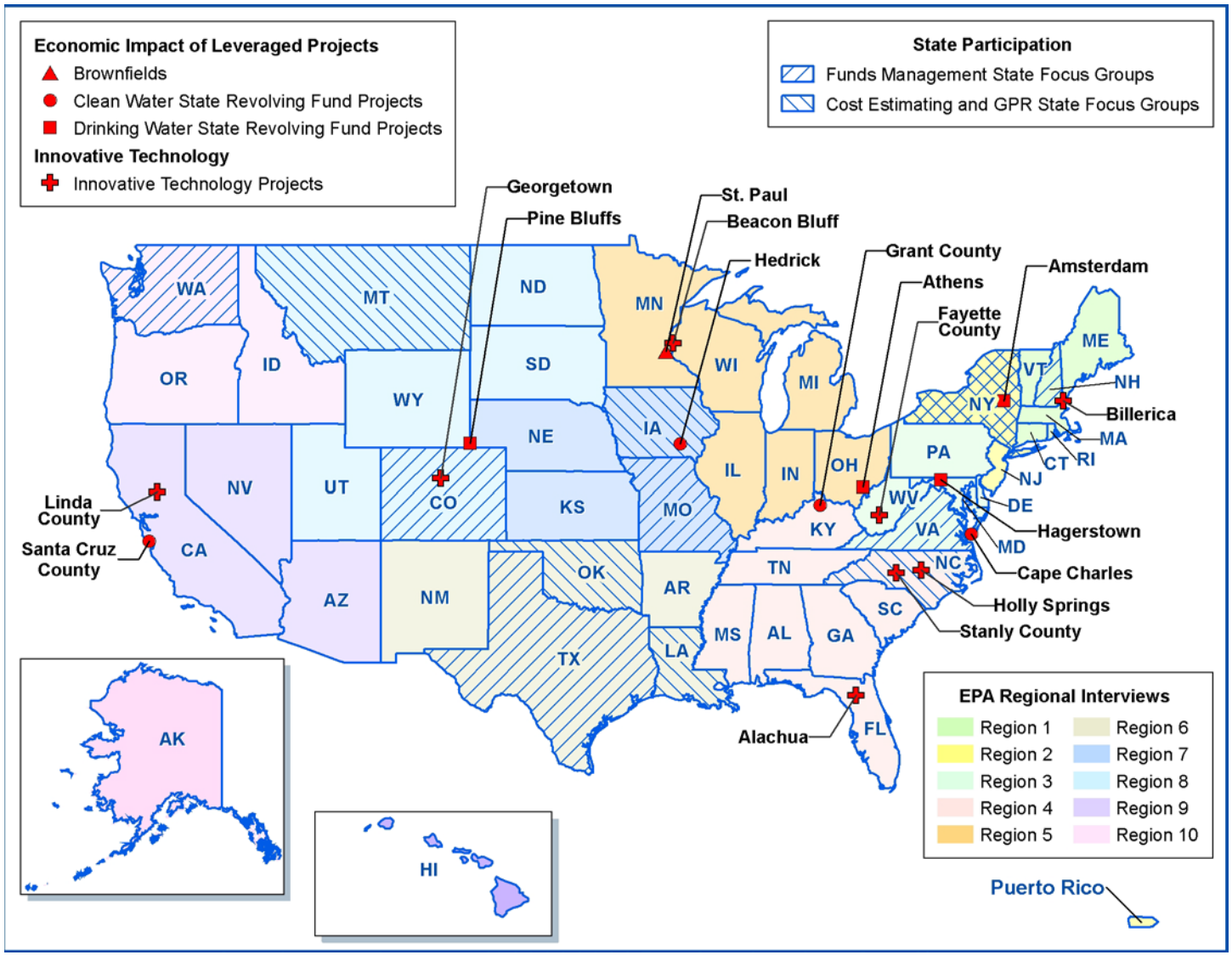
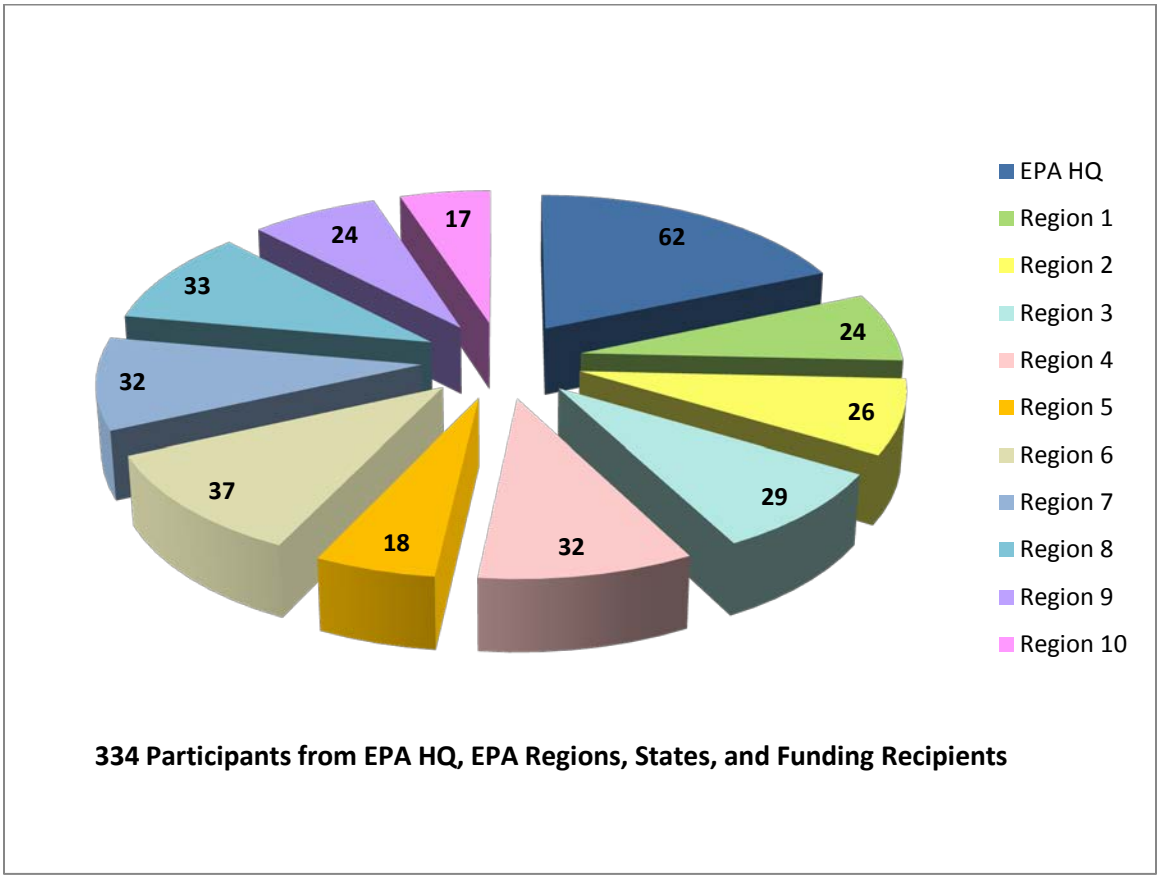


Figure 4 illustrates the number of individuals providing input to the six ARRA studies. These include EPA staff from HQ and the Regions, state program staff and several funding recipients (e.g., vendors for innovative technologies). Over 330 individuals participated in the effort.

FIGURE 4. PARTICIPANTS IN ARRA STUDIES - EPA HQ, EPA REGIONS, STATES, AND FUNDING RECIPIENTS



SECTION 3. FINDINGS

In the course of this study, SAIC interviewed or included in focus groups more than 330 individuals who had worked on EPA ARRA programs either at EPA or with states or funding recipients. While many relayed project-specific or state-specific incidences, some common sentiments rose to the top, including successes (as identified by study participants), lessons learned, some unintended consequences of ARRA processes or projects and recommendations for the future.

SUCCESSES OF ARRA IMPLEMENTATION

- **Early, frequent collaborative efforts were key.** Planning meetings *before* ARRA was even signed helped EPA and states hit the ground running. States were already compiling their lists of projects to be funded when the statute was signed. Communication throughout ARRA implementation, especially when conducted through electronic means to all stakeholders, enabled everyone to have access to the same information at the same time.
- **Building on existing programs, processes and systems saved time.** There was no need (or time) to reinvent the wheel. Adjustments made to existing programs, processes and systems were easier to absorb.
- **'Live' meetings, webinars and training sessions contributed to the success of ARRA implementation.** Face-to-face communication bolstered the sense of a team united to address common challenges together.
- **Strong partnerships among EPA, states and localities were essential to ARRA implementation.** EPA's communications underscored the understanding that EPA's environmental goals can be met only through coordination and cooperation with its partners.
- **Implementation inspired the development of forms and templates to standardize and accelerate processes.** These, and other streamlining initiatives, have been permanently adopted by some programs.
- **ARRA funding supported the development and sale of innovative technologies.** Water and wastewater utilities, which are normally risk-averse, were motivated to iuse new technologies.
- **Green Project Reserve's requirement to use at least 20 percent of ARRA-SRF funds for green projects served as a catalyst to seek out energy efficient projects** and incorporate this criterion into the states' existing programs.
- **The Superfund program's ability to use existing contract vehicles at existing sites meant the program was able to readily meet ARRA deadlines and requirements.** The program maintained a large stock of large shovel-ready projects and did not pose significant burdens to staff because remediation contracts were already in place.
- **ARRA projects stimulated local economies during the recession.** For every ARRA dollar spent, the regional impact ranged from one and a half to three dollars across nine case study projects. Thus communities experienced economic and environmental benefits from ARRA projects.
- **ARRA provided needed funding to disadvantaged and rural communities.** State and funding recipients noted that ARRA funding contributed significantly to their rural and disadvantaged communities, citing that the majority of these communities are unable to afford an SRF loan

and/or to coordinate larger projects. Communities appreciated ARRA's subsidy/loan forgiveness provision, but states noted that this created extra administrative work to track different percentages of loan forgiveness across different communities.

LESSONS LEARNED ABOUT ARRA IMPLEMENTATION

- **The workload was intense and EPA and partners used several strategies to address it.** EPA HQ, Regions and states all agreed that the workload from the bounty of funding, and the accompanying requirements, was daunting. Some programs hired new staff; most shifted responsibilities to ensure that experienced staff handled the ARRA work while junior staff managed the base programs. States were grateful for the funding, but many reported they would think twice if offered the same opportunity again.
- **Early guidance was helpful, but changes over time created substantial re-work and uncertainty.** States appreciated the guidance issued by EPA but commented that changing the guidance mid-stream was confusing and contributed to the overall workload.
- **ARRA implementation required the most knowledgeable, dedicated people.** The complexity and scale of the effort required people with extensive knowledge of how the existing programs worked and who they needed to contact when the rules changed – as they had under ARRA.
- **The level of oversight did not always match the need.** States and Regions commented that in some cases the amount of time devoted to monitoring expenditures and progress seemed unnecessary. Participants did not see clear targeting of oversight issues based on risk. Participants noted that it appeared to them that few people used the information gathered through recipient reporting.
- **The mandate to spend the funds quickly sometimes conflicted with state priority lists for projects.** States recounted instances in which they had to pass over priority projects with greater environmental benefits in favor of shovel-ready projects with fewer benefits to the public.
- **Tight deadlines for obligating and spending funds was inconsistent with the timeline for most innovative technologies**, which require concept design, fabrication, pilot testing and full-scale commercialization. The SRF's deadline for having projects under contract within one year made it difficult for water projects to take advantage of green infrastructure or innovative technology options, especially if project blueprints had to be revised.
- **The realities of the financial times changed cost estimates for projects, which were lower than expected due to the fierce competition between companies trying to stay afloat.** Profits became less important than retaining skilled employees. States related that businesses definitely would have failed if ARRA funding had not come to the rescue.

UNINTENDED CONSEQUENCES

During the course of communications with stakeholders, SAIC unearthed several unintended consequences of ARRA implementation. Some are positive consequences; some are less so. It is difficult to plan for the unexpected; if you know it is going to happen, you can plan for it. Nevertheless, it may be instructive to keep these lessons in mind when considering the impacts of distributing funding to accomplish environmental and economic goals.

- **Mixed blessings.** Small communities receiving sizeable grants for ambitious projects were grateful for the improvements in their towns. With little or no town staff or expertise though, they were overwhelmed and needed to turn to their state or consultants for project management support. State staff, pressed into double-duty as program implementers and project managers, carried significant loads. The same can be said for not-so-small towns who had never received SRF funds before; they also required considerable attention from already over-burdened state staff.
- **You get (only) what you pay for.** One of the easiest project types to fund quickly was metering. In some cases, metering could be counted as a 'green' project and thus also helped states achieve their 20 percent requirement for the Green Project Reserve. Towns with inadequate metering reported that they were losing public revenues due to losses of produced water (potable water treated and distributed through the public water supply) to unmetered users or users with old, inaccurate meters. After new meters were installed, users accustomed to very low water bills were shocked at the true cost of their water usage. Instead of viewing these public improvements as a positive change for their communities, some citizens viewed the new meters as technologies that increased their water bills.
- **Just the (wo)man for the job.** Some states used ARRA-funded administrative dollars to make new hires to handle the increased workload. In some cases the new hires, which were advertised as temporary, performed so well that the states elected to make the hires permanent. Thus the stimulus bill *did* accomplish the goal of creating good, meaningful jobs. Employees who thought they were getting only a temporary job landed a permanent one.
- **Double bonus points.** It is intuitive that money invested in a community will prompt other investments. What might not be intuitive is that this concept could apply to sewage treatment plants or road paving projects. States cited several instances in which an ARRA-funded community project sparked additional investments from the community members either from increased civic pride or created economic opportunities. Thus, not only did the community reap the benefits of new public spending, they multiplied the benefits by investing their own funds in the community.
- **Innovation turns green.** Water and wastewater utility managers reported that the adoption of innovative technologies funded through ARRA provided more than an efficient means of achieving compliance with regulatory standards. Participants confirmed that the green requirements helped encourage recipients to consider additional benefits including energy savings, lower maintenance costs, reduced water waste and less chemical use.

RECOMMENDATIONS FOR EPA

Based on participants' input and data analyses, SAIC and Toeroek Associates, Inc. discerned several recommendations.

- **Use multi-disciplinary, multi-organizational teams to draw input from all stakeholders.** All perspectives are needed to identify the best processes for implementation, discern a common lexicon that all stakeholders will understand, and clarify confusing terms that connote different meanings between different agencies and organizations (e.g., 'shovel-ready', 'green'). In

particular, submit guidance documents and forms to a thorough vetting process such that all stakeholders can provide their perspectives *before* the guidance is officially issued.

- **Think strategically about information needed to assess success, whether for environmental, economic or other goals** – not only what will be needed now but in five years. The SAIC Team was surprised to find that states accurately tracked the loans that they provided to fund projects but did not keep detailed records of total project costs. By only tracking the funds they provided, they had no information on funds received from non-EPA sources or the grantee itself. As a result, the estimated cost of the project could not be compared to the final project cost. (New York was an exception in that program managers monitored all project costs regardless of the source of the funds.) Likewise, when the Team attempted to document primary and secondary environmental benefits of green projects, states responded that they were not required to collect such data and indeed did not. Knowing data needs ahead of implementation will shape systems development, reporting requirements and oversight processes and schedules.
- **Identify conflicting goals and objectives as early as possible and attempt to prioritize.** As noted above, states had difficulties in finding shovel-ready projects that also met important environmental priorities. Sometimes states reluctantly passed over higher ranking projects just because they were not classified as 'green' or were not shovel-ready. If quick obligation of funds is paramount, do not attach new complex requirements that slow the process. In addition, many perspectives are critical to recognizing what might be the major management, economic, technological challenges and trade-offs as early as possible. Recognizing and planning for these is critical to successfully implementing programs with new goals and requirements.
- **Develop a process to facilitate peer learning throughout the implementation process.** States and localities noted that they could have benefited from learning about how their peers were handling similar situations. Particularly for small communities or for areas that previously had not participated in EPA grant programs, funding recipients needed additional guidance on managing grant funds, reporting and managing project selection and construction. This training must happen early in the process.

Preliminary Recommendations Used for Emergency Response and Recovery Efforts

EPA already adopted some preliminary recommendations from this study to guide decisions and management for the Gulf Coast Oil Spill and Hurricane Sandy response and recovery efforts. With regard to the Gulf Coast Oil Spill (i.e., Deepwater Horizons), EPA accepted the role of chair of a multi-agency task force to coordinate government actions and develop effective strategies that addressed a wide range of challenges. Internally, EPA assembled an interdisciplinary team to develop policy initiatives and an administrative group to coordinate funds management for the Gulf. Many of these funds had special legal provisions and limitations.

For Hurricane Sandy, EPA received $600 million primarily for State Revolving Funds. Using the lessons learned from this ARRA study, EPA organized a multi-disciplinary management team, reached out to state officials immediately to understand their management goals and helped organize the President's Sandy Task Force. Specifically, EPA developed an Internal Control Plan based on input from all stakeholders that focuses efforts on commonly accepted risks and establishes agreed upon priorities that EPA and the states will monitor. This effort helped to align EPA and state priorities.

For both recovery efforts, EPA coordinated with other federal agencies that had the same challenge of distributing large sums of money quickly to targeted recovery efforts. Also, EPA's Office of Water has continued efforts to improve the capabilities of both the PBR and CBR data systems to make them more user-friendly, with project details that are more useful to EPA and state users.

APPENDIX 1: COMPILED EXECUTIVE SUMMARIES FROM THE SIX TASK REPORTS

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EXECUTIVE SUMMARY – COST ESTIMATING

PURPOSE

This study seeks to examine the methods used for estimating costs of Clean Water and Drinking Water State Revolving Fund (CWSRF and DWSRF) and Superfund projects funded by the American Recovery and Reinvestment Act (ARRA). This study compares estimated costs to final project costs, with the objectives of capturing successful approaches, determining the factors that contributed to variations between estimated costs and final project costs, and identifying lessons learned.

METHODOLOGY

EPA contracted with Science Applications International Corporation (SAIC), and its subcontractor Toeroek Associates, Inc., to review both estimated and final costs of CWSRF, DWSRF and Superfund projects funded by ARRA. SAIC used two different approaches to review cost estimates and compare them to final costs, one for the CWSRF and DWSRF programs, and one for Superfund. One major reason for the different approaches was that the SRFs are primarily state-managed with cost estimates performed by localities and utilities using the grant funds for clean and waste water projects, while the Superfund sites were primarily federally managed.

For the SRF programs, SAIC performed the following activities: reviewed existing studies and information on cost estimates; conducted state focus groups and reviewed state files with project-specific data; analyzed nine individual projects' field change orders to assess their impacts on costs and scope; and analyzed the data obtained from the focus groups and file reviews.

For the Superfund program, SAIC reviewed existing studies and information on Superfund cost estimating; collected additional information on completed Superfund projects; interviewed EPA Superfund staff; and reviewed and analyzed collected information and interview results.

FINDINGS

Upon completion of this study, SAIC prepared several observations and noted lessons learned from the cost estimating process for EPA's consideration for both SRF and Superfund projects.

CLEAN WATER AND DRINKING WATER SRF PROGRAMS

- **The ARRA funding program favored projects that replaced existing infrastructure.** These relatively routine projects minimized the likelihood of costs increasing beyond original estimates and typically did not require significant environmental review. ARRA funds enabled much-needed maintenance of wastewater and water infrastructure, which often are the largest capital assets of many communities. An ample supply of qualified contractors and laborers for this type of work led to an increase in the number of competitive bids, which lowered costs.
- **Flexible scopes (e.g., replace aging pipelines in a generally defined area) allowed the quantity of work to expand or shrink to match the estimated cost.** The length of pipeline replaced or the number of meters installed could be increased or decreased to fully utilize the funding available without exceeding the funding amount.

- **Cost estimates for a project evolve over time and each successive cost estimate adds its own value to the process.** Accepted engineering practices are used to prepare cost estimates. These practices are uniform from state to state. Estimates (become more accurate with each iteration, which provides useful information to the SRF programs. There is not some 'better' approach that could be used to prepare cost estimates. The tight time constraints created by the one--year deadline to be under contract often favored projects with more developed cost estimates.
- **States generally identified prevailing economic conditions as the most significant factor contributing to variances from costs estimates.** In the early part of the ARRA program commercial construction dropped off significantly because of difficulty in obtaining loans for commercial and residential construction. This increased competition for municipal projects. Grantees received many more bids for ARRA-funded projects than they had previously received for similar projects. This increased competition reduced bid costs below earlier estimates.
- **States developed and implemented procedures to ensure ARRA loans closely matched estimated project needs.** The procedures implemented included: working with the grantees during project development to enable a better understanding of project goals and contribute their engineering experience in a collaborative manner; basing loan offers on project bid costs; providing contingency amounts for construction to account for unforeseen circumstances; using non-ARRA SRF funds for contingency amounts (money not used could be returned to the non-ARRA SRF account); encouraging grantees with excess available funding to utilize the excess money to improve the project (e.g., purchasing spare parts) while staying within allowable expenditures; and prohibiting the use of ARRA funds to cover cost over-runs.

SUPERFUND:

- **The program has one standard method for cost estimating** but the accuracy of the bids is dependent on variables such as the quality of data known about the site. Factors that improve cost estimating include a better defined site with fewer unknowns, timing of the estimates (prepared closer to commencing the project) and understanding the extent of contamination.
- **Less complex sites lead to more accurate cost estimates**. Smaller and less complex sites or activities (e.g., road building) are easier to cost and lead to more accurate cost estimate.
- **Advanced sites with existing activities lead to more accurate cost estimates.** Even complex sites with remediation underway lead to better cost estimates then those initially presented in the Record of Decision (ROD). The extent of contamination is better understood by this point and the contractors are experienced with the site.
- **Superfund adapted more easily to ARRA deadlines and influx of funds.** The Superfund program adapted more easily to the influx of ARRA funding because it had ongoing and shovel-ready projects or projects that had been through the ROD process. This allowed for more accurate and timely cost estimating.
- **Existing contracting vehicles simplify award without changing scopes.** The process to award tasks was simplified as each Region had pre-existing remediation contracts/contractors in place, ready and experienced with many of the sites or types of projects.

RECOMMENDATION

Provide forum for successful approaches. States in the focus group discussions described several techniques used to minimize differences between cost estimates and final project costs. EPA could provide a forum for sharing these techniques among states.

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EXECUTIVE SUMMARY – FUNDS MANAGEMENT

PURPOSE

This study seeks to capture the lessons from EPA, states, tribes, localities and other fund recipients' management efforts related to the $7.2 billion ARRA funds appropriated to EPA. The scale, scope and new requirements posed daunting management challenges to all of these stakeholders requiring new guidance, processes and systems. Although there is no proposal before Congress for another major investment similar to ARRA, EPA and its partners periodically face challenges managing substantial funding for many projects with new terms, requirements and conditions, such as for Hurricane Sandy, and have already used some of these lessons.

METHODOLOGY

ARRA, enacted in 2009, bolstered the economy, in part, by funding six EPA programs. These programs included drinking water and clean water infrastructure projects through the State Revolving Funds (SRFs) and environmental initiatives through Superfund, Diesel Emissions Reduction Act (DERA), Leaking Underground Storage Tank (LUST) and Brownfields programs. EPA contracted with SAIC, and their subcontractor Toeroek Associates, Inc., to review the activities and process for funds distribution, management and reporting for each of the six programs that received ARRA funding. The objective of the review was to capture, verify and analyze the critical lessons learned and successful approaches related to ARRA funds management. To achieve this objective, the SAIC Team gathered information on three specific aspects: timely obligation and expenditure of funds, additional mandates of ARRA (Section 1605 Buy American mandate, Section 1606 Davis-Bacon Prevailing Wage mandate, Section 1512 reporting requirements, and Green Project Reserve mandate), and grants management processes for the previously mentioned programs.

The data collection method used interviews with EPA staff and state focus groups, combined with additional information from literature, websites and databases. SAIC and Toeroek gathered the majority of the information from 47 EPA staff interviews and 12 state focus groups, which included 108 state personnel and 9 funding recipients or funding recipient consultants/contractors.

EPA distributed approximately 86 percent of its $7.2 billon ARRA funding to individual states through capitalization grants based on an allocation calculation. This was approximately twice EPA's historical annual grants per fiscal year for the SRF drinking and clean water programs. Each state met the accelerated, first ever imposed deadline of its kind, by surmounting difficult barriers and addressing unforeseen challenges. All funds were obligated without any re-obligation within the one-year timeframe; more than 90 percent of the funds were expended within the three-year or specific programmatic deadlines.

FINDINGS

In this study, the SAIC Team discerned several important aspects of ARRA funds management processes. Following the Executive Summary, the full report presents the findings in three major categories: Challenges, Successful Approaches and Recommendations.

The report addresses:

- Changes in policies, processes and procedures, and evolution and response to those changes.
- Factors that helped or hindered, as well as the challenges affecting different outcomes among the programs, Regions, states and projects.
- Successful approaches to addressing conflicts and implementing the ARRA-funded programs.

CHALLENGES AND SUCCESSFUL APPROACHES

Based on the perspectives from all stakeholders, below are summaries of the major challenges described and some successful approaches used.

- **Scale** - Overall, the additional workload from the sheer magnitude of the ARRA funding amounts, coupled with the work associated with the four mandates, produced serious demands on EPA and state staff. Everyone from EPA to states to local vendors worked above and beyond usual schedules to meet ARRA goals. EPA Regions and states who overcame their initial reluctance to hire new staff with ARRA Management and Oversight funds fared better in handling the additional workload. Early and frequent communication among stakeholders, with regularly-scheduled meetings and webinars that began before ARRA was even passed helped to form solid working relationships. The enhanced communication and collaboration between EPA, states and funding recipients were critical factors in getting through this intense period. Innovative, streamlined management approaches were developed out of necessity, but remain today as permanent program improvements. The ARRA 1512 reporting requirements helped states prepare for requirements of the Federal Funding Accountability and Transparency Act.
- **Regional and State Variation** - During ARRA implementation, it became clear that there were 51 distinct SRF programs (50 states plus Puerto Rico); any changes made at the national level affected these 51 programs differently. Existing, established processes and procedures served as a good foundation on which to incorporate ARRA requirements. Modifying existing processes made the changes easier to implement. The fast-paced nature of ARRA implementation encouraged federal, state, and local organizations to 'flatten out their management process' by eliminating unnecessary reviews at multiple levels, allowing for simultaneous rather than sequential reviews, and providing information and updates to everyone at the same time, ideally through web postings, to eliminate the time required for information to trickle down from one level to the next. Some improvements have been incorporated; some remain as future goals. For example, some states have shortened the period from application submission to contract award.
- **Additional Requirements** - The four additional mandates that came with ARRA funding – Davis-Bacon labor requirements, Buy American stipulations for iron, steel and manufactured goods, Section 1512 reporting on expenditures, and the designation of 20 percent of ARRA funds for 'green' projects – created extensive challenges for EPA, states and funding recipients. The

provisions were complex, guidance was often changing and the workload associated with the mandates alone was significant. Some states opted to designate specialists to remain up to date on the mandates and process the necessary paperwork. EPA HQ and Regions endeavored to provide training and guidance to work through complex issues.

- **Inexperienced Recipients** - Many states widened their customary range of grant recipients to include new communities and new businesses, in an effort to 'spread the wealth.' These new funding recipients, unfamiliar with EPA program requirements, had difficulties in handling the accelerated schedules and the sizes of the projects awarded. Communities without sufficient management experience, especially small towns with little or no town staff, turned to their state program offices for assistance. The towns were very appreciative of the new activity in their communities; in some instances, ARRA funding kept businesses from going bankrupt or laying off personnel. State offices admitted though that their personnel were overextended in managing projects for entities without sufficient staff or experience.
- **Conflicting Goals** - The fundamental ARRA goal to inject money quickly into the economy sometimes conflicted with the EPA goal to fund projects that would yield the greatest environmental benefit. The need to find 'shovel-ready' projects meant that sometimes higher priority projects were passed over in favor of other projects that were ready to implement. Despite this conflict, ARRA funds enabled the completion of beneficial projects that would never have been done otherwise. ARRA funded projects that yielded environmental and public health benefits. The requirement to include 'green' projects encouraged engineers to add water and energy efficiency technologies into their drinking water and clean water projects.

RECOMMENDATIONS

The numerous discussions with stakeholders in the funds management processes generated recommendations for going forward. Recommendations in the following summary are not listed in any priority order and are presented as guideposts for EPA and states' existing programs and any new initiatives for the existing programs.

- **Think strategically about information that will be needed in the future.** Involve all stakeholders (multi-disciplinary and multi-organizational) in assessing what information will be needed to measure outcomes or results. Identify and agree on specific monitoring data needs prior to implementation; collect the necessary data to track incremental milestones that measure the progress or status of activities.
- **Work as a team to achieve process efficiencies.** Collaborate with all stakeholders through working groups to develop plans, policies and guidance prior to and throughout implementation. Attempt full transparency in communication; share information with everyone simultaneously to avoid unnecessary delays as information slowly spreads. Communicate with one voice to avoid conflicting messages from different federal agencies. Create short-term working groups focused on specific issues or processes.
- **Follow a strategy with clearly defined goals; eliminate conflicting goals.** Clarify primary and secondary goals so that states do not have to wrestle with tough choices. Consider incorporating new requirements as incentives or goals instead of mandatory requirements where possible. Provide for flexibility at the state and local level to allow for adjustments to the local situation.

Delegate the decisions to the local level as much as possible because the local situation will dictate what or how to apply requirements. Simplify requirements to enable quick implementation and better compliance. Target oversight to ensure that states with historical program or financial management issues receive attention early in the process.

- **Use effective tools and processes.** Develop and maintain a website to provide one central place for updated policies and guidance; remove obsolete guidance to avoid confusion. Use the website to disseminate successful approaches developed by stakeholders. Provide reasonable deadlines and establish internal indicators to alert managers of potential problems/delays. Provide sufficient resources to handle the increased workload. Dedicate experienced staff to the effort; reassign staff from other program areas. Make temporary hires and use contractors.

Some of the lessons learned from ARRA implementation have already been applied by EPA managers in their regular programs and in response to funding for Hurricane Sandy recovery. Experience with ARRA provided managers insight on what questions to ask. The lessons about early and frequent communications among all stakeholders led EPA to create a communications network that enables questions to be posed and discussed. The Hurricane Sandy Task Force crafted guidance and policy to make guidance clearer initially and reduce the need for re-work. This included specifying clear financial deadlines and clarifying crucial definitions.

EXECUTIVE SUMMARY – INFORMATION SYSTEMS DEVELOPMENT AND ENHANCEMENT

PURPOSE

ARRA, enacted in 2009, required EPA to rapidly obligate its ARRA funds to many hundreds of projects in six environmental programs across all 50 states, tribes and territories and to satisfy the special reporting requirements for oversight, accountability and transparency. EPA contracted with SAIC to assess EPA's information systems development and enhancement efforts to implement ARRA.

METHODOLOGY

SAIC used interviews of EPA senior staff combined with additional information from literature and databases to capture, verify and analyze the critical lessons learned and successful approaches related to EPA's system development and enhancement efforts.

During the interviews, EPA respondents identified a number of challenges, successful approaches, recommendations/lessons learned and systems and process changes that were initiated due to ARRA, but have had more expansive impacts to EPA's programs beyond ARRA.

FINDINGS

More than half of the respondents identified the following two challenges: 1) unclear and evolving Office of Management and Budget (OMB) and Recovery and Transparency Board (RAT Board) guidance, and 2) the time constraints for ARRA implementation. The majority of the respondents identified successful approaches that helped them meet the deadlines for ARRA implementation: 1) use existing funding or a simple process for obtaining funding for systems modification, 2) use existing staff, 3) modify existing systems, and 4) use existing contracts. Using existing personnel and infrastructure made it possible for EPA to meet the aggressive ARRA implementation schedule.

Respondents described the process and systems changes they made as a result of the ARRA program and plan to implement and maintain on a permanent basis. One EPA program established a systematic process for future system updates. Other programs expanded system capabilities to improve data management for the entire program, not just ARRA-related functions (e.g., providing states direct-entry, expanding the use of funding recommendation templates, improving accounting consistency between multiple funds management systems, and adding data elements to enable storage of estimated and actual data.) In addition to these process and system changes which EPA offices made permanent, three respondents noted that ARRA brought an increased focus on geospatial elements of data reporting.

RECOMMENDATIONS

Two of the recommendations proposed by the EPA interviewees were directly related to challenges that they faced. They might be possible to implement during future large-scale funding efforts.

- Respondents recommended providing additional lead time to allow for strategic planning related to systems changes. The short implementation schedule did not allow time for strategic planning.

- One EPA respondent strongly recommended that the responsible entities from all levels – highest management level to the lowest level (individual EPA offices) define the systems requirements before starting the effort (and not change them when implementing the requirements). (During ARRA, defining the system requirements was not possible due to the ongoing changes to the OMB and RAT Board guidance and the changes made to the data requirements only a few weeks before the first reporting period.)

EXECUTIVE SUMMARY – GREEN PROJECT RESERVE

PURPOSE

This study seeks to capture the benefits and outcomes related to the Green Project Reserve (GPR) requirements of ARRA funds allocated to the EPA Clean Water and Drinking Water State Revolving Fund (CWSRF and DWSRF) programs. EPA and states had to target almost $1.2 billion for green projects - one of the largest single goals that EPA ever had to meet.

METHODOLOGY

EPA contracted with SAIC, and their subcontractor Toeroek Associates, Inc., to review the benefits and outcomes of the green projects undertaken to fulfill the GPR requirements for the CWSRF and DWSRF programs under ARRA. 'Green' projects include those that deal with green infrastructure, water efficiency, energy efficiency or those that are environmentally innovative. The objective of the review was to gather and report on information related to both primary and secondary outcomes of State Revolving Fund (SRF) green projects. To achieve this objective, the SAIC Team reviewed existing documents and information related to green projects; reviewed existing EPA databases such as the CWSRF Benefits Reporting system (CBR) and the DWSRF Project Benefits Reporting system (PBR); categorized clean water and drinking water projects; conducted focus group discussions and file reviews in six states; and documented the results of these analyses.

Several challenges became evident as SAIC began collection and analysis of data for this study. ARRA did not mandate that states collect data that would allow for measurement or documentation of primary or secondary environmental benefits of completed green projects. In addition, the downloaded data that SAIC received from the CBR and PBR databases represented only a snapshot of ARRA projects. Finally, finding published data to enable SAIC to identify environmental outcomes was particularly difficult, as completed projects had only been in operation for a few years at most.

FINDINGS

SAIC primarily based its analyses on perspectives from six state focus groups. SAIC was largely unable to find existing studies that included quantitative analyses of environmental outcomes of green ARRA projects. The one exception is a draft partial analysis of anticipated environmental benefits of ARRA-funded GPR projects conducted by Industrial Economics, Inc. (IEc). The authors of this study were only able to find data for about a third of the GPR projects. Similarly, a review of EPA's CBR and PBR databases produced limited findings; data was not entered consistently, so SAIC was unable to compare the amounts spent on different types of green projects.

The six state focus groups offered largely qualitative information on primary and secondary environmental benefits of GPR projects. Participants noted that there was no documentation of environmental benefits from ARRA-funded GPR projects nor was it requested or required by EPA, but all of the state participants were able to identify some secondary outcomes during discussion sessions.

BENEFITS AND LESSONS LEARNED

SAIC found that the majority of GPR projects undertaken by the CWSRF and DWSRF programs across the nation involved the installation or replacement of water meters (113 projects), the rehabilitation or replacement of leaking pipes (41 projects), the construction of wastewater treatment plants (183 projects), and stormwater management (194 projects). SAIC's review of these projects and those discussed during the state focus groups yield several anecdotal observations of primary and secondary environmental benefits, including:

- The overall improvement of environmental awareness of project area residents.
- Increased community pride, enhanced property values and overall neighborhood beautification.
- Increased efficiency in water meter reading operations, which also results in less vehicular emissions, better use of water utility staff, improved customer service and increased funding for utilities to use in other areas of water line maintenance.
- Large cost savings to municipalities due to reduction in energy consumption by water treatment and distribution activities, allowing for investment in other community improvement projects.
- An overall increase in the innovative attitude of municipalities and engineers, and a desire to pursue future green projects.

In addition to these environmental benefits, SAIC observed several notable lessons learned, including:

- ARRA projects that were 'categorically' green did not require a business case to document expected environmental benefits, because the primary benefits were assumed.
- Existing project priority scoring mechanisms in Intended Use Plans were not designed to capture green project benefits that would address specific green priorities.
- The short time frame available to EPA to develop ARRA guidance for the state SRFs may have resulted in less than optimal guidance in some areas.

RECOMMENDATIONS

Upon completion of this study, SAIC formulated several recommendations for EPA's consideration. EPA could consider:

- Requiring business case documentation as well as quantifying primary and secondary environmental benefits for all completed projects, which would be useful in quantifying total environmental benefits.
- Tracking and evaluating costs and secondary benefits more closely.
- Developing guidance on assessing secondary benefits of green projects.
- Encouraging cooperation between states and outside organizations to leverage the ability to document green project benefits.

EXECUTIVE SUMMARY – INNOVATIVE TECHNOLOGIES

PURPOSE

ARRA, enacted in 2009, bolstered the economy, in part, by encouraging the adoption of innovative technologies, particularly for drinking water and wastewater treatment. EPA contracted with SAIC to review examples of innovative technologies adopted through ARRA-funded projects. The objective of the review was to capture examples and successful approaches from technological innovation made possible by various EPA programs that distributed ARRA funding. To achieve this objective, SAIC gathered information regarding nine innovative technologies in the Drinking Water State Revolving Fund (DWSRF) and Clean Water State Revolving Fund (CWSRF) programs that received support through ARRA funds. The findings are summarized below.

METHODOLOGY

For the qualitative analyses, SAIC interviewed local experts familiar with the drinking water and wastewater projects as well as company representatives from the major suppliers. SAIC also reviewed studies of technological innovation and other materials provided by interviewees.

FINDINGS

ARRA funding supported the adoption of innovative technologies. Despite the challenging circumstances, ARRA funding supported the adoption of innovative technologies. The scale and scope of the adoption varied in expected ways (e.g., widespread adoption of advanced metering technologies and regional adoption of tank mixers). These are low-cost or low-risk technologies in that technology failure does not result in noncompliance.

ARRA funding motivated water utilities to consider innovative technologies and assume some additional risk. Normally risk-averse water and wastewater utilities adopted innovative technologies that were potentially cost-effective and/or satisfied additional operating constraints provided their performance claims could be realized. The utilities interviewed evaluated both conventional and innovative technologies before selecting the innovative technologies. It is possible that favorable ARRA funding conditions such as principal forgiveness encouraged utilities to accept a little more risk than they might normally accept. It is clear that the ARRA funding enabled several projects – large and small – to proceed.

ARRA funding supported adoption of innovative technologies that improved environmental protection. All recipients interviewed were satisfied with the performance of the selected innovative technologies. Not only did the technologies help them achieve their main compliance objective, but they also provided green benefits, such as energy savings, less infrastructure, less sludge production, less water use and loss, and less chemical use.

ARRA funding positively affected innovative technology sales during the economic recession. Funding made available specifically for innovative technology projects motivated utility managers interviewed to try new technologies. Funding conditions, such as the Buy American provision that increased the burden on funding recipients, also led some businesses to prefer U.S. manufacturing sources. They learned that onshore manufacturing increased their control over product quality and lowered shipping costs.

Successful demonstration projects sparked follow-on business for technology vendors. In each instance of a first-time installation for vendors interviewed, the vendor has experienced or anticipates follow-on work because of demonstrated performance and positive word-of-mouth. This suggests the need for demonstration projects that establish the capabilities of new technologies and also identify whether they are ultimately more cost-effective than conventional alternatives.

RECOMMENDATION

Provide a longer timeframe for innovative technology projects. Innovative technologies require time for concept development, design, pilot demonstration, and commercialization phases. Consider extending obligation and expenditure deadlines to encourage innovative technology development.

EXECUTIVE SUMMARY - ECONOMIC IMPACTS OF LEVERAGED PROJECTS

PURPOSE

To help EPA better understand how ARRA funding was used to successfully leverage local resources to achieve short-term and long-term economic benefits, SAIC studied the impacts of several ARRA-funded projects. A crucial goal for ARRA, enacted in 2009, was for local communities to leverage funds in their local economies to stimulate economic activity during the recession. To understand how particular programs leverage resources and expand local economic activity, EPA sought to capture some of the successful examples of ARRA programs and funding recipients leveraging resources and strengthening local economic activity.

EPA distributed the vast majority of its ARRA funding through programs designed to assist communities making investments in infrastructure such as water treatment plant upgrades or pipeline replacements or industrial site cleanups. These ARRA-funded investments potentially had two types of economic impact. First, the infrastructure expenditures increased the demand for locally produced goods and services. This, in turn, increased the demand for 'upstream' goods and services that produce the goods and services needed by the infrastructure project. Thus, a dollar of infrastructure spending led to more than one dollar of regional economic output. Second, the infrastructure investment may result in long-term economic benefits by achieving environmental and/or development goals such as reducing health risks or supporting local growth objectives.

Infrastructure investments such as water treatment plant upgrades to meet regulatory standards for water quality can be expensive. For some municipalities, these kinds of infrastructure investments pose a fiscal challenge when they have to raise fees and taxes to repay the capital construction loans or bonds. ARRA funding provided an opportunity for these recipients to leverage local resources using federal funding to implement such investments.

The study objectives are to quantitatively estimate the ratio of total regional economic growth relative to the original project investment, called an "impact ratio," and to qualitatively address the long-term benefits of the investment. To achieve these objectives, SAIC gathered information on nine ARRA-funded projects in the Drinking Water State Revolving Fund (DWSRF), the Clean Water State Revolving Fund (CWSRF), and the Brownfields program.

METHODOLOGY

For the qualitative analysis, SAIC used two information sources. SAIC interviewed local experts familiar with the infrastructure projects and reviewed studies of economic benefits of environmental regulations for projects that were part of a regulatory compliance plan.

For the quantitative analysis of regional economic impacts, SAIC collected detailed project expenditures data and used the Regional Input-Output Modeling System (RIMS II) to estimate local economic impacts. The RIMS II model was developed by the U.S. Bureau of Economic Analysis (BEA) to estimate the effect of *direct expenditures* on *indirect expenditures* and *induced expenditures* in a region. Direct expenditures are those paid to implement the project (e.g., laying a new pipeline), while indirect expenditures represent the additional economic impact of increases in the demand for 'upstream' goods and services (e.g., piping manufacturers or excavation companies), and induced expenditures represent the additional economic

impact of increased demand of consumer goods and services attributable to 'upstream' labor earnings. The longer each dollar of direct expenditure can remain within a local community – going from vendor to vendor in the form of new revenue – the higher its regional impact will be. This is the multiplier effect that the RIMS II estimates. The multiplier effect is limited by the tendency for money to flow out of a region to pay for 'imported' goods and services, which is often called *leakage*. These are not imports in the sense they are goods or services produced outside the United States; any good or service that originates outside the local region is considered an import in RIMS II.

FINDINGS

Based on SAIC's interviews of individuals associated with nine ARRA projects and analysis of data, the major case study findings regarding economic impacts are as follows.

The projects examined will provide the affected communities with a variety of medium- and long-term environmental and economic benefits. SAIC's qualitative analysis shows that the environmental benefits stem from meeting various regulatory compliance requirements. The benefits include human health risk reductions and improvements in surface water quality from reduced nutrients, sediments and toxics in wastewater discharges. The DWSRF projects will also reduce water use and/or energy production costs. Both DWSRF and CWSRF projects will have some additional tangible financial benefits in the form of cost savings for the utility and for customers. Two of the projects will also facilitate community economic development objectives by increasing utility capacity to support residential and commercial growth. A third project supports economic growth through the renewal and sale of urban land to industrial and commercial businesses.

The case study project expenditures unambiguously achieved the objective of stimulating local economies during the recession. The regional economic impact per dollar of project expenditure ranges from $1.58 to $2.96 across the nine case study projects. These per-dollar estimates represent the quantifiable direct, indirect and induced expenditures in the regional economies that can be attributed to the infrastructure projects. These values are based on the impact ratios that SAIC estimated using RIMS II.

The regional economic impacts were higher for projects that could rely primarily on local sources of goods and services. The projects that retained the highest proportion of direct expenditures in the local community generally have higher impact ratios because the RIMS II multipliers applied to a majority of total project expenditures. Projects that required imports of expensive materials tend to have lower impact ratios. Because case study projects with treatment plant upgrades were more likely than other project types to have expensive treatment equipment imports, these projects had lower regional economic impacts.

These findings are subject to constraints that can lead to potential errors, uncertainties and biases. These constraints arise from factors such as a having limited number of case studies, which restricts the extent to which regional economic impact results can be generalized, and having a project mix specific to a short timeframe (2009 to 2011).

APPENDIX 2: TOPICS COVERED IN REVIEW OF EXISTING STUDIES

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TOPICS COVERED IN REVIEW OF EXISTING STUDIES

TOPIC	PROGRAM(S)	NO. OF STUDIES	
Improvements needed to OMB ARRA Implementation Guidance	All	1	OIG March 2009a
Awarding assistance agreements and contracts to recipients with open audit recommendations	All	1	OIG July 2009
Contractor performance evaluations	All	1	OIG April 2010
Contracts and grants workforce and workload	All	1	OIG October 2010
EPA Management Integrity guidance for conducting internal control reviews	All	1	OIG April 2009c
Financial activity reporting	All	1	OIG June 2010
Financial monitoring reviews	Superfund	1	OIG January 2011
Grant accrual methodology	All	1	OIG August 2009
Grant activity documentation errors	DERA	1	OIG March 2011c
Grant project delays	DERA	1	March 2011b
Grant recipient reporting and data quality review	All	2	OIG October 2009 OIG September 2010
Grants terms and conditions deficiencies	LUST	1	OIG November 2010b
Green reserve projects	CWSRF, DWSRF	1	OIG February 2010b
Impact of ARRA funds on economically disadvantaged communities	All	1	OIG April 2011
Independent government cost estimates	Superfund	1	OIG February 2010a
Interagency agreements	Superfund, DWSRF	1	OIG November 2010a
Management of Superfund special accounts	Superfund	1	OIG March 2009b
OIG oversight efforts	All	2	OIG March 2010a OIG March 2011a
Process improvements to ensure projects meet ARRA deadline	DWSRF	1	OIG December 2009
Promoting grants competition	DERA	1	OIG March 2010b
Open audit recommendations on grants, contracts and interagency agreements	All	1	OIG April 2009b
Recovery of Superfund removal costs for projects not on the National Priority List (NPL)	Superfund	1	OIG April 2009a
State oversight of subrecipients	CWSRF, DWSRF	2	OIG September 2008 OIG August 2011

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