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

Green Project Reserve

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EXECUTIVE SUMMARY

PURPOSE

This study seeks to capture the benefits and outcomes related to the Green Project Reserve requirements of the American Recovery and Reinvestment Act (ARRA) funds allocated to the U.S. Environmental Protection Agency's (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 Science Applications International Corporation (SAIC), and their subcontractor Toeroek Associates, Inc., to review the benefits and outcomes of the green projects undertaken to fulfill the Green Project Reserve 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, conducted by Industrial Economics, Inc. (IEc), of anticipated environmental benefits of ARRA-funded Green Project Reserve projects (GPR projects). The authors of this study were only able to find data for about one 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, OUTCOMES 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:

- Improved overall 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.
- Increased 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 (IUPs) 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

Based on its interpretations of the data and perspectives shared by study participants, SAIC formulated several overall recommendations for EPA to consider:

- Require business case documentation quantifying primary and secondary environmental benefits for all completed projects, which would be useful capturing real world results that could be used as the basis for planning elsewhere.
- Track and evaluate costs and secondary benefits.
- Develop guidance on assessing secondary benefits of green projects.
- Foster teaming between states, nonprofits, and businesses to leverage the ability to document green project benefits.
- Continue to support Green Project Reserve requirements for SRF projects, since they have raised the awareness of green alternatives with state water planners.

SECTION 1. INTRODUCTION

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 dollars 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 examine several components of EPA's implementation of ARRA. The SAIC Team studied three management topics - **Cost Estimating** processes, **Funds Management** processes and **Systems** enhancement and development. The Team also looked at three topics geared more towards outcomes than management processes. These include the **Green Project Reserve** initiative, the use of ARRA funds to spur **Innovative Technologies** and the use of ARRA funds to **Leverage Local Economic Benefits**. After completion of the research phase, the SAIC Team produced a series of six reports, each covering one of the six topics noted above. The Team also prepared a separate overarching summary report with an Executive Summary, containing highlights of each of the six reports, as well as a description of the goals and methodology for the entire study.

1.1 PURPOSE/OBJECTIVES OF THIS STUDY

This report describes a review of green initiatives' results for ARRA-funded projects. ARRA included specific requirements and set-asides for green initiatives and projects, the largest being the requirement that 20 percent of the Recovery Act's Drinking Water and Clean Water SRFs) be used for 'green' projects. This funding is referred to as the 'Green Project Reserve'. In dollar terms this meant that EPA and states had to target almost $1.2 billion dollars for green projects - one of the largest single goals that EPA ever had to meet.

EPA's Office of the Chief Financial Officer (OCFO) contracted with SAIC to review green initiatives' results. This specifically included the requirement to "gather and report on information related to successes, strategies and lessons learned." However, EPA OCFO subsequently found that other entities in EPA had already tasked other organizations and contractors with identifying green initiatives' results. When SAIC's study began, OCFO anticipated that several of these studies could provide relevant background and input for SAIC's study. Thus EPA directed SAIC to submit a work plan that focused on identifying 'secondary' benefits and outcomes of green projects using DWSRF and CWSRF data. In this report, 'primary' benefits are considered to be those which the project was specifically designed to accomplish; for instance, the primary benefit of GPR projects that involve land application of treated wastewater is often to eliminate direct discharges to waterways. Primary benefits are those typically cited in business cases. (A business case documented how a project qualified to be "green" under ARRA.) In contrast, a 'secondary' benefit of land application of wastewater is that such projects may result in increased stream flows that could benefit certain aquatic organisms at times of low stream flow (as applied water runs off the land and into small streams adjacent to fields).

During the course of SAIC's investigations, SAIC discovered that only limited information on 'secondary' benefits was available. There was no detailed information or data in the clean or drinking water databases that would enable a quantitative analysis of the benefits of green projects. In addition, SAIC found no documentation that listed or compared primary versus secondary benefits of such projects. This appears to have been related to the need to put all ARRA SRF projects under contract within 1 year, which left little time for the states and EPA to negotiate or plan for data fields capturing actual "green" cost savings. Identifying and understanding different types of Green Project Reserve benefits is essential to a full recognition of the value of GPR projects, and the impacts of EPA's ARRA spending in addressing environmental problems. The manner in which SAIC addressed this challenge is discussed in Section 2 of this report.

Testimony to Congress by EPA Acting Administrator Bob Perciasepe in April 2013 makes clear that funding green projects through the SRFs is an ongoing agency priority. He stated, "Ensuring that federal dollars provided through the State Revolving Funds support effective and efficient system-wide planning remains a priority for EPA. The FY 2014 budget request includes $1.1 billion for the Clean Water State Revolving Fund and $817 million for the Drinking Water SRF. This money will also assist EPA efforts to expand and institutionalize the use of up-front planning that considers a full range of infrastructure alternatives like 'green' infrastructure, so that the right investments are made at the right time, and at the lowest life-cycle cost. This budget request will allow the SRFs to finance approximately $6 billion in wastewater and drinking water infrastructure projects annually." (Perciasepe, 2013). It is a goal of this review to provide information useful to this ongoing process.

1.2 BACKGROUND

For the purposes of ARRA, GPR projects are described in Attachment 6 of an EPA memo on awarding water quality management funds appropriated by ARRA (Suzanne Schwartz, 2009):

- **Green infrastructure projects** include a wide array of practices that manage precipitation in order to maintain and restore natural hydrology by infiltrating, evapo-transpiring, and capturing and using stormwater. In the context of DWSRF, green infrastructure consists of site-specific practices, such as green roofs and porous pavement at drinking water utility facilities. In addition to managing rainfall, these green infrastructure technologies can simultaneously provide other benefits such as reducing energy demands.
- **Water efficiency projects r**educe water consumption. These projects include the use of improved technologies and practices to deliver equal or better services with less water.
- **Energy efficiency projects** reduce energy consumption. These projects include energy audits, leak detection equipment, water pump system improvements or replacements, variable frequency drives, on-site clean power for treatment systems, and replacement or rehabilitation of distribution lines.
- **Environmentally innovative projects** demonstrate new and/or innovative approaches to managing water resources in a more sustainable way, including projects that achieve pollution prevention or pollutant removal with reduced costs, and projects that foster adaptation of water protection programs and practices to reduce climate change.

States applying for federal funding under either DWSRF or CWSRF must annually prepare and submit Intended Use Plans (IUPs). When the ARRA program began, states evaluated their existing IUPs to identify green initiatives and projects that (1) appeared likely to qualify in whole or in part as GPR projects and (2) met all eligibility requirements of the program. States could also solicit new projects for the Green Project Reserve. If projects in a state's IUP did not contain qualifying projects or components with a total value equal to at least 20 percent of the ARRA capitalization grant to the state, then the state was required to make a timely and concerted solicitation for projects, with the objective of determining which qualifying GPR projects it would include in its plan. CWSRF regulations required states to add any newly identified green projects to their priority lists as well as their IUPs. States were prohibited from rejecting applicants if, through that rejection, less than 20 percent of the appropriated funds were for GPR projects.

ARRA section 1602 requires that "recipients shall give preference to activities that can be started and completed expeditiously, including a goal of using at least 50 percent of the funds for activities that can be initiated not later than 120 days after ... enactment" of ARRA. States implemented this preference requirement by selecting ARRA funding for those projects that appeared to be able to start by June 17, 2009 (Schwartz, 2009).

1.2.1 CATEGORICAL VERSUS NON-CATEGORICAL PROJECTS

For both the CWSRF and DWSRF, projects classified as 'categorical' clearly meet the intent of GPR projects. Other projects designated as 'non-categorical' may or may not meet the Green Project Reserve requirements. Appendix 1 contains EPA's 2009 guidance for determining which projects are considered 'categorical.' For any non-categorical project to be counted toward meeting ARRA's 20 percent requirement for GPR, project files must contain documentation of the project (often called a business case) or project component that was judged to qualify. For instance, modifications, retrofits or replacements of existing wastewater pumping systems that achieve a 20 percent increase in energy efficiency will qualify for the Green Project Reserve. Projects that do not achieve a 20 percent increase in energy efficiency may also count towards the Green Project Reserve if they have a business case showing how the project significantly improves energy efficiency. Other non-categorical projects that require business cases include pipe replacement and existing water meter replacement. Appendix 1 also identifies the types of projects that are eligible for the Green Project Reserve.

1.3 STUDY QUESTIONS

SAIC included a set of study questions in a proposed scoping document for the Green Project Reserve study, shown in Table 1. Table 1 contains overarching questions and more detailed questions intended to help answer the larger questions. The questions relate to primary and secondary environmental benefits of DWSRF and CWSRF projects, and the factors that influenced environmental outcomes. SAIC's preliminary review of existing documents revealed that states gathered very little information about environmental outcomes of GPR projects. SAIC shifted its focus to gathering lessons learned about GPR project benefits and Green Project Reserve program processes from specific states invited to participate in focus groups. The methodology for SAIC's approach is described in the next section.

TABLE 1. STUDY QUESTIONS FOR THE GREEN PROJECT RESERVE STUDY

Overarching Study Questions	Detailed Study Questions	Data Sources
What were the environmental benefits achieved by the DWSRF projects?	Did the projects implemented at public water systems report any health-based violations?	State focus groups; existing literature.
	What were the environmental benefits of water meter replacement projects?	State focus groups; existing literature; GPR project business cases.
	Did the replacement of pumps and motors result in environmental benefits apart from reduced power consumption? For example, did the replacement change the heating/cooling requirements for the location where the pumps are installed?	State focus groups; existing literature; GPR project business cases.
	What were the environmental benefits of storage projects?	State focus groups; existing literature.
	Did projects that increased source water capacity (new wells) result in reduced contaminants in the water delivered to customers?	State focus groups; existing literature.
	Did projects to eliminate leaks in distribution piping have secondary environmental benefits beyond water use reduction, such as reduced energy use for pumping, or reduced chemical use?	State focus groups; existing literature; GPR project business cases.
	Did projects to provide new or additional treatment only increase system capacity, or did they reduce the quantity of contaminants in the water provided to consumers?	State focus groups; existing literature.
	Did projects to add/replace/improve Supervisory Control and Data Acquisition capabilities provide environmental benefits such as energy savings due to less frequent operator visits to remote locations; or improved operator control of the system?	State focus groups; GPR project business cases.
	Did any unanticipated benefits result from DWSRF green projects?	State focus groups.
What were the environmental benefits achieved by the CWSRF projects?	Were the projects implemented at publicly-owned treatment works in noncompliance with permit limitations?	State focus groups; Integrated Compliance Information System-National Pollutant Discharge Elimination System database; GPR project business cases.
	In the case of wastewater collections system improvements, did the improvements reduce sanitary sewer overflows (SSOs), combined sewer overflows (CSOs), and basement backups?	State focus groups.
	Did the replacement of pumps and motors result	State focus groups; existing literature;

Overarching Study Questions	Detailed Study Questions	Data Sources
	in environmental benefits apart from reduced power consumption? For example, did the replacement change the heating/cooling requirements for the location where the pumps are installed?	GPR project business cases.
	Did landfill projects include energy recovery to produce renewable power?	Existing literature.
	Did projects to improve stormwater quality provide environmental benefits beyond removal of nutrients and pathogens, such as habitat restoration or recreational use?	State focus groups; existing literature.
	In what ways could the environmentally innovative projects be applied more widely?	This question was not explored due to lack of state data.
	What were the unanticipated benefits resulting from CWSRF green projects?	State focus groups; existing literature; GPR project business cases.
What are the lessons learned?	What factors lead to projects that achieved their projected environmental benefits?	State focus groups.
	Is there any difference between categorical and non-categorical projects in terms of project outcomes?	State focus groups.
	Did any unanticipated benefits result from these projects?	State focus groups; SAIC analysis.
	Were there environmental benefits that were realized in addition to the primary green benefit for the various types of projects?	State focus groups; existing literature.
	Did the project result in technological advances in science and health?	Existing literature.
	Did green projects result in more benefits than non-green projects?	This question was not explored due to lack of state data.
	What are some best practices that could be derived from this analysis?	State focus groups; SAIC analysis.

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SECTION 2. METHODOLOGY

EPA's OCFO contracted with SAIC to "gather and report on information related to successes, strategies and lessons learned." However, EPA OCFO subsequently found that other entities in EPA had already tasked other organizations and contractors with identifying green initiatives' results. When SAIC's study began, OCFO anticipated that several of these studies could provide relevant background and input for SAIC's study. Thus EPA directed SAIC to submit a work plan that focused on identifying 'secondary' benefits and outcomes of green projects. During the course of SAIC's investigations, it was discovered that limited information on 'secondary' benefits was available. Information and data that would enable a quantitative analysis of the benefits of green projects was lacking. In addition, SAIC found no documentation that even listed or compared primary versus secondary benefits of such projects. To address these challenges, SAIC developed a data collection methodology that consisted of the following major steps:

- Review existing documents and information.
- Categorize clean water and drinking water projects.
- Conduct state focus group discussions and file reviews.
- Document the results of the analyses. Analyze information obtained from all sources, including existing documents, EPA databases, state focus group discussions and file review results and document the successes, strategies and lessons learned.

2.1 EXISTING DOCUMENT AND DATABASE REVIEW

SAIC obtained and reviewed existing documents, literature and data related to green project outcomes. This included EPA databases; published literature, including industry journals such as those published by the Water Environment Federation; newspaper articles; and other sources to identify information about specific project outcomes.

2.2 REVIEW AND CATEGORIZATION OF CLEAN WATER AND DRINKING WATER PROJECTS

SAIC categorized all projects in the databases that support the CWSRF and DWSRF. These databases are the CBR (clean water) and the PBR (drinking water) systems, respectively. SAIC used the PBR and CBR database downloads provided by EPA on November 23, 2011, and February 22, 2012, respectively.

SAIC reviewed the fields labeled "Project Description" and "Project Name" in both reporting systems to understand each project's components and to develop categories to which each project was then assigned. The categories vary in some respects between the CBR and PBR databases because of the differences between wastewater and drinking water projects. The project categories are described in Table 2.

TABLE 2. CATEGORIZATION OF PROJECTS IN THE EPA DATABASES

COMMON CATEGORIES IN BOTH CBR AND PBR DATABASES	**Treatment** – construction or upgrade of wastewater or drinking water treatment facilities and/or unit processes. **Pipes** – projects involving pipe replacement, rehabilitation or repair of the wastewater collection system or water transmission lines. **Multiple Categories** – projects that included more than one category of work; for instance, pipe replacement and treatment plant upgrade. **Water Storage** – construction of tank or other storage option. **Pumps and Motors** – new, replacement or upgrade of pumps and pump stations. **Meters** – installation of new meters or replacement of existing meters. **Expansion** – increased collection system capacity or new water transmission lines to serve new customers. **Administrative** – SRF loans to the states. This category is not project oriented and thus is not included in our analyses. **Other** – projects that do not fit into the identified categories. These projects are not numerous enough to warrant categories of their own. Examples include construction of a stairway, roof repairs or installation of an injection well.
WASTEWATER AND STORMWATER PROJECTS ADDITIONAL CATEGORIES	**Supervisory control and data acquisition** (SCADA) - installation or upgrade of SCADA systems. **Stormwater** – projects that improve stormwater quality. **Land Application/Reclaimed Water** – land application of treated wastewater and/or sludge, or other use of reclaimed water. **Energy Generation** – energy recovery from wastewater treatment processes; solar and wind power generation projects. CSO – projects that addressed overflows from combined sewers. **Agriculture** – projects that involved agricultural lands.
DRINKING WATER PROJECTS ADDITIONAL CATEGORIES	**Uncategorized** – projects for which sufficient information to determine their intent was not provided. For instance, some descriptions just say “water system improvements.” **Source Water** – projects designed to improve or expand drinking water sources.

Projects in the *Uncategorized* and *Other* categories were not further evaluated, due to lack of sufficient information about the projects. Database entries identified as *Administrative* are not project oriented and thus were not further evaluated.

2.3 STATE FOCUS GROUP DISCUSSIONS AND FILE REVIEWS

Ultimately, states were selected for focus group discussions based on staff availability to engage in discussions with SAIC on the topic. Staffs of several states initially considered for inclusion because of the number and/or type of green projects that were implemented within the state were unavailable to meet with researchers.

The findings in this study, therefore, are based on responses from focus groups and/or literature, and are not necessarily representative of the entire population of states receiving ARRA funds for their SRF programs. Table 3 lists the states that participated in the focus groups and the program affiliation of participants.

TABLE 3. FOCUS GROUP PARTICIPANTS (FUNDING RECIPIENTS IN PARENTHESES) AND PROJECTS

STATE	NO. OF PARTICIPANTS	NO. OF CWSRF GREEN PROJECTS	NO. OF DWSRF GREEN PROJECTS
Iowa	8(1)	13	11
Louisiana	4	7	7
Montana	8(2)	11	17
New York	14	68	15
North Carolina	3(1)	15	31
Oklahoma	11*(1)	10	4

*One participant provided feedback over the phone.

Appendix 2 lists the green projects implemented by the focus group states during the ARRA program.

To guide the discussion, SAIC developed a *Green Project Reserve Guide for State Focus Groups* (Appendix 3) that was used for each of the focus group sessions. This document provided a format and general discussion topic list that proved valuable in eliciting SRF staff discussions.

2.4 DATA COLLECTION CHALLENGES

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. As a result, states did not collect such data, except occasional anecdotal reports. In addition, SAIC found that a significant challenge to the Green Project Reserve study was the lack of an Information Collection Request (ICR) that would allow for collection of information from more than nine state SRF offices. To address the ICR issue, SAIC used a focus group process to engage participants in an open discussion about ARRA implementation of the Green Project Reserve requirements. The focus groups were designed for the following purposes:

    - To harvest the knowledge and lessons learned held by the state staff while meeting ICR data collection requirements.
    - To identify whether the information available in state files is sufficient to answer the study questions.
    - To obtain SRF staff general observations and lessons learned.

- The downloaded data that SAIC received from the CBR and PBR databases represents a snapshot of ARRA projects. SAIC was informed that all ARRA projects should be present in the downloaded data from CBR and PBR, but other information in the databases, such as the amount ultimately spent on each project and whether the project is complete may have changed since the time that the downloaded data was provided to SAIC.
- The states are largely responsible for uploading data to these databases. Based on SAIC's assessment and comparison of the data, it appears that some data entry fields may have been viewed differently by different data entry personnel. For example, some data fields that contain dollar amounts were used inconsistently and thus the amounts cannot be compared from project to project. This was noted for both databases.
- Another challenge involved finding published data to enable SAIC to identify environmental outcomes, especially given that even completed projects have only been in operation for a few years at most. For some types of projects, this may be sufficient time for environmental outcomes to be realized. For example, projects that reduce drinking water losses (the primary benefit) may have almost immediate secondary benefits in the form of reduced energy and chemical usage. On the other hand, wastewater collection projects for CSO elimination will have primary and secondary benefits that are realized only during extreme precipitation events. It is unlikely that secondary outcomes from these projects can be documented until many years after project completion. Thus, data supporting outcomes may be more available for some project types than for others.

SECTION 3. FINDINGS

The text discussion presented in this section is organized by research method and includes the following categories of findings:

- Findings from Existing Studies and Information Sources. Section 3.1 includes information from other EPA funded research and research conducted by other organizations as well as reviews of specific states' IUPs.
- Findings from EPA Database Analysis and Categorization of Clean Water and Drinking Water Projects. In Section 3.2, SAIC presents the results of analyses of EPA's Clean Water and Drinking Water databases to identify which projects were green and to categorize each project by type.
- Findings from State Focus Groups. Section 3.3 provides an overview of the states' GPR projects and secondary benefits or outcomes as described by SRF staff, as well as examples of GPR projects funded by the state.
- SAIC observations of green project types across all states. Section 3.4 reviews the benefits of major types of green projects based on review of documents pertaining to ARRA projects, literature reviews and SAIC's focus group experiences.
- Summaries of benefits/outcomes, Green Project Reserve program successes and lessons learned. Section 3.5 summarizes benefits found in reports, from focus group participants, literature reviews and ARRA document reviews, as well as SAIC's experience.
- Recommendations. In Section 3.6, SAIC formulated several recommendations based on the information learned from this study, including the lessons listed above regarding the Green Project Reserve program for EPA's consideration

Table 4 summarizes the big picture findings of this research for each study question. Upon completion of all focus group meetings and literature reviews, SAIC compiled and analyzed the information. Table 4 below presents answers to the overarching and detailed questions, to the extent possible. The big picture findings are generally based on information gathered from existing studies and information sources and focus groups with representatives from six states. The findings range from specific facts from literature and existing study information to anecdotal information from observations and expected outcomes from on-the-ground focus group participants. The table provides the reader with information on where the findings came from, either literature or focus groups. The sections of the report following the table include a thorough discussion of the findings. The sources used to arrive at the findings for each question also are identified in Table 1 in the Introduction section.

TABLE 4. STUDY QUESTIONS IN THE GREEN PROJECT RESERVE STUDY AND BIG PICTURE FINDINGS

DETAILED STUDY QUESTIONS	BIG PICTURE FINDINGS
Overarching Study Question: What were the environmental benefits achieved by the DWSRF projects?	
Did states use drinking water quality violations as a criterion for funding upgrades at public water systems?	Some states assessed whether communities were at risk of non-compliance to determine which projects received ARRA funding. Not all green drinking water system upgrade projects were funded to address non-compliance however.
What were the primary and secondary environmental benefits of water meter replacement projects?	The key primary benefits included water conservation (i.e., less water usage). Some key secondary benefits included enabling home owner to make decisions with accurate, on-time information, and reduced homeowner disturbance (e.g., trucks and meter readers) based on discussions with state and funding recipients.
Did the replacement of pumps and motors result in environmental benefits apart from reduced power consumption? For example, did the replacement change the heating/cooling requirements for the location where the pumps are installed?	The primary reason for such projects was energy use reduction. It is likely that there were additional engineering expectations regarding secondary benefits related to reduced cooling needs (due to more efficient pumps and motors), but states did not report that they documented these environmental benefits.
What were the environmental benefits of storage projects?	Water storage projects were in a smaller category (about 16 projects out of almost 500 green drinking water projects). Review of ARRA projects documentation indicates that storage projects can make use of electricity at non-peak times for pumping. This reduces cost of pumping but also uses a power plant's output more effectively. This may in turn reduce the need to build additional power plants.
Did projects that increased source water capacity (i.e., new wells) result in reduced contaminants in the water delivered to customers?	Source water projects were a smaller category (about 25 out of almost 500 green drinking water projects). States did not discuss these during focus groups. It is SAIC's observation that projects to increase source water capacity, including new wells, were needed to address potable water quality.
Did projects to eliminate leaks in distribution piping have secondary environmental benefits beyond water use reduction, such as reduced energy use for pumping, or reduced chemical use?	State recipients identified that the key secondary benefits were reduced energy, increased fire flows and reduced chemical use. These secondary benefits were cited as a reason to fund the projects and energy savings and chemical savings were estimated prior to project selection. Actual savings were not tracked or documented however.

Detailed Study Questions	Big Picture Findings
Did projects to provide new or additional treatment only increase system capacity, or did they reduce the quantity of contaminants in the water provided to consumers?	SAIC's review of EPA's Drinking Water database revealed that in general, such projects were designed to increase capacity as well as improve the quality of the water provided to consumers. However, in some cases existing plants were upgraded for capacity reasons, and not necessarily due to quality issues.
Did projects to add/replace/improve SCADA capabilities provide environmental benefits such as energy savings due to less frequent operator visits to remote locations; or improved operator control of the system?	Review of EPA's Clean Water and Drinking Water databases indicates that very few SCADA projects were funded as green projects. In SAIC's experience, environmental benefits of such projects include reduced amount of truck travel (e.g., fuel emissions) and improved operator understanding and control of the system. SCADA systems can reduce energy use by utilizing radio communications to reduce unnecessary trips to remote assets. Some Business Plans identified that with the SCADA system, the central office can turn water supply wells off and on to maintain water levels in the tank at a desired range, potentially reducing energy use for pumping. The SCADA system provides immediate notification in the event of a catastrophic failure of a system component, enabling operators to take immediate corrective action potentially preventing property damage and reducing threats to public health.
Did any other unanticipated benefits result from DWSRF green projects?	Unlike most drinking water projects that focused on increasing or improving water supply, five of the six projects in Puerto Rico included improvements designed to reduce the pressure of the drinking water being supplied. This in turn reduced pipe breakage and resultant water loss.
Overarching Study Question: What were the environmental benefits achieved by CWSRF projects?	
Were the projects implemented at publicly-owned treatment works (POTWs) that were in noncompliance with permit limitations?	Review of project descriptions in EPA's Clean Water database revealed that often the primary reason for funding POTW improvements was to increase plant capacity. By increasing plant capacity, backups in the system could be reduced or eliminated, thus resulting in improved surface water quality. Some, but not all, POTWs receiving ARRA funds had permit compliance issues.
In the case of wastewater collection system improvements, did the improvements reduce SSOs, CSOs and basement backups?	Yes - capacity improvements helped reduce CSOs, SSOs and basement backups, based on SAIC's experience.

DETAILED STUDY QUESTIONS	BIG PICTURE FINDINGS
Did the replacement of pumps and motors result in environmental benefits apart from reduced power consumption? For example, did the replacement change the heating/cooling requirements for the location where the pumps are installed?	The primary reason for such projects was energy use reduction. It is likely that there were additional engineering expectations regarding secondary benefits related to reduced cooling needs (due to more efficient pumps and motors), but states did not report that they documented these environmental benefits.
Did landfill closure projects include energy recovery to produce renewable power?	Fairbanks implemented a landfill gas to energy project in Alaska; a secondary benefit was proving technology could be used in cold regions with sub-optimal geologic settings.
Did projects to improve stormwater quality provide environmental benefits beyond removal of nutrients and pathogens, such as habitat restoration or recreational use?	Yes – literature reviews indicated that some stormwater projects restored natural spaces, which provided for greater public enjoyment, as well as improved fish and wildlife habitat.
In what ways could the environmentally innovative projects be applied more widely?	Information to answer this question was not obtained during the focus groups.
What were the unanticipated benefits resulting from CWSRF green projects?	Stormwater projects were particularly likely to produce unanticipated benefits. Because such projects are very noticeable to the community and visitors to the community, they serve to improve the environmental awareness of residents; allow residents to see the use and benefits from tax dollars; improve communities through beautifying formerly urbanized landscapes; increase neighborhood pride; and enhance property values. Several states noted these types of effects.
Overarching Study Question: What are the lessons learned?	
What factors lead to projects that achieved their projected environmental benefits?	Data were insufficient to permit analysis of this question; states did not document environmental benefits.
Is there any difference between categorical and non-categorical projects in terms of project outcomes?	Data were insufficient to permit analysis of this question.

Detailed Study Questions	Big Picture Findings
Did any unanticipated benefits result from these projects?	Yes - one example is the use of waste restaurant grease to create energy, as identified in a literature review. Besides this primary benefit, when grease is captured for use, less grease enters sewers. This results in a decreased incidence of sewer overflows and blockages, which would otherwise impact water quality. Human health impacts caused by contact with sewage would also be reduced.
Were there environmental benefits that were realized in addition to the primary green benefit for the various types of projects?	Yes – focus group participants and literature reviews confirm that stormwater projects provide visible outcomes – cleaned up streams with effective erosion control in place and new wetlands and open spaces that citizens can readily see and appreciate. Based on SAIC's experience, the primary and secondary benefits of many drinking water plant, distribution system and wastewater projects are less visible to the public. Their benefits may be more quantifiable through engineering calculations for reduced leaking, etc.
Did the project result in technological advances in science and health?	Fairbanks landfill gas to energy project is an example of a green project that proved the viability of technology in a challenging physical environment.
Did green projects result in more benefits than non-green projects?	Data were insufficient to permit analysis of this question.
What are some best practices that could be derived from this analysis?	Potential best practices include modifying project ranking systems to include green criteria and asking states to quantify primary and secondary impacts. Quantifying impacts might be achieved by requiring business cases for all projects.

3.1 FINDINGS FROM EXISTING STUDIES AND INFORMATION SOURCES

Prior to conducting the focus groups with the states, SAIC reviewed a number of existing studies and data regarding anticipated environmental benefits. (These studies from various sources did not focus solely on the states selected for the focus groups.) Representative studies are discussed in this section. SAIC found very few studies that included actual project outcomes. One of the reasons for this is that environmental outcomes may not be observable until years after project completion. For instance, reduced numbers of SSOs resulting from upgrades to wastewater treatment plants and collection systems may not be observable until certain rainfall conditions occur. Planning, funding and accomplishing water quality studies to demonstrate environmental benefits resulting from upgraded treatment plants may take years. As was noted earlier, ARRA did not require measurement or documentation of primary or secondary environmental results. Thus it is not surprising that states did not require project recipients to acquire and provide this to SRF program staff.

EPA funded studies of ten CWSRF GPR projects (http://water.epa.gov/grants_funding/cwsrf/Green-Project-Reserve.cfm). The studies described the technologies used for the selected green projects and their expected outcomes. Data was not collected and/or was not available on the actual environmental outcomes of the projects. An overall report from the effort focused on the numbers and locations of projects rather than the environmental benefits of such projects (EPA, 2012). Similar studies of CWSRF GPR projects were also not designed to identify and quantify actual project benefits.

Aside from the draft partial analysis conducted by IEc and described below, SAIC did not uncover any quantitative analysis of environmental outcomes of green ARRA projects. Environmental benefits of green projects are notoriously difficult to quantify, and no other studies were found that attempted such an analysis for ARRA-funded projects.

3.1.1 INDUSTRIAL ECONOMICS, INC. (2011)

IEc analyzed anticipated environmental benefits from ARRA CWSRF and DWSRF GPR projects (Industrial Economics, Inc., 2011). The possible universe of projects included all those which were partially or wholly funded by funds designated to be in the Green Project Reserve. Environmental benefits data were obtained from documentation that funding recipients provided to state environmental protection agencies in 2009 and early 2010 as part of their SRF assistance applications (specifically, business cases). IEc was able to find data only for about one-third of GPR projects. The lack of data availability was attributed to several reasons. First, EPA did not require documentation for projects that were 'categorically' green, which reduced the universe of projects with available data. Moreover, although EPA guidance required states to maintain documentation of environmental benefits for all projects which were not 'categorically' green, IEc gleaned from conversations with Regional EPA and state environmental staff that many staff considered the guidance unclear on what projects did or did not require business cases (i.e., what projects were 'categorically' green). State staff made their own determination on which projects would require documentation.

IEc's review of the environmental benefits of ARRA green projects included:

- Reduced wastewater volume discharged.
- Reduced discharges of nitrogen.
- Reduced discharges of phosphorous.
- Shoreline restored.
- Reduced sediment.
- Wetlands created.
- Reduced potable water treatment and use, leading to less water treatment chemicals being used.
- Avoided greenhouse gas emissions from renewable energy use.

Discussions of the qualitative environmental benefits of green projects are underway by a variety of non-profit and other associations. Summaries of several of these efforts are included below.

3.1.2 THE CENTER FOR NEIGHBORHOOD TECHNOLOGY (2010)

A study by The Center for Neighborhood Technology found that the following types of environmental benefits might be expected from green infrastructure projects, primarily stormwater projects (The Center for Neighborhood Technology, 2010):

- Reduces water treatment needs.
- Improves water quality.
- Reduces gray infrastructure needs.
- Reduces flooding.
- Increases available water supply.
- Increases groundwater recharge.
- Reduces salt use on roads.
- Reduces energy use.
- Improves air quality.
- Reduces atmospheric carbon dioxide.
- Reduces urban heat island.
- Improves aesthetics.
- Increases recreational opportunity.
- Reduces noise pollution.
- Improves community cohesion.
- Encourages urban agriculture.
- Improves habitat.
- Cultivates public education opportunities.

3.1.3 ENVIRONMENTAL FINANCE CENTER AT SYRACUSE UNIVERSITY (2010)

Under a cooperative agreement with EPA, the Environmental Finance Center at Syracuse University produced a study designed to identify positive and negative aspects of the state's Green Innovation Grant Program (GIGP) application, selection and implementation processes and to assist the state's SRF offices in improving future rounds of GIGP. (The Environmental Finance Center at Syracuse University, 2010)

The Syracuse report found that 40 percent of green projects funded by New York were energy efficiency projects. As an example of expected outcomes, the study cites The Town of Richland in Oswego County. The town invested in wind energy infrastructure by constructing two, 50 kilowatt hour (kWh) wind turbines at the local Schoeller Well Site. The renewable energy produced was expected to offset energy consumed in pumping and treating water. The estimated total project cost was $976,400, of which ARRA funded about half. The Syracuse report does not provide data indicating whether the expected efficiencies were achieved.

The Syracuse report cites an example green infrastructure project. The Tioga County Soil and Water Conservation District project was expected to restore 227 acres of wetlands in the Susquehanna River, at a projected cost of $857,108.

In another example, the Troy Department of Public Utilities in Rensselaer County received $450,000 to install vibration leak detection equipment along 155 miles of distribution mains. This will enable the City to identify and reduce water lost through leaks and is expected to result in savings of approximately 350 million gallons per year. Again, no follow up data was provided to show actual project outcomes.

3.1.4 ASERTTI

The Association of State Energy Research and Technology Transfer Institutions (ASERTTI) is a 501(c)(3) organization whose membership includes state and federal agencies, universities and private corporations. ASERTTI's mission is "to increase the effectiveness of energy research efforts in contributing to economic growth, environmental quality, and energy security." ASERTTI has collected data for a number of energy related projects, including several that were funded under the ARRA Green Project Reserve. These include:

- Gloversville-Johnstown Joint Wastewater Treatment Facilities (Johnstown, NY) Anaerobic Digester (AD) and Combined Heat and Power (CHP) System Upgrades. This ARRA-funded project increased the efficiency of the aeration system and the anaerobic digester, enabling the facility to move closer to energy independence.
- City of Glens Falls Sludge Disposal Auxiliary Fuel System. This innovative project provided an alternative approach to managing yellow waste grease at the Glens Falls Municipal Wastewater Treatment Facility. The plant has the capacity to treat 9.8 million gallons of water per day (MGD) and usually treats 5 MGD. Sludge, or suspended solids, is a byproduct of the wastewater treatment process. To dispose of sludge, the plant uses a fluid bed incinerator which burns the biosolids and collects the ash. The ash can then be used and distributed as intermediate grading material for landfills or as filler for cement. Traditionally, the incinerator was powered using fossil fuels like oil and natural gas. After upgrades in 2009, the plant at Glens Falls now powers its incinerator with yellow waste grease from local restaurants, food processing plants and bakeries. As a popular tourist area in the foothills of the Adirondacks, there is an ample supply of commercial grease from local eateries. The upgrades effectively protect the wastewater system, save money and protect the environment.
- Village of Saranac Lake System-Wide Water Meter Project. The Village of Saranac Lake is located in the Adirondack Mountains of upstate New York and has a population of over 5,000 people. The Saranac Lake Department of Public Works (DPW) began studying village water consumption in 2007. There are 1,900 water meter service connections in the village, but only about half had actual water meters, which were not owned by Saranac Lake. This situation made for a very inefficient, two-pronged billing structure for both metered use and flat rates. After first fixing leaks identified in a leak survey, DPW determined that an overabundance of water was being consumed by residents, businesses, and municipal buildings. The Saranac Lake System-Wide Water Meter Project was conceived as a solution to conserve water and streamline billing operations. Through a combination of grant and local funding, 1,900 new, village-owned water meters were purchased to replace old meters and to meter the rest of the connections.

3.1.5 STATE INTENDED USE PLANS

SAIC reviewed the 2009/2010 IUPs for each of the six states in which focus groups were conducted. IUPs serve as part of the application that states must make annually for federal funding under both DWSRF and CWSRF. Each year, the states evaluate their water quality needs and develop priorities for the SRFs. States may develop their own prioritization systems. Prioritizing conventions include, for example, identifying priority waters according to the needs within these waters; identifying priority problems or needs at the state level; and generating priorities based on a state's watershed management program. After the prioritization step, each state solicits projects from wastewater and drinking water agencies within the state, and chooses the projects that it proposes to fund to include in the draft IUP. After public review, the IUP is finalized.

It is important to note that existing project priority scoring mechanisms in IUPs were not designed to capture green project benefits that would address specific green priorities. The abbreviated ARRA timeline allowed state SRF managers little time for specific marketing or outreach efforts to promote green projects. However, despite these problems, SAIC notes that state SRF staff were able to identify projects that met ARRA goals for green funding.

SAIC found during the focus groups that many state SRF programs responded to the ARRA Green Project Reserve requirement by modifying their priority ranking systems to incorporate Green Project Reserve elements in their scoring process. This adjustment will allow those states to identify and focus on the 'best' green projects (i.e., those expected to produce the greatest benefits) in future SRF funding cycles.

3.2 FINDINGS FROM EPA DATABASE ANALYSIS AND CATEGORIZATION OF CLEAN WATER AND DRINKING WATER PROJECTS

There are differences in data fields between the CBR database and the PBR database. This adds to the complexity of efforts to evaluate and analyze information in the two databases. For instance, clean water projects that were determined by the states to meet the definitions of Green Project Reserve were identified in the CBR database in a data field entitled "Green". Drinking water projects deemed by the states to meet the Green Project Reserve definition were identified in a PBR data field entitled "Green Infrastructure." For the purposes of this report, SAIC assumes that all projects so identified are green projects or contain elements that are green.

Database entries indicate that many projects contained both green and non-green elements; the amounts for non-green and green expenditures are listed separately. Each database contains data fields for amounts of spending to be entered for Green Infrastructure, Green Water, Green Energy, Green Innovative, and Green Amount. Unfortunately, the data were not consistently entered. For example, a state may have entered duplicate $500,000 entries under Green Infrastructure and under Green Innovative, when the total project value was only $500,000. This may have been an effort to note that the green project was innovative as well as constituting green infrastructure. Thus the various amounts entered in these data fields cannot be used to compare spending on green energy versus green water.

The databases do however allow for evaluating the total ARRA funding spent on each of the categories of projects, as explained further below.

3.2.1 RESULTS OF DWSRF PROJECT ANALYSIS

The majority of ARRA spending on DWSRF GPR projects supported four project types, as shown in Table 5: pipes; meters; multiple categories, which include more than one category of work; and treatment. The PBR data indicate that average ARRA spending per project category (e.g., pipe, meters, treatment, etc.) was fairly consistent among categories. Pipe projects, meter projects, source water projects and water storage projects all averaged around $1.3 to $1.4 million each. The fact that some states, for instance, Montana, set a maximum amount that would be provided to each project may contribute in some part to the similar average ARRA amount for these projects. Pump and motor projects averaged less at $971,274 per project, probably because this type of project tended to deal with only one or a few pumping locations as opposed to the more system-wide type projects. The one system expansion project, for instance, received the largest amount of any of the categories. Energy generation projects, in contrast, averaged at a lower cost than any other type of project.

Note: Definitions of the CBR and PBR data fields used in the tables below are provided in Appendix E. These were partially based on a literature source (James A. Hanlon, 2009).

TABLE 5. ARRA SPENDING ON DRINKING WATER GREEN PROJECTS BY PROJECT CATEGORY (ENTIRE U.S.)

CATEGORY	NO. OF GREEN PROJECTS	ARRA AMOUNT	AVERAGE ARRA AMOUNT PER PROJECT
Pipe	111	$144,658,074	$1,303,225
Meters	109	$141,098,380	$1,294,480
Multiple Categories*	101	$274,091,346	$2,713,775
Treatment	69	$137,481,296	$1,992,482
Energy Generation	29	$26,525,861	$914,684
Source Water	25	$35,557,162	$1,422,286
Pump and Motor	22	$21,368,030	$971,274
Water Storage	16	$20,892,490	$1,305,780
System Expansion	1	$3,120,000	$3,120,000

*Multiple categories include projects that can be classified into more than one category of work; for instance, pipe replacement and treatment plant upgrade. Data did not identify which categories these were however.

3.2.2 RESULTS OF CWSRF PROJECT ANALYSIS

The majority of ARRA spending on CWSRF GPR projects supported four project types, as shown in Table 6: stormwater; treatment; multiple categories, which include projects that can be classified into more than one category of work; and pipes. The CBR data indicates that in general wastewater projects funded by ARRA cost considerably more per project than the drinking water projects. Expansion projects had the highest cost per project, perhaps due to the large amount of gray infrastructure (traditional pipes,

buildings, etc.) involved. The same is true for CSO projects and treatment projects. Stormwater projects, in contrast, were considerably less costly at $961,126 per project.

Note that EPA specifically allowed drinking water utilities to apply to the CWSRF (Suzanne Schwartz, 2009), resulting in the meter projects funded by the CWSRF.

TABLE 6. SPENDING ON CLEAN WATER GREEN PROJECTS BY PROJECT CATEGORY (ENTIRE U.S.)

Category	No. of Green Projects	ARRA Amount	Average ARRA Amount per Project
Stormwater	194	$186,458,481	$961,126
Treatment	183	$594,454,031	$3,248,383
Multiple Categories*	84	$278,199,649	$3,311,901
Pipes	41	$156,961,306	$3,828,325
Energy Generation	37	$97,353,610	$2,631,179
Pump and Motor	19	$27,244,623	$1,433,928
Land Application/ Reclaimed Water	18	$61,411,289	$3,411,738
Agriculture	6	$13,417,000	$2,236,167
Expansion	6	$68,560,830	$11,426,805
CSO	6	$26,647,901	$4,441,317
Meters	4	$2,560,777	$640,194
SCADA	2	$3,659,700	$1,829,850

*Multiple categories include projects that can be classified into more than one category of work; for instance, pipe replacement and treatment plant upgrade. Data did not identify which categories these were however.

An interesting question that could not be answered through analysis of the CBR and PBR databases is whether certain categories of projects might produce more green benefits than other categories. For instance, does a stormwater project produce more or fewer green benefits than a wastewater treatment plant upgrade? Is the level of green benefits realized related to project cost? In order to answer such questions it would be necessary to more carefully record the spending on the green portions of projects, and to evaluate and document specific green outcomes of projects.

3.3 FINDINGS FROM FOCUS GROUP STATES

The following section provides a discussion of the findings from the state focus groups, supplemented with additional research into those states' specific ARRA green projects.

The text discussion is organized by state:

- Iowa.
- Louisiana.
- Montana.
- New York.
- North Carolina.
- Oklahoma.

For each state, the discussion includes:

- Overview/Introduction to State Green Project Reserve Program.
- GPR Projects by Category – from CBR and PBR.
- Secondary Benefits or Outcomes Identified During the Focus Group.
- Table of Example ARRA GPR Projects - provided by SRF staff or identified through literature review.

Appendix 2 provides a table with all the focus group state's CWSRF GPR projects and a table with all of the DWSRF GPR projects. These tables are taken from the CBR and PBR databases. The CBR database contains some information that is lacking in the PBR database. The CWSRF table shows the name of the borrower (Borrower), the category of the project (Category), the amount of each project that was funded by ARRA (ARRA Amount), the total amount funded by the SRF (Total SRF Amount), the total cost of the project (Total Project Cost), and the amounts that were entered for each project under the headings Green Amount, Green Infrastructure Funded, Green Energy, Green Water, and Green Innovative. The DWSRF table lacks the Total SRF Amount and the Total Project Cost. It also does not include a borrower name, so the name of the city or town is used in the table instead (Project City).

With regard to secondary environmental benefits, state focus group participants noted that they did not have documentation of secondary benefits nor was it requested or required by EPA, but all of the state participants were able to anecdotally identify some secondary outcomes as the green projects were discussed. These benefits are not quantifiable. All of the state focus group write-ups below describe primary environmental benefits (e.g., improved wastewater treatment capacity and/or quality) and secondary benefits (e.g., town pride in improved infrastructure leading to additional business investments.)

3.3.1 IOWA

The state of Iowa funded 13 green projects with $11.2 million in ARRA CWSRF funds, and 11 green projects with $5.8 million in ARRA DWSRF funds (amounts were funds spent on green projects only). Like many other states, prior to ARRA Iowa had not focused on green projects. The SRF programs had to incorporate the new green requirements and solicit for projects that would meet these goals. The staff also worked with their clients to identify the green components of traditional infrastructure projects. Water meter projects were popular as this type of project could be implemented much more quickly than large infrastructure projects. A summary of the categories and numbers of GPR projects funded by Iowa is provided in Table 7.

TABLE 7. IOWA GPR PROJECTS

CWSRF CATEGORY	NO. OF PROJECTS	DWSRF CATEGORY	NO. OF PROJECTS
Energy Generation	1	Meters	8
Pump and Motor	3	Pump and Motor	3
Stormwater	4		
Treatment	5		
Total	**13**	**Total**	**11**

SECONDARY BENEFITS/OUTCOMES IDENTIFIED DURING THE FOCUS GROUP

The Iowa Department of Natural Resources (IDNR) did not track secondary outcomes, other than anecdotally. Some cities did track secondary outcomes, but the SRF program did not. CWSRF staff observed that in general cleaner water and lower utility rates resulted from their projects. DWSRF staff found that improved drinking water quality was obtained at a lower cost. Anecdotes cited included:

- **Stormwater management**. Charles City completed a permeable pavement green project. It helped reduce flooding in older parts of the community. As a result, home values went up. The project led to an attitude shift in the town: Before the project, citizens were skeptical about permeable pavement; now, many neighborhoods want permeable pavement and are asking when they can get it.
- **Green infrastructure partnership**. The City of Dubuque is partnered with IBM to accomplish a sustainable community project involving green infrastructure. This partnership provides an example to other cities as to how green objectives can be accomplished by involving private groups.

EXAMPLES OF GPR PROJECTS AND OUTCOMES IN IOWA

Iowa funded a mix of different types of projects through its CWSRF and DWSRF programs. CWSRF infrastructure projects included construction of new wastewater treatment facilities, upgrade of sewer systems, correction of CSOs and stormwater management. DWSRF projects included variable frequency drives (VFD) and meter projects. SAIC was able to find information about several such projects and some of their environmental benefits during the document review (Table 8). Figure 1 illustrates one of Iowa's GPR projects, a permeable pavement project in an historic district.

FIGURE 1. CHARLES CITY GREEN PERMEABLE PAVING PROJECT

TABLE 8. SELECTED GPR PROJECTS FOR IOWA

ARRA GPR PROJECTS	BENEFITS
Charles City Green Infrastructure Project Source: http://www.cdfinc.com/Project?project_id=83	• Created 16 blocks of permeable paving in an historic residential district. • Deemed to be so successful in the management of water quantity and quality that the City decided to add six more blocks. • Reduced load on overburdened storm sewers.
Council Bluffs Energy Efficiency Project Source: http://www.foxeng.com/news/saving-energy-council-bluffs-trickling-filter-recirculation-pump-station-mcc-replacement	• Variable frequency drives (VFDs) installed for five large trickling filter recirculation pumps and two sludge return pumps enabled the pumps to automatically pace flow conditions, thereby reducing energy consumption. More efficient drives and controls provide automatic operation at reduced costs. • Replacing plant effluent water pumps replaced, allowed an increase in capacity of the wastewater treatment plant without requiring new construction and plant expansion. Adjustable frequency drives installed on these pumps provide better operation and reduce energy consumption.
Dubuque Water Meter Replacement	• City found that almost seven percent of water use was not recorded by large meters. Replacing the meters:

ARRA GPR Projects	Benefits
Sources: http://www.cityofdubuque.org/index.aspx?NID=1304 And http://www.cityofdubuque.org/DocumentCenter/Home/View/1965	- Captures $676,000 per year in water/sewer revenues. - Saves $142,000 per year in meter reading costs. - Total savings of $1.4 to 2.2 million per year. • Reduction in water loss also reduces energy and chemical use. Each one million gallons costs $154 in electricity and $191 in chemicals and sludge removal.

3.3.2 LOUISIANA

The state of Louisiana funded seven green projects with $8.7 million in ARRA CWSRF funds, and seven green projects with $9.5 million in ARRA DWSRF funds (amounts were funds spent on green projects only). Prior to ARRA the state's SRF had focused on funding traditional type treatment projects, so the state had little experience with identifying appropriate green projects. About half of the CWSRF GPR requirement was met by the West Monroe wastewater recycling project. Meters were a success story for both SRFs, as they greatly reduced water loss.

EPA stated that drinking water utilities may apply to the Clean Water State Revolving Fund (Hanlon, 2009). Louisiana is one state that implemented this, funding five metering projects under the CWSRF (Appendix 2). In addition, two meter projects were funded by DWSRF. A summary of the categories and numbers of GPR projects funded by Louisiana is provided in Table 9.

TABLE 9. LOUISIANA GPR PROJECTS

CWSRF Category	No. of Projects	DWSRF Category	No. of Projects
Meters	4	Meters	2
Other	1	Multiple Categories	2
Stormwater	1	Pipe	1
Treatment	1	Treatment	2
Total	**7**	**Total**	**7**

SECONDARY BENEFITS/OUTCOMES IDENTIFIED DURING THE FOCUS GROUP

SRF staff confirmed that they do not track environmental benefits from the projects and do not follow up with communities receiving the projects. However, the staff were able to point to the following benefits as examples of the program's achievements:

- **Water conservation and reduced costs.** The need for meters was extreme in communities selected for new meter projects. Much of the produced water was being used by unmetered customers. The new meters greatly reduced this, and enabled the utility to correctly apportion

costs to water users. This helped to lower water costs for all customers, while at the same time providing sufficient funding for operation and maintenance activities.

- **Aquifer conservation for potable water use.** SRF staff discussed the West Monroe wastewater recycling project. The City of West Monroe had an existing 7.5-MGD wastewater treatment plant that was over 25 years old and in need of replacement. The city proposed to construct a new treatment plant on the same site to treat wastewater to drinking water standards. Treated effluent can be used by a local industry, Graphic Packaging International, Inc. (GPI), as process water for paper manufacturing. GPI currently draws approximately 10 MGD from the Sparta aquifer for process water. This project was designed to eliminate that demand on the aquifer, and provide some relief from the declining water levels in the aquifer. All 14 parishes that rely on the Sparta aquifer can benefit from this project because GPI's 10 MGD demand for potable water from the aquifer was eliminated.

EXAMPLES OF GPR PROJECTS AND OUTCOMES IN LOUISIANA

The only documentation available for ARRA projects in Louisiana comes from the business cases required for several of the meter installation projects. The cities already had water meters for most customers, but the meters were old and inefficient. As water meters age, they record less of the water use. By replacing aged meters, the cities were able to achieve several benefits. Table 10 provides examples of meter replacement projects and their benefits.

TABLE 10. SELECTED GPR PROJECTS FOR LOUISIANA

ARRA GPR PROJECTS	BENEFITS
City of Youngsville replacement of inefficient water meters and installation of an automatic water reading system Source: (City of Youngsville, Louisiana, 2009)	• Near real-time tracking of water loss events as each water meter is read four times daily. • Water main break triggers alarm, notifying the city immediately so that it can be repaired. Water loss and threats to public health are minimized. • Water taken illegally from a fire hydrant triggers an alarm, minimizing water loss. • Overall reduction in water loss by 80% expected from these improvements.
City of Carencro replacement of inefficient water meters and installation of an automatic water reading system Source: (City of Carencro, Louisiana, 2009)	• Expected 20% increase in water that is metered, thus apportioning water use more fairly to customers. • Water loss expected to decrease from 65 million gallons per year (MGY) to 13 MGY. • Lower water production rate reduces chemical and energy use. • Automated water reading system reduces need for meter readers to leave their vehicles and, therefore, reduces vehicle idling, saves fuel and reduces greenhouse gas emissions.

3.3.3 MONTANA

The state of Montana funded 11 green projects with $6.8 million in ARRA CWSRF funds, and 17 green projects with $9.6 million in ARRA DWSRF funds (amounts were funds spent on green projects only). State SRF staff made the decision to spread out the funds around the state as much as possible, so a cap was set of about $750,000 per project. This was considered enough to accomplish the project, but also would allow for funding as many projects as possible around the state. The state also sought a good distribution among different types of projects. Table 11 provides a summary of the categories and numbers of GPR projects for Montana.

TABLE 11. MONTANA GPR PROJECTS BY CATEGORY

CWSRF CATEGORY	NO. OF PROJECTS	DWSRF CATEGORY	NO. OF PROJECTS
Land Application/ Reclaimed Water	1	Meters	4
Multiple Categories	2	Pipe	13
Other	1		
Pipes	1		
Stormwater	1		
Treatment	5		
Total	**11**	**Total**	**17**

SECONDARY BENEFITS/OUTCOMES IDENTIFIED DURING THE FOCUS GROUP

Montana staff reviewed their list of all SRF GPR projects during the focus group. Montana did not specifically document secondary benefits or outcomes, but staff were able to recall observed benefits for many of the DWSRF and CWSRF projects. The benefits are listed in no particular order and some could have been benefits for several categories of projects.

- **Overall improved civic pride.** Implementing ARRA-funded projects had a positive effect on towns' civic pride. Homeowners maintained their properties better, and community pride increased. Roads were often resurfaced as a result of water distribution main projects, and this contributed to community pride.
- **Fire protection.** Fire protection was enhanced by new larger distribution mains. Many of the rural systems had not been upgraded in 100 years.
- **Open space.** Some of the funds were used to aid in transitioning from individual septic tanks to central treatment. Usable space and open space increased when septic tanks were removed.
- **Cost savings.** Cost savings resulted from using less chemicals and energy.
- **Habitat.** Enhanced wetlands provide habitat for wildlife.
- **Cleaner groundwater.** Staff also noted that spray irrigation of wastewater on fields increased stream flows, as less water was withdrawn from streams in order to irrigate crops. Increased

stream flow could benefit certain aquatic organisms at times of low stream flow (such as during a drought).

- **Compliance.** ARRA funding helped many municipalities come into compliance. Even though the SRF program has been around for decades, it still requires municipalities to apply for loans and obtain approvals from local councils for rate increases. ARRA grants allowed very rural communities to upgrade and improve systems without high loans.
- **Growth in towns.** New sewer systems led to growth in rural towns, new open spaces and more efficient land use.

EXAMPLES OF GPR PROJECTS AND OUTCOMES IN MONTANA

Table 12 below provides a selection of GPR projects and some of their expected environmental outcomes, provided by state SRF staff. Figures 2 and 3 illustrate two GPR Montana projects under construction.

TABLE 12. SELECTED GPR PROJECTS COMPLETED BY MONTANA

ARRA GPR PROJECTS/LOCATION	BENEFITS
Missoula County-Lewis and Clark Subdivision Water Meter Installation and Main Replacement Source: Focus Group and follow-up request	• Annual water savings are anticipated to exceed 12 million gallons. • Energy cost savings estimated at approximately $2,500 annually. • Other O&M savings are estimated at $9,700 annually.
Red Lodge Waste Water Treatment Plant Solar Panel Array and VFDs Source: Focus Group and follow-up request	• Solar panel array will produce 6,500 kWh/month of electricity, more than 40% of the plant's total electrical use. • Excess energy created at times when the blowers are not operating will be sold. • VFDs will allow the motors to be run at less than full operating horsepower when the full power is not necessary, saving energy. • New dissolved oxygen probe will allow the motors to be run only when the oxygen levels are low. • Overall, project is estimated to reduce the City's emissions by 61 metric tons of carbon dioxide per year.

FIGURE 2. LEWIS AND CLARK SUBDIVISION MAIN REPLACEMENT

FIGURE 3. RED LODGE SOLAR ARRAY UNDER CONSTRUCTION

3.3.4 NEW YORK

The state of New York funded more green projects than any other state except Ohio. Congress granted $432 million in CWSRF funds to New York through ARRA. Of this, 20 percent, or $86 million, was designated as Green Project Reserve funds. The funds were managed by the New York State Environmental Facilities Corporation (NYSEFC) because it also oversees the state CWSRF and DWSRF. To facilitate distribution and to satisfy the requirements of these funds, NYSEFC designed the new Green

Innovative Grant Program (GIGP). NYSEFC received 294 project applications amounting to $468 million in requested grant money and $682 million in project value. Given the contracted time frame in which NYSEFC had to design the program and solicit proposals, NYSEFC expected to receive relatively few proposals. Thus the high response and the total amount requested for green projects was seen by the agency as a success (The Environmental Finance Center at Syracuse University, 2010). A summary of the categories and numbers of GPR projects funded by New York is provided in Table 13 below.

TABLE 13. NEW YORK GPR PROJECTS

CWSRF CATEGORY	NO. OF PROJECTS	DWSRF CATEGORY	NO. OF PROJECTS
CSO	2	Energy Generation	4
Energy Generation	7	Meters	7
Multiple Categories	12	Multiple Categories	1
Other	4	Other	2
Pipes	6	Treatment	1
Pump and Motor	1		
Stormwater	15		
Treatment	21		
Total	**68**	**Total**	**15**

SECONDARY BENEFITS/OUTCOMES IDENTIFIED DURING THE FOCUS GROUP

Documentation of project environmental outcomes in New York exceeds that of the other states in the SAIC study. This is at least partly due to the partnership with Syracuse University to help fund and operate the Green Project Exchange™ (GPE) at the Environmental Finance Center at Syracuse. The GPE includes a website that showcases projects from communities across New York State. It is a user-driven database to which posts are contributed by project leaders interested in sharing success stories, best practices and tested solutions (http://www.greenprojectexchange.org/). The website contains information regarding the outcomes of several of the ARRA GPR projects that were implemented within New York State. Examples of projects and outcomes are shown in Table 12 below.

As a result of the wealth of written documentation of project benefits, the focus group discussions did not cover this topic in any detail. SRF staff noted that Rome and other cities experienced revitalization after their streets were rebuilt for water infrastructure projects. The staff heard things like “Hey, my street looks better, I should open a business here.”

EXAMPLES OF GPR PROJECTS AND OUTCOMES IN NEW YORK

Table 14 below provides a selection of GPR projects and some of their expected environmental outcomes as listed on the Green Project Exchange website.

TABLE 14. SELECTED GPR PROJECTS FOR NEW YORK

ARRA GPR PROJECTS	BENEFITS
City of Glens Falls Sludge Disposal Auxiliary Fuel System	• Anticipated 99% decrease in the amount of fossil fuel needed to power the incinerator. • Reduced preventive maintenance costs. • Diversion of an estimated 455,308 gallons of waste grease from the wastewater system every year, protecting the system and preventing improper disposal of the grease.
Village of Saranac Lake System Wide Water Meter Project	• Expected 20% reduction in water use (70 MG/year). • Comparable reduction in energy and chemicals used for treatment. • Savings in time, man-hours and energy as a result of new drive-by meter reading system.
Gloversville-Johnstown Joint Wastewater Treatment Facilities Anaerobic Digester (AD) and Combined Heat and Power (CHP) System Upgrades	• New dissolved air flotation tanks enable fats and oils to be removed from wastewater more efficiently, reducing loading to other parts of the treatment process and energy use. • Fats and oils are fed into the anaerobic digester, which maximizes energy production (biogas) in this unit. • Capture and use of biogas from the anaerobic digester on average meets or exceeds the energy needs of the entire facility, leading to greatly reduced dependence on fossil fuel.
Lindenhurst Memorial Library Sustainable Parking Lot	• Removes silt and pollutants from stormwater runoff. • Provides an aesthetic alternative to conventional drains. • Alleviates stress on sewage conveyance and treatment systems. • Reduces the urban heat island effect due to use of high albedo pavers.

Source: Green Products Exchange http://www.greenprojectexchange.org/gpe/

3.3.5 NORTH CAROLINA

The state of North Carolina funded 11 green projects with $14.2 million in ARRA CWSRF funds, and 31 green projects with $13.1 million in ARRA DWSRF funds (amounts were funds spent on green projects only). North Carolina was fairly new to funding green projects; prior to ARRA, SRF funds were typically used for treatment or pipe projects. The Green Project Reserve requirements of ARRA greatly encouraged SRF funding of green projects.

A summary of the categories and numbers of GPR projects funded by North Carolina is provided in Table 15.

TABLE 15. NORTH CAROLINA GPR PROJECTS

CWSRF CATEGORY	NO. OF PROJECTS	DWSRF CATEGORY	NO. OF PROJECTS
Land Application/Reclaimed Water	1	Energy Generation	11
Other	1	Meters	12
Stormwater	13	Pipe	2
		Pump and Motor	2
		Source Water	1
		Treatment	3
Total	**15**	**Total**	**31**

SECONDARY BENEFITS/OUTCOMES IDENTIFIED DURING THE FOCUS GROUP

North Carolina reviewed their list of all SRF GPR projects during the focus group. The participants had not documented any secondary benefits or outcomes but were able to identify benefits for many of the DW and CW projects. The benefits are listed in no particular order and some could have been benefits for several categories of projects.

- **Stream restoration.** With ARRA funding and pressure to find green projects, the Department of Natural Resources funded stream restoration projects and other stormwater projects for the first time.
- **Recovered costs.** The state cited automated meters as very successful. Twelve of North Carolina's GPR projects replaced decades-old meters with new automated reading technology. The new meters are much more accurate, allowing for better recovery of costs. As meters age, they read lower and lower, and at very low flows they may not read at all if the impeller sticks. So new meter installation results in more accurate cost allocation. More of the produced water is actually paid for by customers, so customers know the real cost of water and are thus encouraged to use less. The recovered costs are channeled back into operation and maintenance activities which help to ensure compliance with drinking water regulations.
- **Reduced disinfection byproducts.** Solar powered mixers installed on water treatment units that previously were unmixed were successful in some, but not all, cases in lowering disinfection byproducts.
- **Water conservation and improved quality.** Replacement of failing water mains helped to reduce water loss. These projects also were expected to positively impact drinking water quality.

EXAMPLES OF GPR PROJECTS AND OUTCOMES IN NORTH CAROLINA

North Carolina completed a number of stormwater projects under ARRA. Results of several such projects are summarized in Table 16. Project information is from the Charlotte-Mecklenburg stormwater website (see Table 16 below). Stormwater projects were more likely to be completed in a short time frame and provide more immediately observable results than most other types of projects. Figures 4 and 5 show before and after pictures of a stream restoration project.

TABLE 16. SELECTED GPR PROJECTS FOR NORTH CAROLINA

ARRA GPR PROJECTS	BENEFITS
ARRA GPR Project/Location	**Benefits**
Torrence Creek Main Stem & Torrence Creek Tributary #2 Stream Restoration and Water Quality Enhancement/ Mecklenburg County Source: http://charmeck.org/stormwater/projects/pages/mcdowellcreek-torrencecreekstreamrestoration.aspx	• Restored 7,700 linear feet of the main stem of Torrence Creek and 9,000 linear feet of Torrence Creek Tributary #2. • Repaired bank erosion. • Improved aquatic habitat. • Created 'pocket' wetlands in the floodplain.
Muddy Creek Storm Drainage Improvement Project/ City of Charlotte Source: http://charmeck.org/stormwater/projects/pages/muddycreek.aspx	• Restored 7,373 linear feet of stream and 6.1 acres of wetland along Muddy Creek and Eastland Branch. • Created, enhanced and protected forested riparian areas. • Created a new 27.9 acre riparian wildlife habitat conservation area. • Improved habitats for aquatic life and wildlife.
Wilora Lake Rehabilitation/City of Charlotte Source: http://charmeck.org/stormwater/Projects/Pages/WiloraLakeRehabilitation.aspx	• Decreased maintenance by building two forebays to remove sediment from the water flowing into a pond. • Constructed a littoral shelf to provide wildlife habitat, improve water quality and provide safety benefits.

FIGURES 4 AND 5. BEFORE AND AFTER PHOTOS OF TORRENCE CREEK

(from www.charmeck.org/stormwater/projects/pages/mcdowellcreektorrencecreekstreamrestoration.aspx)

3.3.6 OKLAHOMA

The state of Oklahoma funded 10 green projects with $12 million in ARRA CWSRF funds, and 4 green projects with $7.7 million in ARRA DWSRF funds (amounts were funds spent on green projects only). Oklahoma SRF programs had mainly funded traditional treatment type projects prior to ARRA. The state was able to meet the short timeline for ARRA projects by partnering with other public agencies and third parties to accomplish some green projects, such as stream bank restoration. Oklahoma SRF staff found that the ability of 'smart meter' projects to provide real-time water use data was a huge improvement over existing systems. A summary of the categories and numbers of GPR projects funded by Oklahoma is provided in Table 17.

TABLE 17. OKLAHOMA GPR PROJECTS

CWSRF CATEGORY	NO. OF PROJECTS	DWSRF CATEGORY	NO. OF PROJECTS
Stormwater	6	Meters	2
Treatment	4	Multiple Categories	2
Total	**10**	**Total**	**4**

SECONDARY BENEFITS/OUTCOMES IDENTIFIED DURING THE FOCUS GROUP

Although SRF staff did not specifically track secondary benefits/outcomes, they offered several examples of observed benefits/outcomes during the focus group.

- **Improved customer service.** SRF staff stated that installation of automatic meter readers (AMRs) resulted in improved customer service—city staff could spend their time fixing leaks instead of reading meters. In small towns, meter readers usually have other tasks too; installation of AMRs freed them up for these other tasks. As a result, no city staff were laid off.

- **Creative 'green' project additions.** Some of the grant recipients' engineers began to think about what changes could be made in project design and equipment specifications to make a project more 'green.' For example, they thought about widening the scope of projects to include installing in solar panels.

- **Energy conservation.** The state provided an example business case that was submitted for the City of Duncan's wastewater treatment plant. The project was to replace the existing aerator blowers with new high efficiency motors that include VFDs. The City estimated that the new motors would reduce the annual energy consumption of the aerators by almost 44 percent. Since this exceeds the Green Project Reserve requirement that such projects achieve a 20 percent net energy reduction, the project was eligible for Green Project Reserve funding. However, no follow up data were collected that would confirm the expected energy savings.

EXAMPLES OF GPR PROJECTS AND OUTCOMES IN OKLAHOMA

Oklahoma documented the results of several GPR projects. Stormwater projects were more likely to be completed in a short time frame and provide more immediately observable results than most other types of projects. Two examples for which results were documented on the State's website are listed below in Table 18. Figures 6 and 7 show before and after photos of a streambank stabilization project in Oklahoma.

TABLE 18. SELECTED GPR PROJECTS FOR OKLAHOMA

ARRA GPR PROJECTS	BENEFITS
Illinois River Streambank Stabilization Source: http://www.ok.gov/conservation/News/Illinois_River_Tour_September_12,_2012.html	• Repaired erosion damage to streambanks at 11 sites in the Illinois River watershed. • Planted native grasses, wildflowers and trees to improve the stability of the bank and the riparian areas and to help limit pollutant loading in the streams. • Improved both aquatic and terrestrial habitats and reduced the amount of sediment going into the.
Owasso Public Works Authority Regional Stormwater Detention Basin Source: (City of Owasso, Oklahoma, Undated)	• Planted trees to provide shade, which lowered water temperature and improved aquatic habitat. • Vegetated areas to provide filtration for sediment, nutrients and other pollutants. • Provided improved habitat for upland species.

FIGURES 6 AND 7. BEFORE AND AFTER PHOTOS OF REPAIRED SITE ON ILLINOIS RIVER

(from http://www.ok.gov/conservation/News/Illinois_River_Tour_September_12,_2012.html)

3.4 SAIC OBSERVATIONS OF GREEN PROJECT TYPES (CATEGORY) ACROSS ALL STATES

The following comments and observations of green project benefits are based on the SAIC Team's review of documents pertaining to ARRA projects, literature reviews and SAIC's focus group experiences. The categories included in the following discussion represent some of the most common ARRA-funded GPR projects (water meter, stormwater, treatment, pipe), as well as a type of project that was not often chosen for Green Project Reserve funding (drinking water storage).

3.4.1 WATER METER PROJECTS

Based on SAIC's categorization of green projects, 109 DWSRF projects and four CWSRF projects involved installing or replacing water meters. Installing water meters where none were present was considered to be categorical, but a business case was required to replace existing water meters. Many projects resulted in installation of water meters that report wirelessly to the utility. Smart meters have wireless transmitters that send water-use data multiple times per day to a central computer. These meters offer real-time or near real-time tracking of water use.

The major environmental benefits of these meter installations are reduction in water loss and potential reduction in household water usage, both of which result in decreased chemical, energy and source water usage. Secondary environmental benefits include:

- Utilities can use metering results to guide the capital investment project planning process by focusing on the parts of the distribution that are experiencing the greatest water loss. This can yield reduced water loss beyond what would otherwise be possible without the data obtained from the smart meter system.
- Reduced need for meter reader staff enables utilities to transfer staff to general distribution system maintenance and other areas. More staff time is thus available to address water loss issues.
- Meter reading vehicle fleet is reduced. This results in less vehicular emissions, neighborhood noise and gasoline usage. Funds that would otherwise be used to support the fleet can be redirected to activities that directly result in water conservation.

Water meter projects were quickly able to meet shovel-ready status, as compared to projects that involve intensive planning, such as water and wastewater treatment. The total amount of ARRA Green Project Reserve spending on water meter projects under DWSRF was approximately $139.45 million. This is substantially more than the amount spent on the second highest category - distribution pipes.

3.4.2 CWSRF PIPE PROJECTS

Of the 41 CWSRF pipe projects under ARRA Green Project Reserve, 12 were for the purpose of rehabilitating or replacing existing sewers. The other 29 pipe projects involved miscellaneous types of pipe such as laterals, force mains, interceptors, and recycled water pipes. Sewer rehabilitation or replacement is typically done to reduce inflow and/or infiltration (I/I) of rainwater or groundwater into sewers. Inflow and infiltration cause greater expenditures of energy and chemicals to convey and treat the extra, unpolluted water in the sewers and treatment plant. I/I also is a major cause of SSOs. SSOs cause violations of wastewater treatment plant permits and degrade water quality. The EPA guidance document (EPA Region 8, 2010) and other sources state that sewer collection infiltration and inflow pipe repair and replacement projects do not qualify for the Green Project Reserve except under extreme conditions, such as when the pipe is under water. Only a few states provided Green Project Reserve funding for sewer rehabilitation, perhaps due to this particular language. For instance, one of the focus group states noted that they believed sanitary sewer rehabilitation was simply not eligible to qualify as a green project.

Alabama did provide Green Project Reserve funding for sewer rehabilitation. A business case was submitted to rehabilitate the City of Childersburg's sewer system. The business case indicated that reduction of I/I through this project would result in an energy savings of 43.5 percent. Beyond that, an estimated 40 percent of cost reduction would occur in avoided chemical use, pipeline repairs and other activities. The human health benefits from improved water quality due to reduced sewer overflows was not calculated in the business case, but would certainly add to the green value of such a project. This example represents a powerful case that sewer I/I reduction can conserve energy equivalent to projects that are categorically green. In later EPA guidance, the discussion of I/I reduction was changed to simply indicate that a business case would be needed to prove that the project meets efficiency requirements of at least 20 percent.

3.4.3 WASTEWATER TREATMENT PROJECTS

ARRA funded 183 green wastewater treatment projects involving each of the three major areas: water efficiency, energy efficiency and innovative projects. During ARRA, 60 percent of the CWSRF Green Project Reserve funding was awarded to green wastewater treatment projects. More projects involved innovative technology than any other category of project, based on the amount of funding ($65 million).

The largest of the treatment projects was the City of Austin's Hornsby Bend Biosolids Plant (HBBP) Upgrades. This project includes the refurbishment and upgrade of the liquid sludge receiving facilities, the anaerobic digesters, the dewatering facilities and the digested sludge composting facilities as a comprehensive program. The increased digester gas production from this project will serve as fuel for a combined heat and power facility that is to be implemented in a separate project (also funded under ARRA, through the Department of Energy). The entire project was considered to be innovative.

Expected benefits from the HBBP project include:

- Provided a larger quantity of digester gas for a combined heat and power project, to reduce the purchased electric power cost for HBBP.
- Reduced the diesel fuel requirements for operation of the HBBP and the transport of biosolids to off-site land application outlets.
- Reduced round-trip truck transport mileage for hauling of biosolids to off-site locations.
- Reduced chemical use.
- Increased diversion of green waste from landfill disposal for use as a bulking agent in composting, thereby reducing the methane production from landfilling green waste.
- Other benefits including carbon sequestration, decreased carbon emissions from the breakdown of composted and land-applied biosolids, and use of green building materials (fly ash).

3.4.4 STORMWATER PROJECTS

Stormwater projects were the most numerically common category of GPR projects funded by CWSRF programs. Across all states, 194 stormwater projects were funded by ARRA. This constitutes 30 percent of all CWSRF green projects. Stormwater projects are very cost-effective, as they accounted for only about 11 percent of all CWSRF ARRA funds spent. Beyond the primary benefits such as improved aquatic and wildlife habitat and better management of water quality/quantity, stormwater projects have some unique benefits because they are often implemented in neighborhoods where they:

- Improve the environmental awareness of residents.
- Allow residents to see the use and benefits from tax dollars.
- Improve communities through beautifying formerly urbanized landscapes.
- Increase neighborhood pride.
- Enhance property values.

Specific examples of stormwater project benefits are identified earlier in this report for several of the focus group states.

3.4.5 DRINKING WATER STORAGE PROJECTS

There were only 16 drinking water storage projects among the ARRA-funded green DWSRF projects. The largest project in this category was for the City of Drexel, Missouri. This project included additional water system improvement besides storage. Drexel had previously produced its own drinking water from a lake, but the supply was barely adequate to support the population and was inadequate to sustain fire flows. Prior to announcement of ARRA funding availability, the City had studied the options for increasing their water supply, and had selected and designed the preferred option, which was connecting to the Tri-County Water Authority (TCWA). The TWCA is a regional water supply source that utilizes a well field and ground water softening plant. This project had been approved by voters and was truly shovel-ready. The project included construction of a new supply main, pump station and elevated tank; the project also called for internal distribution improvements. As a result of the project, the City now has the storage needed to sustain pressure for fire flows, and the water supply is sufficient to allow the city to grow.

More typical storage projects were conducted by the New Hope Water Association in Mount Olive and Glade Water Association in the City of Laurel, both in Mississippi. Both of these projects consisted of construction of a new 100,000 gallon elevated water storage tank with associated appurtenances and piping. Properly designed and operated storage tanks protect drinking water quality and ensure that system pressures are adequate for both consumer use and fire flows.

3.5 SUMMARY OF BENEFITS/OUTCOMES

Table 19 provides a summary of the intended primary benefits and potential secondary benefits from green projects that SAIC discovered during this project. The table summarizes benefits found in reports, from focus group participants, literature reviews and ARRA document reviews, as well as SAIC's experience.

TABLE 19. SUMMARY OF BENEFITS BY CATEGORY

PROJECT TYPE	INTENDED PRIMARY BENEFITS	POTENTIAL SECONDARY BENEFITS
Agriculture	• Agriculture projects typically involve irrigation. Green aspects funded by ARRA included removal of water diversions from a creek; installation of a fish screen; and replacement of unlined irrigation canals with pipelines to conserve water.	• No agriculture GPR projects were evaluated for secondary benefits during this study.

PROJECT TYPE	INTENDED PRIMARY BENEFITS	POTENTIAL SECONDARY BENEFITS
CSO	• CSO projects are primarily intended to reduce pollutants entering surface waters from combined sewers. The Green Project Reserve aspects of these projects are typically small 'green' pieces of much larger CSO projects. • CSO projects help the POTW meet NPDES requirements for a Long Term Control Plan and/or Nine Minimum Controls.	• Depending on the 'green' aspect of the project, secondary benefits will be similar to those described for Wastewater Collection System Pipes.
Energy Generation	• Energy generation projects vary, but in terms of GPR projects they are primarily designed to capture solar or wind energy, or use bio-fuels to replace conventional fuels.	• Management of waste grease is greatly improved when it is used to produce fuel. Waste restaurant grease is diverted to anaerobic digesters where it enhances methane generation. The methane is captured and used to produce energy or burned onsite to offset the need for heating. Restaurants containerize the grease rather than disposing of it to landfills or sewers. Less grease enters sewers, resulting in a decreased incidence of sewer overflows and blockages. This results in improvement of water quality and reduction of human health impacts that could be caused by contact with sewage. • Capture and use of bio-gas from landfills has a positive effect on air quality by eliminating the flaring (outside burning) of such gas. Capturing landfill gas also enhances safety by reducing the likelihood of fires and explosions. • Landfill gas is typically 50% methane and 50% carbon dioxide. Converting the methane to carbon dioxide through energy generation results in reduced emission of methane, which has more greenhouse gas warming potential than carbon dioxide.
Land Application/ Reclaimed Water	• Land application of treated wastewater is often used as a method to eliminate direct discharges to waterways. • Water reclamation primarily serves to reduce the need for potable water for uses such as irrigation.	• Increased stream flow could benefit certain aquatic organisms at times of low stream flow (such as during a drought). • Spray irrigation of wastewater on crop fields decreases use of surface water for irrigation, resulting in increased stream flows. • Land application of wastewater results in reductions of both conventional pollutants

Project Type	Intended Primary Benefits	Potential Secondary Benefits
		and nutrients.
Pumps and Motors	• The primary benefit of replacement of existing pumps and motors is to achieve greater efficiency. More efficient pumps reduce the amount of fuel needed to achieve the same pumping capacity. • VFDs are generally installed to provide more even control of wastewater pumping. A consistent flow of wastewater into the treatment plant allows for better operation.	• SAIC found no documented secondary environmental benefits from replacement of pumps and motors. • Installation of VFDs can prevent surges that can lead to pipe breakage. Broken pipes release untreated sewage into the environment. • Use of VFDs results in longer pump life by eliminating start/stop cycles. • VFDs conserve energy by automatically adjusting the pumping rate based on the flow rate. Thus, if flow is high, the VFDs enable more water to be pumped, but low flows result in reduced pump speed. • VFDs reduce the need for operators to travel to pump stations to manually adjust pumping rates. Thus, operators' time is freed for other operation and maintenance tasks needed to ensure system optimization. Vehicular and fuel use is reduced.
SCADA	• SCADA systems reduce energy use by utilizing radio communications to reduce the need for system operators to drive to evaluate remote system assets. Tank water levels can be maintained at a desired range, potentially reducing energy use for pumping.	• Environmental benefits include reduced amount of truck travel (e.g., fuel emissions) and improved operator understanding/control of system. • Operators can respond more quickly to abnormal events, which benefits human health and safety.
Source Water	• Green aspects of source water projects funded by ARRA included improvement of riparian corridor health; increased efficiency of hydro-generation; improvement of drinking water quality; increased water available for fire flows; and installation of VFDs to reduce energy use.	• No source water GPR projects were evaluated during this study.
Water Storage	• Increase potable water availability. • Provide adequate volume and pressure for fire flows.	• Allows for use of electricity at non-peak times for pumping. • Reduces pumping costs. • Allows for reduced pump sizing. • Reduces the need to build new power plants.

PROJECT TYPE	INTENDED PRIMARY BENEFITS	POTENTIAL SECONDARY BENEFITS
Stormwater	• Stormwater projects vary greatly, but in terms of GPR projects they are primarily designed to reduce pollutant discharges to surface waters. • As GPR projects they are also typically used to reduce the volume of runoff to storm sewers and combined sewer systems. This reduces CSOs and the potential for flooding.	• Improvement of aquatic habitat. • Creation of wildlife habitat. • Reduction of stream bank erosion. • Creation of wild space within the urban habitat improves human quality of life. • Allows community to connect with and learn to appreciate nature. • Improves biodiversity within the urban habitat by creating a diversity of natural habitats. • Provides opportunities for recreation. • Enhances property values. • Enhances community pride. • Natural infiltration into the ground recharges aquifers and stimulates a natural habitat for soil organisms. • Provides opportunity for the community to see the positive results of ARRA projects on a daily basis. • Provides a learning laboratory for local schools and groups.
Wastewater Collection System Pipes	• The primary benefits of repair or replacement of collection system pipes include reduction of SSOs and compliance with NPDES permit requirements. • Basement backups may be targeted by some collection system projects. • Street flooding issues prompt some collection system projects.	• Improved water quality results from fewer SSOs. • Aquatic habitat is improved, and biodiversity may increase as water quality increases. • Community pride is enhanced when repeat sewage overflows are eliminated. • Property damage and resulting liability claims against the utility are reduced. • Property values may improve. • Human health is improved because sewage no longer backs up into homes.
Water and Wastewater Treatment	• The water and wastewater treatment projects implemented under the Green Project Reserve vary. These are typically small 'green' pieces of much larger treatment plant projects.	• Depending on the 'green' aspect of the project, secondary benefits will be similar to those described for Energy Generation, Pumps and Motors, Wastewater Collection System Pipes, and SCADA. • Treatment process efficiency may be enhanced and pollutants reduced.

Project Type	Intended Primary Benefits	Potential Secondary Benefits
Water Distribution Pipes	• Replaced or repaired pipes reduce water loss. This results in savings in production costs, including chemicals and energy used in water treatment and distribution. • Reduced drain on aquifers and watersheds results from less water loss through the distribution system.	• Improved drinking water quality as a result of new pipes (elimination of biofilms). • In some cases, elimination of need to develop a new water source. Development of a new water source (such as by damming a stream) may negatively impacted aquatic or wildlife habitat. • Increases available water to meet fire flows.
Water Meters (including smart meters)	• New water meters more accurately account for water usage, thereby allowing the agency to better recoup water production costs from consumers. • Smart meters enable savings of staff time and vehicle and fuel usage formerly needed to read meters manually.	• Smart meters provide water consumers with a better understanding of their consumption habits from near-real-time feedback. This enables consumers to make better water use decisions, resulting in lowered water consumption. • Ensuring that all customer water use is paid for can put the utility in a better financial position, enabling it to better operate and maintain its assets and thus ensure that the water provided to customers is always in compliance with Primary Drinking Water Regulations. • Provides a more equitable basis for customer billing.

3.6 SUMMARY OF GREEN PROJECT RESERVE PROGRAM SUCCESSES

The following Green Project Reserve program successes are a summary of those the SAIC Team heard through the focus groups or researched through the individual states' websites. The challenge of finding shovel-ready green projects in the SRF programs led to innovative approaches from many states that are worth mentioning. Many of these approaches have been adopted into their regular base programs and/or show persistence and inspiration from staff. Many of these successes could be adopted or used as a starting point for existing or new initiatives when integrating 'green' into their programs.

- The need to identify green projects resulted in new types of project ideas coming into the SRF system for the first time. During the focus group conducted with Iowa, CWSRF staff observed that Iowa is an agricultural state and traditionally most of their non-point source projects are agriculture related. Therefore, the state decided that they would need to solicit for green projects for both CWSRF and DWSRF. The state issued a public announcement of the availability of funds, and targeted discussions with associations and other groups involved in green infrastructure, water or energy efficiency improvements and other environmentally innovative activities. This proved to be an effective strategy. As a result of these solicitation efforts, two hundred possible project ideas were received in early March 2009, resulting in 120 applications received by late March (Iowa Department of Natural Resources Iowa Finance Authority, 2009).
- Some of the green projects proposed as a result of the ARRA program were tabled for possible post-ARRA funding. (Iowa Focus Group). Iowa staff stated that they received some applications with interesting business cases for green projects, but the projects would have taken too long to coordinate thus missing obligation deadlines, so they could not be funded under ARRA. However, these projects could potentially be funded through future SRF financing; thus the Green Project Reserve process provided a list of interesting projects for the state to consider.
- State SRF staff found EPA's guidance to be useful to help their project applicants write their business cases (Iowa Focus Group).
- ARRA provided an opportunity for economically disadvantaged communities to receive funding for GPR projects (Louisiana Focus Group). Louisiana SRFs had not traditionally provided funds to economically disadvantaged communities. After ARRA came out, the state was able to focus its project solicitation in these communities and received about 300 applicants. Similarly, prior to ARRA, green projects were not funded in Louisiana. As a result of ARRA, the state has incorporated green projects into its funding process.
- More GPR projects were funded than were actually documented because once the 20 percent requirement was met or exceeded; it was more cost effective to cease developing business cases (Montana Focus Group). This success was partly due to the fact that Montana already had a professionally structured marketing strategy for the SRF programs, including information on compact disks (CDs) and application templates. Montana also specifically developed outreach programs for GPR projects.
- Some states capped ARRA funds to a maximum amount per project, thus spreading out the funding as far as possible (Montana and North Carolina Focus Groups).
- ARRA efforts were leveraged by partnering with outside entities (Oklahoma and New York Focus Groups). New York's partnership with Syracuse University to fund and operate the Green Project Exchange™ website enabled New York to market the SRF loan program, document project results and make these studies available to a wide audience (New York Focus Group). This approach contributed to New York's being able to identify and fund more green projects than any of the other focus group state. Green projects in Oklahoma included partnerships with Oklahoma State University, the Tulsa Library, and the Army Corps of Engineers.
- Residential water use conservation is attributed in part to ARRA Green Project Reserve funding, which provided new meters and enabled residents to know how much water they are actually using and its cost. Water use per resident has decreased by about 25 percent since the 2007 drought (North Carolina Focus Group).

3.7 SUMMARY OF LESSONS LEARNED

The SAIC Team heard about many of the Green Project Reserve challenges and program and individual successes from states, funding recipients and through review of literature and existing studies relating to ARRA implementation. SAIC identified a few lessons learned listed below, and offer these as guideposts for EPA and for states' existing SRF programs and any new initiatives for the existing programs.

- ARRA projects that were 'categorically' green did not require a business case to document expected environmental benefits, because the primary benefits were assumed (e.g., explicitly framed as water or energy efficiency projects). This fact limited the collection of data on expected benefits of projects (for instance, in the IEc analysis (Industrial Economics, Inc., 2011)). It also reduced the number of projects for which expected benefits could potentially be compared with observed benefits. Similarly, Iowa SRF staff observed that if they had it to do again, they would require applicants to conduct more rigorous data collection both before and after installation of replacement water meters to document actual energy savings.
- Existing project priority scoring mechanisms in Intended Use Plans (IUPs) were not designed to capture green project benefits that would address specific green priorities. The abbreviated ARRA timeline allowed state SRF managers little time for specific marketing or outreach efforts to promote green projects. Despite these problems, state SRF staff were able to identify projects that met ARRA goals for green funding. States eventually modified their priority ranking systems to incorporate Green Project Reserve elements in their scoring process. This will enable states to identify and focus on the 'best' green projects (i.e., those expected to produce the greatest benefits) in future SRF funding cycles.
- 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. This may explain why projects were concentrated in certain categories (i.e., water meters) while other categories had fewer projects. Since that time, as the Green Project Reserve program has continued, better guidance is available that may encourage more types of projects to be included under Green Project Reserve.
- An interesting question that could not be answered through analysis of the CBR and PBR databases is whether certain categories of projects might produce more green benefits (primary and secondary) than other categories. For instance, does a pipe project produce more or less green benefits than a wastewater treatment plant upgrade? Is the level of green benefits realized related to project cost? In order to answer such questions it would be necessary to more carefully record the spending on the green portions of projects, and to evaluate and document specific green outcomes of projects.
- Of the project types funded by the ARRA Green Project Reserve, stormwater projects appear to produce the most secondary benefits. This is because stormwater projects are often located within communities, and directly impact residents and improve the urban habitat. In contrast, energy generation projects involving solar or wind appear to have minor benefits beyond the primary benefit of replacing conventional fuel. As funded by ARRA, such projects were too small to have an impact on the utility's overall energy usage.

3.8 RECOMMENDATIONS

Upon completion of this study, SAIC formulated several recommendations based on the information learned from this study, including the lessons listed above regarding the Green Project Reserve program for EPA's consideration. These recommendations are not listed in any priority order and are offered for consideration by EPA and states' existing programs and for any new initiatives in the existing programs.

- Business case documentation was not required for 'categorical' projects. In addition, states were not required to track environmental benefits after project completion. In the future, requiring business case documentation as well as quantifying primary and secondary environmental benefits, to the extent possible, for all completed projects would be useful in quantifying total environmental benefits.
- Some categories of projects have higher costs than others. If costs and environmental outcomes were more carefully tracked and evaluated, it might be possible to learn whether project costs are related to project outcomes for a given category of project. EPA could consider whether this kind of analysis is beneficial. EPA could consider developing guidance on assessing secondary benefits of green projects. Consideration of secondary benefits may make some proposed projects more beneficial to the community, even if the cost of the project is higher than other proposed projects with fewer secondary benefits.
- If EPA wishes to track the environmental benefits from all ARRA-funded projects, the scope will need to expand beyond those specifically identified by states as 'green.' Some states stopped classifying projects as 'green' once they met the 20 percent Green Project Reserve requirement. In addition, many projects not officially classified as 'green' provided primary, and likely secondary, benefits.
- New York provided an example of the advantages that can result from cooperation with outside organizations. Documentation of project environmental outcomes in New York exceeds that of the other states in the SAIC study. This is at least partly due to the state's partnership with Syracuse University to help fund and operate the Green Project Exchange™ (GPE) at the Environmental Finance Center at Syracuse University. Documentation of green project outcomes would be enhanced if more states opted to engage in such collaborative efforts.

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APPENDIX 1: ELIGIBILITY FOR GREEN PROJECT RESERVE OF SOME COMMON CATEGORIES OF PROJECTS

from (EPA Region 8, 2010) and (Hanlon, 2009)

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ELIGIBIILTY FOR GREEEN PROJECT RESERVE OF SOME COMMON CATEGORIES OF PROJECTS

DRINKING WATER PROJECTS

WATER METER INSTALLATION PROJECTS

A project for the installation of water meters in an area with previously unmetered connections in a water system is categorically green, with the simple caveat that such projects would also need to include a commitment by the Public Water Supply to bill a metered rate based on consumption.

A project that proposes to replace existing water meters with newer water meters is not categorically green, and a business case is required to identify and document any water and/or energy efficiency improvements from such replacement. Because a metered system would have already seen its water conservation benefits, installing new water meters would not affect the water efficiency of the system, unless the system can demonstrate that the existing water meters are substantially malfunctioning as part of a business case. Projects to replace existing water meters with automated meter reading systems also require a business case, and such business cases can be based on water conservation benefits of replacing substantially malfunctioning existing meters and or energy savings associated with reduced energy use for transportation of employees to manually read meters.

WATER DISTRIBUTION PIPE PROJECTS

Some water line replacement projects may be considered eligible under the Green Project Reserve if they make a sufficient business case for their efficiency benefits. This business case should provide specific data documenting water loss (at a minimum, system-wide, or more localized data if available). The business case should identify the length, C-values, pipe material, diameter, and provide a general description of position within system, of pipes being rehabilitated/replaced, and should document that the pipes to be replaced are the primary source of water loss (if such data is available). At a minimum, the business case should provide specific information on the basis for rehabilitation/replacement of the pipes covered in the project, such as pipe age and type, and any relevant break repair or other maintenance records. This information should give a reasonable basis to expect that the pipes proposed for replacement are likely to generate the largest return in leak reduction for the size of the project. Thus, a pipe replacement project based essentially on useful life assessments, without more, is not eligible. Finally, if energy efficiency is relevant to project qualification as ‘green’, the business case should provide any available documentation regarding expected increases in energy efficiency. For such traditional projects as pipe replacement, the state would have to document the business case in the project file to demonstrate the substantial (not incidental) water or energy efficiency benefits of the project in order to qualify the project or eligible portion to use Green Project Reserve funding.

CLEAN WATER SRF PROJECTS

WASTEWATER PUMPING STATIONS

Modifications, retrofits or replacements of existing wastewater pumping systems that achieve a 20 percent increase in energy efficiency will categorically qualify for the Green Project Reserve. Projects that do not achieve a 20 percent increase in energy efficiency can also count towards the Green Project Reserve if they have a business case showing how the project significantly improves energy efficiency. Business cases for wastewater pumping systems must include information that demonstrates that energy efficiency is the primary goal of the project. They should clearly show: 1) that the most energy efficient equipment is being used in the project, 2) that energy efficient design and operational considerations and practices are followed, 3) the percent increase in energy efficiency and kWh saved, and 4) why further energy efficiency improvements cannot be achieved.

VARIABLE FREQUENCY DRIVES (VFDS)

Variable Frequency Drives (VFDs) qualify under the CWSRF Green Project Reserve under certain conditions of use. Many water system motors, especially older ones, turn at nearly constant speed. However, much of the time, pumps operate at less than maximum design speed. Installing a VFD will generally increase/reduce pump activity proportionally to increased/reduced flows. Such an upgrade could generate significant energy savings, especially for utilities that experience great changes in flow.

VFDs will be considered categorically green provided that certain conditions of installation and use, needed to ensure that they are always efficient, are met. Note that this means that the project must provide adequate assurances or commitment to meet those conditions for the project to be green, but that a business case is not required. Some VFDs can be manually bypassed, such as in an emergency situation, making it possible to operate the pump without realizing the energy savings made possible by the VFD. This is appropriate for temporary situations, but energy savings are not realized if the VFD is left in bypass mode. Because VFDs must be operated properly in order to achieve 'green' savings, Green Project Reserve qualification must include (1) adequate training for the utility's staff responsible for operating this equipment (consistent with current operator certification requirements), and (2) integration of current limiting and auto restart features into VFDs with intuitive controls.

AERATION SYSTEMS

Projects that improve the energy efficiency of wastewater aeration systems (such as aeration system improvements or replacements) are categorically eligible for the Green Project Reserve if these changes achieve a 20 percent net energy reduction. If the project does not achieve the 20 percent net energy reduction, then a business case must show substantial energy savings.

APPENDIX 2: CWSRF AND DWSRF GREEN PROJECTS BY FOCUS GROUP STATE

Note that differences in column headings are a result of the differences between the two databases (CBR and PBR).

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IOWA CWSRF GREEN PROJECTS

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Osage, City of	Energy Generation	$572,000	$572,000	$3,873,000	$0	$0	$572,000	$0	$0
Boone, City of	Pump and Motor	$1,016,000	$1,016,000	$1,016,000	$0	$0	$1,016,000	$0	$0
Boyden, City of	Pump and Motor	$116,000	$116,000	$268,300	$0	$0	$116,000	$0	$0
Cascade, City of	Pump and Motor	$173,000	$173,000	$173,000	$0	$0	$173,000	$0	$0
Baxter, City of	Stormwater	$1,279,000	$1,279,000	$1,779,000	$1,279,000	$0	$0	$0	$0
Charles City	Stormwater	$2,871,000	$2,871,000	$2,871,000	$2,871,000	$0	$0	$0	$0
Council Bluffs, City of	Stormwater	$945,000	$945,000	$945,000	$945,000	$0	$0	$0	$0
Pocahontas County DD #65	Stormwater	$1,368,000	$1,368,000	$2,072,472	$0	$0	$0	$0	$1,368,000
Council Bluffs, City of	Treatment	$375,000	$375,000	$375,000	$0	$0	$350,000	$0	$0
Dyersville, City of	Treatment	$1,488,000	$1,488,000	$1,488,000	$0	$0	$1,488,000	$0	$0
Hedrick, City of	Treatment	$303,000	$303,000	$303,000	$0	$0	$303,000	$0	$0
Maquoketa, City of	Treatment	$150,000	$150,000	$150,000	$0	$0	$150,000	$0	$0
Newton, City of	Treatment	$605,000	$605,000	$605,000	$0	$0	$605,000	$0	$0

IOWA DWSRF GREEN PROJECTS

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Charles City	Meters	$100,000	$0	$100,000	$0	$100,000	$0
Denison	Meters	$107,000	$0	$0	$0	$107,000	$0
Dubuque	Meters	$4,000,000	$0	$0	$0	$4,000,000	$0
Fairfax	Meters	$35,000	$0	$0	$0	$35,000	$0
Hudson	Meters	$46,000	$0	$0	$0	$46,000	$0
Ladora	Meters	$13,000	$0	$0	$13,000	$0	$0
Newton	Meters	$908,000	$0	$0	$0	$783,000	$0
Urbandale	Meters	$332,000	$0	$0	$0	$332,000	$0
Baxter	Pump and Motor	$68,000	$0	$0	$68,000	$0	$0
Boone	Pump and Motor	$50,000	$0	$0	$25,000	$25,000	$0
Muscatine	Pump and Motor	$93,000	$0	$466,000	$93,000	$0	$0

LOUISIANA CWSRF GREEN PROJECTS

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Baker, City of	Meters	$500,000	$500,000	$500,000	$0		$0	$500,000	$0
Killian, Town of	Meters	$110,777	$110,777	$110,777	$0		$0	$110,777	$0
Vinton, Town of	Meters	$1,200,000	$1,200,000	$1,200,000	$0		$0	$1,200,000	$0
Youngsville, City of	Meters	$750,000	$750,000	$750,000	$0		$0	$750,000	$0
Carencro, City of	Other	$599,475	$599,475	$599,475	$0		$0	$599,475	$0
Grand Isle, Town of	Stormwater	$749,991	$749,991	$749,991	$749,991		$0	$0	$0
West Monroe, City of	Treatment	$4,750,000	$4,750,000	$4,750,000	$0	$4,750,000	$0	$4,750,000	$0

LOUISIANA DWSRF GREEN PROJECTS

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Baker	Meters	$2,000,000	$0		$0	$2,000,000	$0
Bogalusa	Meters	$2,000,000	$0		$0	$2,000,000	$0
Kinder	Multiple Categories	$298,500	$0		$134,000	$0	$0
Oberlin	Multiple Categories	$385,000	$0		$19,275	$0	$0
Ville Platte	Pipe	$2,000,000	$0		$0	$2,000,000	$0
Natchitoches	Treatment	$2,000,000	$0		$0	$765,000	$0
Westlake	Treatment	$870,000	$0		$43,958	$0	$0

MONTANA CWSRF GREEN PROJECTS

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Wisdom Water and Sewer District	Land Application/Reclaimed Water	$282,880	$282,880	$307,260	$282,880	$329,000	$0	$0	$0
Dutton, Town of	Multiple Categories	$750,000	$1,059,005	$1,659,005	$750,000	$750,000	$0	$0	$0
Laurel, City of	Multiple Categories	$750,000	$1,778,000	$2,028,000	$0	$48,000	$60,000	$0	$0
Bozeman, City of	Other	$750,000	$1,973,000	$1,973,000	$0	$0	$478,700	$0	$0
Townsend, City of	Pipes	$749,529	$749,529	$749,529	$0		$749,529	$0	$0
Glendive, City of	Stormwater	$61,000	$61,000	$66,000	$61,000	$61,000	$0	$0	$0
Columbia Falls , City of	Treatment	$750,000	$1,182,178	$3,186,178	$0	$615,000	$0	$0	$750,000
Conrad, City of	Treatment	$750,000	$1,335,000	$5,532,927	$0	$386,000	$366,700	$19,300	$0
Hamilton, City of	Treatment	$750,000	$1,467,000	$4,429,000	$0	$555,279	$405,354	$149,925	$0
Lewis & Clark County SID	Treatment	$750,000	$750,000	$1,029,000	$750,000	$750,000	$0	$0	$0
Red Lodge, City of	Treatment	$492,043	$492,043	$613,007	$0	$441,300	$492,043	$0	$0

MONTANA DWSRF GREEN PROJECTS

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Manhattan	Meters	$230,000	$0	$230,000	$115,000	$115,000	$0
Missoula	Meters	$486,644	$0	$572,400	$0	$572,400	$0
Troy	Meters	$263,000	$263,000		$0	$0	$0
Virginia City	Meters	$463,199	$0	$430,000	$0	$430,000	$0
Belgrade	Pipe	$750,000	$0	$750,000	$0	$750,000	$0
Billings	Pipe	$750,000	$0	$750,000	$0	$750,000	$0
Cut Bank	Pipe	$750,000	$0	$750,000	$750,000	$0	$0
Fort Benton	Pipe	$630,019	$0	$631,000	$0	$630,019	$0
Glendive	Pipe	$357,000	$0	$357,000	$0	$357,000	$0
Great Falls	Pipe	$750,000	$0	$750,000	$0	$750,000	$0
Havre	Pipe	$350,000	$0	$350,000	$0	$350,000	$0
Helena	Pipe	$750,000	$0	$750,000	$0	$750,000	$0
Miles City	Pipe	$750,000	$0	$750,000	$0	$750,000	$0
Missoula	Pipe	$750,000	$0		$0	$750,000	$0
Pablo	Pipe	$750,000	$0	$750,000	$750,000	$0	$0
Superior	Pipe	$298,000	$0	$298,000	$0	$298,000	$0
Troy	Pipe	$500,000	$0	$500,000	$0	$500,000	$0

NEW YORK CWSRF GREEN PROJECTS

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Buffalo Sewer Authority	CSO	$9,123,901	$17,777,801	$17,887,801	$45,000	$470,000	$175,000	$0	$250,000
Onondaga County	CSO	$10,900,000	$20,000,000	$20,003,150	$1,800,000	$1,800,000	$0	$0	$0
Albany County	Energy Generation	$5,868,742	$5,868,742	$8,558,325	$0	$5,868,742	$5,868,742	$0	$0
Cayuga County Soil & Water Conservation District	Energy Generation	$6,277,801	$6,277,801	$9,501,189	$0	$6,277,801	$0	$0	$6,277,801
Ellenville, Village of	Energy Generation	$341,970	$341,970	$379,967	$0	$341,970	$341,970	$0	$0
Glens Falls, City of	Energy Generation	$1,334,134	$1,334,134	$5,573,978	$0	$1,334,134	$0	$0	$1,334,134
Jamestown Board of Public Utilities	Energy Generation	$2,555,000	$2,555,000	$3,293,995	$0	$2,555,000	$2,555,000	$0	$0
Johnstown, City of	Energy Generation	$6,044,132	$6,044,132	$10,315,702	$0	$4,895,000	$0	$0	$6,044,132
Port Byron, Village of	Energy Generation	$131,306	$131,306	$145,896	$0	$131,306	$131,306	$0	$0
Canastota, Village of	Multiple Categories	$5,141,495	$11,165,950	$14,550,950	$0	$1,643,000	$1,514,619	$0	$0
Cuba, Village of	Multiple Categories	$1,414,247	$2,393,200	$2,393,200	$0	$536,397	$536,397	$0	$0
Elba, Village of	Multiple Categories	$275,119	$275,119	$305,688	$0	$275,119	$275,119	$0	$0
Essex, Town of	Multiple Categories	$5,331,643	$6,331,687	$11,155,663	$0	$1,331,643	$1,271,643	$60,000	$0
Lyons, Village of	Multiple Categories	$546,575	$546,575	$607,310	$0	$546,575	$546,575	$0	$0
Medina, Village of	Multiple Categories	$1,260,486	$1,260,486	$1,400,540	$0	$1,260,486	$1,260,486	$0	$0
Patchogue, Village of	Multiple Categories	$5,439,441	$9,668,812	$11,406,308	$0	$5,119,590	$2,591,590	$604,000	$1,924,000
Rockland County	Multiple Categories	$5,077,383	$14,759,106	$14,759,106	$0	$125,270	$125,270	$0	$0
Ticonderoga, Town of	Multiple Categories	$3,621,100	$5,615,923	$6,615,923	$0	$917,091	$917,091	$0	$0

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Sackets Harbor, Village of	Multiple Categories	$4,351,012	$8,200,000	$9,005,000	$95,000	$1,612,024	$1,107,024	$395,000	$0
Weedsport, Village of	Multiple Categories	$3,195,216	$5,352,845	$5,352,845	$60,000	$1,037,586	$977,586	$0	$0
Williamson, Town of	Multiple Categories	$664,793	$664,793	$738,659	$0	$664,793	$664,793	$0	$0
Cedarhurst (V)	Other	$5,890,345	$11,700,305	$11,700,305	$0	$80,385	$80,385	$0	$0
Lawrence, Village of	Other	$6,342,629	$12,484,568	$13,649,064	$0	$200,689	$200,689	$0	$0
New York City Municipal Water Finance Authority (NYCMWFA)	Other	$65,498,853	$84,226,780	$84,226,780	$0	$56,151,190	$56,151,187	$0	$0
Speculator, Village of	Other	$10,933	$10,933	$12,148	$0	$10,933	$0	$10,933	$0
Albion, Village of	Pipes	$1,377,820	$2,666,764	$2,999,894	$115,500	$115,500	$0	$0	$0
Catskill, Town of	Pipes	$181,672	$217,296	$217,296	$0	$39,175	$39,175	$0	$0
Nassau County	Pipes	$2,980,628	$5,957,891	$6,480,391	$0	$3,366	$3,366	$0	$0
North Salem, Town of	Pipes	$2,838,809	$5,031,704	$19,089,946	$0	$645,913	$79,147	$566,766	$0
Oyster Bay, Town of	Pipes	$3,130,736	$6,258,107	$6,258,107	$0	$3,366	$3,366	$0	$0
Southeast, Town of	Pipes	$1,084,920	$1,942,898	$5,912,119	$0	$226,941	$27,807	$199,134	$0
Tonawanda, Town of	Pump and Motor	$254,430	$254,430	$282,700	$0	$254,430	$254,430	$0	$0
Amherst, Town of	Stormwater	$129,328	$129,328	$143,698	$129,328	$129,328	$0	$0	$0
Chemung County Library District	Stormwater	$821,527	$821,527	$912,808	$821,527	$821,527	$0	$0	$0
Greenwood Lake, Village of	Stormwater	$18,477	$18,477	$20,530	$18,477	$18,477	$0	$0	$0
Greenwood Lake, Village of	Stormwater	$417,965	$417,965	$464,405	$417,965	$417,965	$0	$0	$0
Lindenhurst Memorial Library	Stormwater	$198,111	$198,111	$220,124	$198,111	$198,111	$0	$0	$0

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Monroe County	Stormwater	$4,715,123	$4,715,123	$7,446,921	$4,715,123	$4,715,123	$0	$0	$0
New York City (NYC) Department of Parks & Recreation	Stormwater	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$0	$0	$0	$0
(New York State) NYS Office of Parks, Recreation & Historic Preservation	Stormwater	$556,200	$556,200	$618,000	$556,200	$556,200	$0	$0	$0
North Tonawanda, City of	Stormwater	$276,100	$276,100	$306,773	$276,100	$276,100	$0	$0	$0
NYCMWFA	Stormwater	$14,637,485	$14,637,485	$14,637,485	$14,637,485	$14,637,500	$0	$0	$0
Onondaga County	Stormwater	$256,834	$256,834	$285,371	$256,834	$256,834	$0	$0	$0
Roeliff Jansen Community Library (RJCL)	Stormwater	$320,000	$320,000	$437,824	$320,000	$320,000	$0	$0	$0
Rome, City of	Stormwater	$250,000	$250,000	$304,345	$250,000	$250,000	$0	$0	$0
Tioga County Soil and Water Conservation District	Stormwater	$736,131	$736,131	$857,108	$736,131	$736,132	$0	$0	$0
Utica, City of	Stormwater	$646,641	$646,641	$718,490	$646,641	$646,641	$0	$0	$0
Brookhaven, Town of	Treatment	$5,162,252	$10,153,989	$10,153,989	$0	$170,515	$170,515	$0	$0
Cooperstown, Village of	Treatment	$375,160	$375,160	$416,844	$0	$375,160	$0	$0	$375,160
Granville, Village of	Treatment	$1,195,214	$1,418,864	$1,418,864	$0	$566,637	$566,637	$0	$0
Greenport, Town of	Treatment	$5,275,087	$8,591,249	$8,591,249	$112,206	$1,958,926	$1,276,135	$6,000	$564,585
Greenport, Village of	Treatment	$3,815,595	$5,335,086	$5,335,086	$0	$3,809,632	$1,983,487	$0	$1,826,145
Greenville, Town of	Treatment	$569,481	$651,570	$751,570	$0	$84,705	$84,705	$0	$0
Hoosick Falls, Village of	Treatment	$92,914	$92,914	$103,238	$0	$92,914	$92,914	$0	$0

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Hudson, City of	Treatment	$6,072,567	$11,409,393	$12,230,436	$0	$3,278,663	$3,201,863	$76,800	$0
Jasper, Town of	Treatment	$170,442	$170,442	$189,380	$0	$170,442	$170,442	$0	$0
LaGrange, Town of	Treatment	$405,900	$405,900	$451,000	$0	$405,900	$405,900	$0	$0
Middletown, City of	Treatment	$16,285,868	$27,832,973	$27,832,973	$0	$3,950,103	$4,271,911	$0	$0
Millbrook, Village of	Treatment	$196,650	$196,650	$218,500	$0	$196,650	$196,650	$0	$0
NYCMWFA	Treatment	$15,704,400	$15,704,400	$15,704,400	$0	$1,827,361	$1,827,361	$0	$0
NYCMWFA	Treatment	$27,010,500	$27,010,500	$27,010,500	$0	$4,187,146	$4,187,146	$0	$0
NYCMWFA	Treatment	$35,365,256	$35,365,256	$35,365,256	$0	$7,051,000	$7,051,000	$0	$0
Oakfield, Village of	Treatment	$135,000	$135,000	$150,000	$0	$135,000	$135,000	$0	$0
Ogdensburg, City of	Treatment	$1,061,752	$1,061,752	$1,179,725	$0	$1,061,752	$1,061,752	$0	$0
Richfield Springs, Village of	Treatment	$4,364,329	$5,570,650	$5,570,825	$0	$804,940	$665,185	$0	$139,755
Westchester County	Treatment	$190,539	$190,539	$211,711	$0	$190,539	$190,539	$0	$0
Westchester County	Treatment	$24,402,492	$45,876,873	$45,876,873	$0	$2,928,111	$2,928,111	$0	$0

NEW YORK DWSRF GREEN PROJECTS

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Bath	Energy Generation	$437,400	$0		$437,400	$0	$0
Poughkeepsie	Meters	$61,692	$0		$0	$61,692	$0
Pulaski	Energy Generation	$585,000	$0		$585,000	$0	$0
Saranac Lake	Meters	$1,000,000	$0		$0	$1,000,000	$0
Schaghticoke	Meters	$75,000	$0		$0	$75,000	$0
Syracuse	Energy Generation	$315,000	$0		$315,000	$0	$0
Syracuse	Energy Generation	$438,543	$0		$438,543	$0	$0
LaFargeville	Meters	$208,078	$0		$0	$208,078	$0
Roxbury	Meters	$347,267	$0		$0	$347,267	$0
Sharon Springs	Meters	$203,148	$0		$0	$203,148	$0
Webster	Multiple Categories	$23,730,887	$0	$23,333,333	$23,333,333	$0	$0
Wurtsboro	Meters	$201,438	$0		$0	$201,438	$0
Beacon	Other	$233,100	$0		$0	$233,100	$0
Troy	Other	$450,000	$0		$0	$450,000	$0
Annondale on Hudson	Treatment	$1,590,825	$0		$0	$0	$1,590,825

NORTH CAROLINA CWSRF GREEN PROJECTS

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Raleigh, City of	Land Application/ Reclaimed Water	$1,251,388	$1,251,388	$1,251,388	$0	$1,541,906	$0	$1,251,388	$0
Buncombe County (Government)	Other	$3,000,000	$3,000,000	$3,000,000	$0	$3,000,000	$0	$0	$3,000,000
Asheville, City of	Stormwater	$258,764	$258,764	$258,764	$258,764	$454,500	$0	$0	$0
Black Mountain, Town of	Stormwater	$377,085	$377,085	$377,085	$377,085	$412,840	$0	$0	$0
Burlington, City	Stormwater	$65,000	$ 65,000	$ 65,000	$0	$65,000	$0	$65,000	$0
Carolina Beach, Town of	Stormwater	$1,686,234	$1,686,234	$1,686,234	$1,686,234	$2,300,000	$0	$0	$0
Charlotte, City of	Stormwater	$296,546	$296,546	$296,546	$296,546	$577,555	$0	$0	$0
Charlotte, City of	Stormwater	$778,081	$778,081	$778,081	$778,081		$0	$0	$0
Charlotte, City of	Stormwater	$1,570,740	$1,570,740	$1,614,683	$1,570,740	$2,194,900	$0	$0	$0
Fayetteville, City of	Stormwater	$464,503	$464,503	$464,503	$464,503	$600,000	$0	$0	$0
Fayetteville, City of	Stormwater	$536,692	$536,692	$536,692	$536,692	$557,000	$0	$0	$0
Highlands, Town of	Stormwater	$746,517	$746,517	$746,517	$746,517	$546,517	$0	$0	$0
Mecklenburg County	Stormwater	$2,493,625	$2,493,625	$2,493,625	$2,493,625	$2,576,000	$0	$0	$0
Raleigh, City of	Stormwater	$279,517	$279,517	$279,517	$279,517	$465,735	$0	$0	$0
Watauga County	Stormwater	$390,860	$390,860	$390,860	$390,860	$580,000	$0	$0	$0

NORTH CAROLINA DWSRF GREEN PROJECTS

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Albemarle	Energy Generation	$196,818	$0	$270,946	$0	$0	$196,818
Butner	Energy Generation	$188,692	$0	$235,565	$0	$0	$118,692
Bessemer City	Energy Generation	$87,278	$0	$96,500	$0	$0	$87,278
Burlington	Energy Generation	$141,286	$0	$101,400	$0	$0	$141,286
Graham	Energy Generation	$160,996	$0	$301,550	$0	$0	$160,996
Greenville	Energy Generation	$44,782	$0	$57,848	$0	$0	$44,782
Holly Springs	Energy Generation	$67,067	$0	$81,600	$0	$0	$67,067
Roanoke Rapids	Energy Generation	$166,025	$0	$218,325	$0	$0	$166,025
Spring Lake	Energy Generation	$70,298	$0	$76,500	$0	$0	$70,298
Surf City	Energy Generation	$76,599	$0	$123,596	$0	$0	$76,599
Thomasville	Energy Generation	$118,709	$0	$211,103	$0	$0	$118,709
Cramerton	Meters	$479,851	$0	$320,840	$0	$479,851	$0
Goldsboro	Meters	$492,000	$0	$492,000	$0	$492,000	$0
Goldsboro	Meters	$689,000	$0	$689,000	$0	$689,000	$0
Montreat	Meters	$220,901	$0	$224,400	$0	$220,901	$0
Morganton	Meters	$485,358	$0	$573,800	$0	$485,358	$0
Murphy	Meters	$658,325	$0	$528,496	$0	$658,325	$0
Pollocksville	Meters	$163,304	$0	$200,783	$0	$163,304	$0
Princeville	Meters	$307,648	$0	$310,700	$0	$307,648	$0

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Riegelwood	Meters	$100,255	$0	$100,255	$0	$100,255	$0
Rutherford College	Meters	$155,142	$0	$155,142	$0	$155,142	$0
Taylorsville	Meters	$204,000	$0	$204,000	$0	$204,000	$0
Warrenton	Meters	$365,142	$0	$371,030	$0	$365,142	$0
Gibsonville	Pipe	$122,596	$0	$160,000	$0	$122,596	$0
Sawmills	Pipe	$235,226	$0		$0	$235,226	$0
Asheboro	Pump and Motor	$396,388	$0	$510,000	$396,388	$0	$0
Carrboro	Pump and Motor	$284,658	$0		$284,658	$0	$0
Wilmington	Source Water	$2,716,357	$0	$3,000,000	$0	$0	$2,716,357
Ramseur	Treatment	$230,004	$0	$327,305	$0	$0	$230,004
Rocky Mount	Treatment	$495,727	$0	$448,800	$0	$0	$495,727
Smithfield	Treatment	$3,000,000	$0	$3,000,000	$0	$0	$3,000,000

OKLAHOMA CWSRF GREEN PROJECTS

Borrower	Category	ARRA Amount	Total SRF Amount	Total Project Cost	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Central Oklahoma Master Conservancy District	Stormwater	$1,131,765	$1,131,765	$1,131,765	$1,131,765		$0	$0	$0
Oklahoma Conservation Commission	Stormwater	$86,500	$ 86,500	$ 86,500	$86,500	$86,500	$0	$0	$0
Oklahoma Conservation Commission	Stormwater	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$0	$0	$0
Oklahoma Conservation Commission	Stormwater	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$0	$0	$0
Owasso Public Works Authority	Stormwater	$1,785,000	$1,785,000	$1,785,000	$75,925		$0	$0	$0
Tulsa City-County Library System	Stormwater	$202,800	$202,800	$202,800	$202,800	$278,580	$0	$0	$0
Duncan Public Utilities Authority	Treatment	$304,136	$340,000	$340,000	$0	$68,000	$304,135	$0	$0
Perkins Public Works Authority	Treatment	$2,000,000	$7,225,000	$7,225,000	$110,000	$1,250,000	$1,140,000	$0	$0
Stillwater Utilities Authority	Treatment	$579,000	$1,875,000	$1,875,000	$249,975	$249,975	$0	$0	$0
Sulphur Municipal Authority	Treatment	$2,000,000	$10,200,000	$10,200,000	$0		$0	$233,973	$0

OKLAHOMA DWSRF GREEN PROJECTS

Project City	Category	ARRA Amount	Green Amount	Green Infrastructure Funded	Green Energy	Green Water	Green Innovative
Enid	Meters	$2,000,000	$0	$0	$0	$2,000,000	$0
Sand Springs	Meters	$1,709,326	$0		$0	$1,689,000	$0
Duncan	Multiple Categories	$2,000,000	$0	$1,590,000	$210,000	$1,380,000	$0
Stillwater	Multiple Categories	$2,000,000	$0	$0	$300,000	$1,700,000	$0

APPENDIX 3: GREEN PROJECT RESERVE GUIDE FOR STATE FOCUS GROUPS

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GREEN PROJECT RESERVE GUIDE FOR STATE FOCUS GROUPS – JULY 2012

OVERVIEW	DESCRIPTION
Purpose of Evaluation	The EPA is evaluating secondary environmental impacts of wastewater and drinking water projects implemented through American Recovery and Reinvestment Act (ARRA) funds. **The primary goal is to capture information related to successes, strategies and lessons learned.** Results of this evaluation may assist municipalities to better assess and predict all environmental outcomes (primary and secondary) associated with potential projects. This may help in prioritizing projects in the future according to their anticipated environmental benefits. The evaluation is *not* intended to discuss or address any sort of compliance or compliance-related issues.
Purpose of Focus Group Method	Purpose of a focus group is to generate discussion amongst the participants and to share points of view regarding the topics below. There are no wrong answers or opinions. It is not important who says what but **what gets said**.
Topics	• Secondary Outcomes (positive or negative impacts) of Drinking Water Projects • Secondary Outcomes of Clean Water Projects • Magnitude of Outcomes • Factors that Influence Secondary Outcomes • How Secondary Outcome Prediction and Assessment Could be Improved For each of the above topics, the facilitator will encourage discussion to identify **factors** that **helped** or **hindered** implementation with regards to **policies**, **processes**, **procedures** and **challenges**.
Process Overview (See Attachment)	The following table "Focus Group Structure and Process" shows the general agenda of the Focus Group discussion. The general discussion will take approximately 2-2.5 hours with another half hour of introductions and wrap up.
Participants Requested	• 6-8 participants • State staff who worked on the ARRA project(s) either from the technical and contractual side who can discuss the processes or who were impacted by the topics listed above
Focus Group Process	Unlike the typical focus group, there will be no electronic recordings or double-sided mirrors with observers. For this session, a facilitator will guide the discussion with 1-2 note takers. In some instances, there may be an additional team member present.

AGENDA/GUIDE FOR GREEN PROJECT RESERVE FOCUS GROUP

TOTAL EST. TIME: 2 - 3 HOURS	DISCUSSION GUIDES
Background Information **(15 minutes)** **Conducted by the group moderator**	Introduction of participants and focus group moderators
	Purpose of the Focus Group - Overview of EPA ARRA Program Implementation - Overview of ARRA Evaluation Goals for Green Project Reserve projects
	Overview of Focus Group Process - Discussion topics – secondary environmental benefits of wastewater and drinking water projects, magnitude of secondary benefits, factors that affect benefits, improvements to enable better prediction of secondary benefits - Timing for each topic - Note taking - How the information will be used and reported - Select case studies/files for further review
Discussion topics **(est. total time 1.5 -2.5 hours, approximately 20 minutes per topic, including one 15-minute break)**	• **Environmental Outcomes**: What secondary environmental outcomes (positive and negative) are associated with GPR projects? • **Outcomes Extent**: What was the magnitude of those outcomes? • **Factors Influencing Outcomes, such as Effect of Project Type**: Did the type of outcomes and their extent vary by type of project? • **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? Group moderator and note taker(s) will confer at the end of each topic and clarify any information before moving to the next topic.
Summary and Close **(15 minutes)** **Conducted by the group moderator**	The group moderator and note taker(s) will: - Summarize key points of each topic. - Review the next steps in the evaluation process and remind participants how this information may be used and documented. - Thank the participants for their time and contribution to the evaluation.

APPENDIX 4: DESCRIPTIONS OF DATA FIELDS USED IN TABLES

(partially based on James A. Hanlon, 2009)

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DESCRIPTIONS OF DATA FIELDS USED IN TABLES (PARTIALLY BASED ON JAMES A. HANLON, 2009)

Total Green Amount - The total cumulative dollars of the identified ARRA funding for this project that will be utilized for green infrastructure. The dollar amount reported cannot exceed the amount of ARRA funding for the project.

ARRA Amount - The cumulative total dollar amount of ARRA funding for this infrastructure investment.

Green Energy Amount – The total amount identified by the state and project recipients to be spent on the project or portion of the project that meets the requirements of green energy.

Green Water Amount - The total amount identified by the state and project recipients to be spent on the project or portion of the project that meets the requirements of green water.

Green Innovative Amount - The total amount identified by the state and project recipients to be spent on the project or portion of the project that meets the requirements of green innovative.

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