Federal Resource Efficiency Manager Assessment

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Executive Summary

A Resource Efficiency Manager (REM) is a designated individual contracted by a federal agency to reduce energy and resource costs. The Federal Energy Management Program has worked with the Washington State University Extension Energy Program to support and promote REMs at federal agencies.

The purpose of this assessment of federal REMs is to provide guidance on where future REM support efforts should be focused and on how the success of these efforts can be measured. To conduct this assessment we:

- Analyzed federal agency energy use and facility characteristics data for REM potential.
- Completed 22 interviews with federal agency staff members working for the U.S. Department of Energy who had experience with REMs, points of contact for REMs working at federal facilities, several members of the Federal Interagency Energy Task Force, and other federal agency staff members who had some involvement with REM activities at federal facilities.
- Conducted interviews or received written responses to the interview questions from 19 REMs located at a diverse mix of federal facilities.

We found that federal REM programs have been successful, with savings exceeding program costs by as much as eight to ten times. This success is reflected in the growth of federal REMs over the last ten years to more than 60 REMs serving facilities in the U.S. and abroad. Our preliminary analysis estimates there is potential for 200 to 400 REMs at federal installations. Because some agencies will choose to use in-house staff to carry out REM-like functions, the actual potential for contracted REMs may be less.

A fundamental question raised in this assessment is not only how REM programs can be expanded in the federal sector to achieve their potential, but how they can be sustained. The following key findings and recommendations summarize the results of our assessment. More details can be found in the body of the report.

- **Finding:** REMs have been most successful at Department of Defense (DOD) sites. DOD agencies are expanding their REM activities. There seems to be a relatively high awareness of the benefits of REMs within the DOD.
  Recommendation: Identify key supporters within DOD who can help build on current successes to further expand DOD REM activities.
- **Finding:** Availability of start-up funding is a key factor limiting the continued expansion of REM programs.
  Recommendation: Identify sources of start-up funding for REM programs. Utilities may be a potential source of funds to support program start up.
- **Finding:** Strained federal agency budgets threaten the continuity of existing REM programs. Many REM programs are renewed on an annual basis and most compete for funds with other critical needs.

Recommendation: Consider sustainable funding mechanisms for REM programs.

- **Finding:** We are aware of only two acting REMs at non-DOD agencies. Awareness of REM benefits seems limited at non-DOD agencies. Our interviews suggest these agencies are inclined to rely on in-house staff rather than contracting for a REM. **Recommendation**: Learn more about the opportunities at non-DOD agencies for contracted REMs to support in-house staff or for in-house staff to adopt REM-like practices. Identify ways to encourage REM activities at non-DOD agencies.

- **Finding:** The primary motivation for hiring a REM is to provide dedicated resources focused on energy and resource management that are not otherwise available (often due to budget and staff cuts). The REM program produces reductions in energy consumption and costs and helps meet federal energy reduction goals. **Recommendation**: Promote how REMs can provide dedicated resources to help federal agencies reduce resource costs and meet federal energy reduction goals.

- **Finding:** REMs and federal staff involved with REM programs identified a wide range of successes. The variety of "successes" mentioned highlights one of the most important strengths of REM programs – the ability to adapt to client needs. **Recommendation**: Promote the flexibility and adaptability of REM programs and their responsiveness to client needs.

- **Finding:** Federal staff and REMs cited two key factors contributing to the success of a REM program. One was the support of client staff, managers, and commanding officers and the other was the experience and capability of the REM. **Recommendation**: Consider opportunities for working with REMs and the firms they work for to further enhance REM capabilities through such things as on-line resources and training tools and networks of REMs.

- **Finding**: The firms providing REM services to federal agencies have at times had difficulty finding qualified candidates to fill REM positions. **Recommendation**: Work with firms providing REM services to identify, develop, and bring capable professionals into the REM field.

- **Finding:** The REM programs tended to put the most emphasis on identifying, developing, and obtaining funding for energy efficiency projects. Some programs, particularly those that had been in existence the longest, had strong energy awareness components.
  Recommendation: Provide opportunities to share REM program best practices at conferences, through REM networks, and on-line, particularly in the area of energy awareness and education.

- **Finding:** One of the strengths of REM programs is the regular reporting and documentation of their activities and savings generated. The REMs took practical and straightforward approaches to documenting and determining savings from their efforts. However, savings and costs come in many different forms and it is not simply a matter of adding them together to see if savings exceed costs. **Recommendation**: Sharing how REMs account for savings and developing more consistent approaches could improve the value and effectiveness of REM

performance reporting and could help promote wider adoption of REM programs in the federal sector.

- **Finding:** The REMs provide value in many ways that cannot be quantified in savings. In addition, we found that the emphasis on generating short-term savings can detract from efforts that lead to long-term improvements in efficiency.
  Recommendation: REM programs should balance the need to generate short-term savings with taking the necessary steps to obtain long-term efficiency and lower utility costs. Consideration needs to be given to the long-term opportunity that exists and the multi-year commitment that is needed to capture those savings.
- **Finding:** The Energy Policy Act of 2005 (EPACT2005) sets new requirements for federal agencies including a 2 percent yearly energy reduction goal, new building performance goals, and the installation of smart meters at all buildings. Existing REMs are already taking steps to help their organizations meet these goals. REMs could play a valuable role in helping other federal agencies strengthen their energy management efforts to meet the EPACT2005 requirements.
  Recommendation: The federal government needs to consider what role REM programs can play in meeting the EPACT2005 goals for federal agencies and how this can be supported.

REM programs have been successful at federal agencies, particularly DOD installations. Our findings and recommendations suggest that to build on this success and achieve the potential that REMs can provide in the federal sector, mechanisms need to be in place to support the long-term sustainability of federal REM activities. These include sustainable funding, outreach and promotion (particularly to non-DOD agencies), on-line resources and training tools, and REM networks to facilitate the sharing of experience and information.

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Introduction

A Resource Efficiency Manager (REM) is a designated individual contracted by a federal agency to reduce energy and resource costs[1]. The REM approach has been applied in the federal sector for approximately 10 years and has gained a reputation as an innovative and cost effective means of reducing energy and water use while helping federal agencies meet their federally mandated energy reduction goals and lowering overall operation and maintenance costs. The Federal Energy Management Program (FEMP) has worked with the Washington State University Extension Energy Program (WSU Energy Program) to support and promote REMs at federal agencies. This assessment is part of ongoing REM support activities at the WSU Energy Program.

The purpose of this assessment of federal REMs is to provide guidance on where future REM support efforts should be focused and on how the success of these efforts can be measured. The assessment consists of three elements:

- Market Potential: What are the opportunities for REM activities at federal sites and where does the greatest potential exist?
- REM Performance: What is the federal experience with REM programs? How well are existing REM programs performing? What are the successes, challenges, and uncertainties for REM programs?
- REM Practices and Metrics Development: What are the REM best practices? What elements and activities are included in REM programs? What methods are used to track program performance? Are there measures and data collection strategies that can be used to create a model framework to track and support the success of REM programs?

We used three approaches for collecting information for this assessment:

- Conduct an assessment of potential REM opportunities in federal agencies by analyzing agency energy use and facility characteristics data.
- Interview at least 20 federal agency staff members about their experiences with REMs, potential opportunities, factors that contribute to the success of REMS, and factors that limit the application of REMs. We completed 22 interviews with federal agency staff members working for the U.S. Department of Energy who had experience with REMs, points of contact for REMs working at federal facilities, several members of the Federal Interagency Energy Task Force, and other federal agency staff members who had some involvement with REM activities at federal facilities.
- Interview at least 20 REMs to learn from their experiences, their success, and challenges and to identify best practices for tracking and reporting on REM performance. We conducted interviews or received written responses to the interview questions from 19 REMs located at a diverse mix of federal facilities. We also conducted an interview with an individual with REM experience who was not currently in a REM position. We focused on REMs who had several

[1] More information about Resource Efficiency Managers can be found on the Washington State University Extension Energy Program website at http://www.energy.wsu.edu/projects/rem/rem.cfm.

years of experience working at a federal facility. As part of the interviews, we asked REMs to provide examples of the reports they produce to document their activities and performance.

Background

The REM concept has its roots in the energy management programs that developed in organizations following the energy crisis in the late 1970s and early 1980s. In the Northwest, Resource Conservation Manager (RCM) Programs evolved from the energy management programs aimed at K-12 schools in Oregon and Washington in the late 1980s. In 1992, the Energy Smarts Partnership[2] initiated a RCM Project. Seven school districts in Oregon initially participated in this program and achieved good results. RCM efforts spread to other parts of the region with support from some utilities as well as from what was then the Washington State Energy Office.

In 1996, the WSU Energy Program established the first federal REM at Fort Lewis in Washington State with support from FEMP and the Pacific Northwest National Laboratory. In 1997, a REM was placed at the Naval Air Station on Whidbey Island and several more REMs were added at Navy Region Northwest installations in the following years. During this time the WSU Energy Program obtained a grant from FEMP to create the Total Efficiency Network (TEN) to support federal REM efforts. By 2000 REM activities had expanded to the Navy Region Southwest and they have continued to grow. Today there are more than 60 federal REMs primarily serving at U.S. Department of Defense installations around the world.

Current Status of REM Activities

There is no database of federal REM activities. The WSU Energy Program has maintained an informal listing of REM positions. We rely on our network of contacts to keep this information up-to-date, but there may be positions we are not aware of and others on our list that have been discontinued. We expect there may be more REMs than the 62 we have on our list. The Navy has the most REMs, followed by the Air Force, Army, and Marine Corp (Table 1). The Coast Guard and General Services Administration each have one REM. The U.S. Postal Service, National Oceanic and Atmospheric Administration, and the Department of Energy have also had experience with REMs.

[2] The Energy Smarts Partnership was a unique funding and staffing collaborative among the Bonneville Power Administration, Northwest Natural Gas, Portland General Electric, the Oregon Department of Energy, and the Oregon Department of Education.

Table 1. Federal REMs

Agency	Number of REMs
Navy	29
Air Force	17
Army	9
Marine Corp	5
Coast Guard	1
GSA	1
Total	**62**

Federal Experience with REMs

Our interviews with federal agency staff members provided a variety of insights about the federal experience with REMs. We asked about their experiences with REMs including motivations for hiring a REM, challenges/barriers, contracting, successes, performance, future plans, and suggestions for encouraging federal REMs. The following summary of responses is based on the interviews we conducted.

Federal staff members indicated the primary ***motivation*** for hiring a resource efficiency manager is the need for dedicated resources focused on energy and resource management. Due to reductions in staffing, energy management is often one of many responsibilities assigned to a federal employee. These employees do not have the time to devote to energy management tasks such as resource tracking, project development, applying for utility incentives, or raising energy awareness—or they do not have the capability to effectively pursue these tasks. Without these resources, agencies are not able to meet the energy reduction goals established by executive mandate. By helping to meet these goals, a REM is able to save resources and reduce utility costs.

Federal staff members said the biggest ***barrier*** to starting a REM program is first-year funding. Agencies need money to start the program before the REM begins generating cost savings. In addition, there is skepticism that savings from the REM program will offset the costs. Savings can be difficult to measure and, because savings occur over time and federal staff members are also usually involved, it is not always clear how much of any savings can be attributed to the REM. Some people we talked to said it was hard to justify hiring a REM. Other obstacles to REM programs include a lack of understanding of the REM concept, inertia, and resistance to change. It is something new, people have never done it before, and it takes time to set up.

REMS have not been tried by many agencies because they prefer to rely on in-house staff for resource and energy management. These agencies are not interested in contracting for these services. REMs can be expensive. They wonder why they should contract for this work when someone within the agency can be designated to do the work.

Finding the right ***contracting*** mechanism can also be a challenge to starting a REM program. Many REMs have been hired using the General Services Administration (GSA) Federal Supply Registers for energy services. However, recent U.S. Department

of Defense restrictions on using GSA contracts have resulted in these agencies using different contracting mechanisms. Other approaches include Utility Energy Service Contracts (UESC), agency procurement contracts, sole source, and the U.S. Army Corp Engineering and Support Center in Huntsville, Alabama. The Army Region Southwest has solicited proposals and developed a blanket purchasing agreement with one REM service provider for Army installations in the Southwest that would like to hire a REM. For more information on contracting for a REM, see the Federal Energy Management Program Guide "Contracting for a Resource Efficiency Manager" (http://www.energy.wsu.edu/ftp-ep/pubs/rem/rem_guidebook.pdf)

Federal agency staff members reported a variety of REM ***successes***. Identifying energy retrofit opportunities and developing ESPC (energy savings performance contracts) and UESC projects were primary successes. One manager noted they were able to obtain significant amounts of agency funding, which had not occurred before, to implement projects the REM identified. Other REM successes that were mentioned include obtaining utility incentives for efficiency projects, raising energy awareness, and developing energy guidelines.

Federal staff members cited several factors contributing to the success of a REM program. One was the experience and capability of the REM. While technical competency is important, federal staff members particularly highlighted the need for REMs to have good communication skills and the ability to sell themselves and their program. In addition, a few people we interviewed said having access to the expertise of the firm the REM worked for was valuable. Some of the Department of Defense contacts said that experience with the military and an understanding of military culture is beneficial. Another factor for success is support from agency senior leadership and from the staff the REM works with. The REM often needs help from agency staff or contractors to develop and implement opportunities for savings. Having focused job responsibilities is another reason REMs can be successful, in contrast to agency staff members who often have multiple responsibilities.

Once a REM program is under way, federal staff members indicated that maintaining funding is one of the biggest ***challenges*** to keeping the program going. One person noted the REM program is "off-budget" funding, so he has to fight to justify the REM budget each year. Part of the justification process is demonstrating that savings from the REM program are offsetting the costs, which can also be a challenge. Some of the other challenges reported by federal agency staff members were keeping the REM focused on their specific tasks, needing to provide a lot of direction for the REM, having a REM that was unfamiliar with the agency culture, and having the wrong person for the job. Tempering expectations from upper management was another challenge mentioned because of the time it takes to get a REM program up and running and generating results. Some REM service providers have had trouble filling REM positions for contracts they have won.

Almost everyone we spoke to was positive about the ***performance*** of REMs and felt the REMs added value. This was particularly true of the federal agency staff members who

had some oversight responsibility for REMs. The fact that most REM contracts are being renewed—and that the Department of Defense agencies with the most experience with REMs are expanding their programs—speaks positively about the performance of REMs. However, one person we spoke to indicated they were not seeing the level of performance they were expecting. There have been a few cases where REM programs were not continued. It is our understanding that this was due to lack of funding and management support. This also could have been related to performance and the perceived value of the REM. We suspect some of the factors for a successful REM program noted above were missing in these cases.

Many of the contacts for REM programs we interviewed said their contracts contained performance clauses stating the REM needed to generate enough savings to offset their cost. In some cases this was a two-to-one ratio. All the REMs produced regular reports along with some kind of scorecard or spreadsheet showing savings. The savings included things that can be directly determined like utility incentives received or billing errors identified and refunded, as well as estimated energy savings from projects, and credit for activities that are difficult to measure like energy awareness campaigns. The client and contractor review the savings estimates and agree on what counts as savings (see the next two sections for more discussion). A few people mentioned that REMs often get tasked with things that do not generate cost savings that can be measured. While these activities provide value, it is hard to give the REM credit for them. This is a reason some federal staff members gave for not having cost-savings performance clauses in their REM contracts. They stress deliverables and meeting the REM program goals for that particular installation. There is still an expectation that savings will be generated, but less emphasis is placed on attributing savings to the REM.

We asked federal staff members involved with REM programs about the ***future*** of their programs. Most indicated their programs have year-to-year renewals. As one noted, "next year looks good, five years out who knows." They will continue their program if they see a return on their investment, but it also depends on availability of funding. A few people noted that their programs may evolve and shift focus. For example one person thought they would be doing more energy awareness training as they complete their major project work. It is also important to note that REM programs have been expanding at Department of Defense agencies, but they have made few in-roads at non-defense agencies.

The ***suggestions*** we received for encouraging federal REMs basically fell into two categories: funding and raising awareness. Agencies need funding to get REM programs going and they also need mechanisms to maintain REM program funding rather than relying on budget availability each year. Some federal staff members also suggested there is still a need to raise awareness, share success stories, and provide information on hiring a REM (including the option of contracting with firms that provide REM services). A few suggested meeting directly with key agency staff members and developing agency champions for REMs. However, some of the people we spoke to thought there was a lot of information out there about REMs, that people within agencies were aware

(particularly within the Department of Defense), and there really was not much more that could be done to promote REMs.

Summary

The federal staff members we spoke to were positive about REM programs, and the expansion of these programs within Department of Defense agencies is a testament to the performance of REMs. The primary motivation for hiring a REM is to obtain dedicated resources focused on resource and energy management. The biggest barrier for starting a REM program is lack of funding. In addition, REMs have not been tried by many agencies because they prefer to rely on in-house staff for resource and energy management. Once a REM program is under way, federal staff members indicated that maintaining funding is one of the biggest challenges to keeping the program going.

Federal agency staff members reported a variety of REM successes including the identification of energy retrofit opportunities, obtaining outside funding for projects, raising energy awareness, and developing energy guidelines. The capability and experience of the REM, and support from agency management and staff, were some of the factors mentioned contributing to REM success. Many REM contracts are renewed on a year-to-year basis and renewal depends on meeting performance clauses and availability of funding. Providing funding mechanisms and continuing to raise awareness about REMs were the primary suggestions made for encouraging federal REM applications, although among Department of Defense agencies, awareness already seems to be fairly high.

REM Practices

We conducted interviews or received written responses to our questions from 19 practicing REMs at federal installations and facilities. We asked about their experiences as REMs including the scope and key elements of their REM programs, successes, and challenges. The following summary of responses and best practices is based on the interviews we conducted. In the next section we discuss in more detail REM reporting and analysis approaches related to REM performance (REM Metrics).

REM Program Background

Of the 19 REM programs covered in our interviews, five started in 2000 or earlier, seven started in 2001 through 2004, and seven started in 2005 or 2006. Most of the REMs we spoke to had at least several years of experience as a REM. Some of the REMs involved with recently started REM programs had previous experience as a REM at another federal site. Many of the REMs had extensive prior experience as energy managers, engineers, or in construction and project management.

The REMs gave a variety of reasons why the organization they worked for started a REM program. The most common explanation was to reduce energy consumption and costs and to meet federal energy reduction goals. Other common reasons were to focus more attention and resources on energy management, and to revitalize organization energy programs. Other reasons given included the success of REM programs at other

installations and the availability of seed money to get the REM program started. The California energy crisis in 2000/2001 was a motivator for starting REM programs at some California military installations.

The REMs provided some basic information about their positions. One REM reported working 60 percent-time, while all the others were full-time positions. All of the REMs were contractors. Most were employees of the firm contracting with the federal agency, but there were a few cases where the REM had a sub-contract with the contracting firm. The majority of REMs said they reported to an energy manager or utility manager within their client organization. Some others said they reported to individuals in their installation's Department of Public Works or to individuals at the regional or headquarters level. None of the REMs indicated that their salary was guaranteed by a utility or some other entity,[3] although a few of the REM contracts are handled through a utility. We asked REMs about their annual salary and a little less than half responded. About half of these indicated their salary was in the $50,000 - $70,000 range, about half said it was $70,000 to $90,000, and one said it was more than $90,000. Most said they received health and leave benefits and some others indicated they were sub-contractors or accounted for fringe benefits in the rates they charged.

The majority of REMs we interviewed serve at a specific military installation. A few of these said they also served other remote sites associated with the primary installation. A couple REMs indicated they were the energy managers for their installation. Five of the REMs served as regional REMs, either coordinating REMs at multiple sites in a region or being directly responsible for multiple sites over fairly large areas. One REM reported being part of a team of several REMs serving four different sites.

Successes

A little more than half the REMs rated their programs as very successful and the rest said they were successful. About a third of the REMs pointed out energy performance awards they had won and we suspect more may have won awards, but did not bring it up. Some REMs reported that the savings they have generated exceeded REM program costs by eight to ten times.

The REMs identified a wide range of key successes, reflecting the diversity of programs and differences in client needs. About half the REMs pointed to the development and implementation of energy projects along with arranging for project funding as a key success. In many cases, "other people's money"[4] was used to fund the projects. Some REMs highlighted their ability to work with key groups such as contractors, the engineering unit, or the energy manager as a key success. Several REMs mentioned

[3] There are some instances where utilities have offered to guarantee the salary of a resource conservation manager (or REM) in case savings do not cover the cost of the program. This is a way for utilities to promote their application.

[4] "Other people's money" includes funding mechanisms that do not affect the agencies' or installations' budget such as Energy Saving Performance Contracts (ESPC) and Utility Energy Service Contracts (UESC), utility incentives, and the Energy Conservation and Improvement Program (ECIP), which is a federal program designed to improve energy and water efficiency in existing Department of Defense facilities.

substantial utility billing errors they identified. Some other successes noted by at least two REMs included their energy awareness and building monitors program, negotiation of better rates, solving problems with the energy management control system (EMCS), auditing substantial portions of their buildings, and assisting with privatization of installation utilities. Several REMs pointed to the overall success of their programs and the overall savings achieved rather than highlighting specific successes. It should be noted that some of the key successes REMs identified, while providing value, may not produce savings that can be attributed to the REM program.

A key factor for their success mentioned by almost two-thirds of the REMs was the support of customer staff members, managers, and commanding officers. Many said working effectively as a team with the local energy manager and other staff members was important to their success. In addition, many REMs pointed to their own experience as a key ingredient for success. This included their professional experience and knowledge as well as their institutional understanding of the federal agency and installation they worked for. Some REMs also highlighted the support from other REMs and staff from the firms they work for as contributing to their success. Other skills that were mentioned included good communications, listening, following through, good coordination, and being flexible, innovative and proactive. One REM offered the following advice, "Remember the customer comes first, maintenance is second, and energy is third. I take steps to improve the quality of facilities with the program. That philosophy generates support."

Challenges and Needs

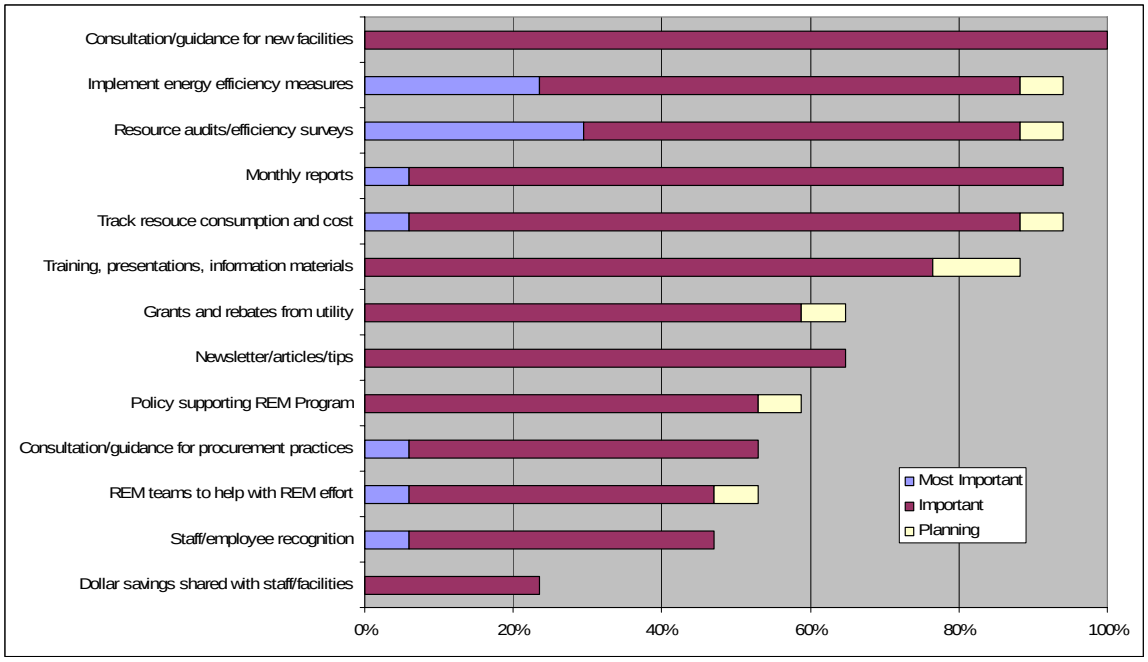
In many respects the challenges experienced by REMs mirror the factors for success. The biggest challenge cited by REMs was working and dealing with organization structures. They mentioned communication difficulties, getting support from organization personnel and tenants, understanding organization structures and functions, dealing with federal bureaucracy, and the time it takes to get things done. The changing conditions and continuous turnover of personnel at Defense Department installations further complicate the situation. This results in the need to constantly re-educate people involved with the program as well as decision-makers whose support of the REM program is crucial. Some REMs said budgets are strained, that they need to do more with less, and that they need to be creative to obtain funding without impacting agency budgets. Since many REM contracts are renewed on an annual basis, this can create uncertainty for contract renewal.

When asked what they needed to continue to be successful, a handful of REMs emphasized continued support from their client, particularly from the top level. A similar number of REMs said they already had the support they need from their client and/or the firm they work for. Some REMs mentioned local or on-line training and seminars on topics such as new technologies and energy saving opportunities, renewable energy, funding opportunities, and preparation for the certified energy manager test would be helpful. Some REMs said they had used FEMP and/or the WSU Energy Program for technical support, fact sheets, software downloads, and on-site assessments. They would like to see this support continue.

Best Practices

We used a list of typical REM program elements to ask the REMs about the key elements in their programs. Figure 1 shows that all the REM programs provide consultation and guidance about resource efficiency for new facilities and construction. The most important program elements identified by the REMs were implementing cost-effective energy efficiency measures, conducting facility resource audits and efficiency surveys, producing monthly reports of their activities and performance, and tracking resource consumption and cost. The least common REM program elements included consultation and guidance for the procurement of energy consuming equipment, creation of REM/energy teams to help with the REM effort, staff/employee recognition for significant resource efficiency efforts, and sharing of dollar savings with staff or facilities. However, even these uncommon program elements were among the most important elements for at least one REM program. In the following text we discuss the best practices we identified from our interviews for each of these program elements.

Figure 1. REM Program Elements



Provide consultation and guidance regarding the resource efficiency of new facilities: All the REMs said they are involved with the resource efficiency of new facilities or new construction projects. Some indicated they review drawings and plans for compliance with standards for energy efficiency and sustainability. Others said they attend planning meetings and provide recommendations for improving resource efficiency. One REM noted they received assistance from FEMP to organize a design charette for one of their new facilities.

Implement cost-effective energy efficiency measures using performance contracting or some other funding mechanism: This was one of the two most important activities identified by the REMs. ESPC and UESC were common project financing mechanisms

used by REMs. However, some REMs indicated they could not get approval to use these external financing mechanisms. In these cases funds were obtained from the federal ECIP program or from various agency sources at the local or regional level. A few REMs noted they have been able to use internal funds to take care of the "low hanging fruit"—low cost projects or projects that are so compelling they are relatively easy to justify. Some REMs reported that they have been able to implement projects without any impact on their agency's budget by using various combinations of ESPC, UESC, ECIP, and utility incentives to fund their projects.

Conduct resource audits or efficiency surveys of facilities: More REMs identified facility audits/surveys as one of their most important activities than any other program element. They view facility audits or efficiency surveys as a primary tool for identifying efficiency opportunities in their facilities. This is a tangible outcome they can report on. It also helps meet the federal goal to have at least 10 percent of their facilities audited each year. A few REMs reported that the majority of their facilities had already been audited. Some said they target their audits to the largest and most energy intensive facilities and some others also rely on suggestions from staff for facilities with the most potential opportunities. The audits or surveys are often conducted by the REM or a team of REMs sometimes working with local staff, but outside consultants or teams from FEMP or the WSU Energy Program also were used by REMs for facility audits and assessments. A few REMs pointed out that audits provide a good opportunity for providing training to on-site facility staff on how they can effectively manage resource use at their facility.

Produce regular reports for organization management about program results and achievement of program goals: Regular reporting (usually monthly, sometimes weekly) of REM activities and results was a common feature of almost all the REM programs. One REM program that did not produce regular reports kept a detailed database of projects and activities that is used by federal staff to produce the reports they are required to generate. For the most part the reports described the REM activities for the reporting period using an agreed upon format that often was based on elements in the REM contract. The REMs also report on savings and costs associated with their activities. More details on performance reporting and savings analysis are covered in the next section.

Track resource consumption and cost using resource accounting software: REMs typically track consumption and cost for energy and water utilities. In addition to tracking utility bills, a few REMs said they collect data from other building meters or they take advantage of an energy management control system to track consumption. They most often use spreadsheets to manage cost and consumption data. A couple of REMs said they also use an Access database in addition to spreadsheets. Some said they use agency based utility/energy data systems to generate reports for consumption and cost (DUERS (Defense Utility Energy Reporting System) and CUBIC (Navy)). Two said they use *Utility Energy Manager* software. There were a few REMs that do not track energy use and cost because of the large number of facilities and accounts they cover. In

this case they focus on the energy use in a particular building when looking for efficiency opportunities.

Develop training, presentations, or information materials for organization staff/employees about resource efficiency: Training, presentations and information materials are generally associated with the energy awareness component of a REM program. About three-quarters of the REM programs included some of these energy awareness activities. Some of the REMs indicated their energy awareness activities were fairly limited. There is a tendency to focus on training facility managers, building operators, and building energy monitors and this may simply be hands-on training when a REM visits a site. Training and presentations also occur at regular (annual) gatherings of managers, contractors, or energy steering committees. Energy can also be included as one component of the training a facility manager may go through. One REM has developed on-line training for energy monitors and new recruits, and at least one other said they were thinking about doing this as a way to deal with the regular turnover of personnel.

Coordinate with local utilities to initiate projects and secure rebates and grants: Some REMs have been very successful obtaining grants and rebates from their local utilities for energy projects. Where local utilities offer rebate and incentive programs for efficiency measures, REMs have taken advantage of them. But a little more than a third of the REMs said their local utility did not have any programs available they could use.

Distribute a newsletter, articles, or tips to encourage staff/employees to reduce consumption: Most REMs do not produce any kind of newsletter or regular communication with staff/employees. Several REMs reported producing articles that could be used in the installation newspaper, although these did not appear to be a regular feature. One REM had a web page. Some REMs used e-mail to distribute simple energy tips and information to their customers.

Implement policies supporting the goals of the REM program: There are federal policies and directives that support REM type activities, but a little more than half the REMs reported having regional or local policies that supported their work. They referred to these as guidelines, instructions, regulations, and strategic energy plans. In a few cases, these guidelines or instructions were developed as part of the REM program. They might include information on temperature set points, design guidelines, purchasing requirements and energy goals.

Provide consultation and guidance regarding procurement practices for energy consuming equipment: Almost half the REMs said they had little or no influence over purchasing practices. They indicated there were existing federal guidelines for purchasing Energy Star equipment. Some REMs said they had helped develop purchasing standards or put guidelines in place and a few said they worked with staff to purchase efficient and proven technologies.

Create REM teams made up of organization staff/employees to help with resource efficiency efforts: About half of the REMs said their installation had a building or energy monitor network, although one REM pointed out that this was linked into the energy program and wasn't set up to support the REM effort. There really were no "REM" teams. A couple of REMs said there was an energy management steering group for their organization that was valuable for supporting their efforts.

Recognize staff/employees who have made a significant contribution to the program: Less than half the REMs said there is a way to recognize staff or employees for their efforts to reduce energy or resource costs. Those that do typically take advantage of existing employee recognition programs within their organization. Recognition can include monetary rewards, prizes or other incentives. One REM said they can recognize an employee who can then receive several hundred dollars or pick from a set of products as a reward for their contribution.

Share dollar savings with staff and/or participating facilities as an incentive: Few REM programs have a mechanism to share dollar savings with participating staff or facilities. The mechanisms that were described included an incentive account that shared a percent of project savings with those who identified and developed the project, incentives to contractors responsible for building operations for reducing operating costs, and the reinvestment of savings into other projects at a particular facility.

We also asked REMs whether some portion of the dollar savings their programs achieve are allocated to help pay for the REM program. Most said in theory the savings from the REM program cover the costs, but they did not think there was a direct budget link between savings and cost. Some of the REMs noted that their REM program is paid for from the utility budget so that savings "accrue to the same account that pays for REM costs."

Summary of REM Practices

Most of the REMs said their programs were started to focus resources on reducing energy consumption and costs and meeting federal energy reduction goals. The majority of REMs interviewed serve at a specific military installation, but five were regional REMs, either coordinating REMs at multiple sites in a region or being directly responsible for multiple sites over fairly large areas.

The REMs rated their programs as successful or very successful and a third pointed out awards they had won. A key success identified by about half of the REMs was the development and implementation of energy projects along with arranging for project funding. Another key success highlighted by the REMs was their ability to work with key groups such as contractors, the engineering unit, or the energy manager to effectively manage resource use. A key factor for their success mentioned by almost two-thirds of the REMs was the support of customer staff members, managers, and commanding officers. In addition, many REMs pointed to their own experience as a key ingredient for success. The biggest challenge cited by REMs was working and dealing with

organization structures. Budget constraints were also a significant challenge for some REMs.

The REM programs tended to put the most emphasis on identifying, developing, and obtaining funding for energy efficiency projects. This included reporting on their activities and performance and tracking resource consumption, costs, and savings. There was less emphasis on energy awareness type activities, although these were important parts of some programs. The diversity of REM programs reflects differing client needs.

The majority of REMs expect their programs to continue because they are providing value and their clients are satisfied and supportive. For those REMs that were unsure, funding was the primary issue. A few REMs thought the nature of their work could change over time and, as they complete energy projects, there might be more emphasis on energy awareness or other activities. While one REM thought there might be a need for fewer REMs serving his particular installations another thought his installation could support up to four REMs.

REM Metrics

One of the key features of a REM program is that it is self funding. Many REM contracts have performance clauses stating that savings generated by the REM program should exceed costs. A key question is how to determine whether the value delivered by the REM exceeds the cost. In our interviews with federal agency staff members we heard some skepticism that savings from a REM program will offset the costs. This can be a barrier for hiring a REM. Savings can be difficult to measure and, because savings occur over time and other federal staff members are usually involved, it is not always clear how much of any savings can be attributed to the REM. In this section we consider how existing REMs report their performance, we discuss key issues, and we offer some guidance and recommendations.

The information in this section is based on our interviews with REMs and federal agency staff members, and on examples of REM reports provided by seven REMs. In considering this information, it is important to emphasize that there is not a “best” or “right” way to report REM performance. What is done should reflect the needs of the agency contracting for the REM. These needs can vary significantly. However, there are issues that should be considered and agreed upon to ensure the REM program provides the expected value.

REM Reports

Most REMs produce monthly reports documenting their activities and performance. A few REMs produce weekly reports. We ran across one REM that did not produce reports, but maintained a detailed database of their activities and projects that could be used by agency staff to produce the reports required by the agency. Many REMs were also responsible for producing various federal reports regarding energy and resource use and performance.

The content and detail of regular REM reports varied significantly, ranging from a page or two to 16 pages. The reports simply listed activities or used an agreed-upon format that corresponded to contract deliverables or services. The reporting categories reflected the types of services REMs typically deliver:

- Development of energy/resource strategy, guidelines, requirements
- Energy/resource accounting and analysis, rate analysis
- Energy audits and identification of savings opportunities
- Project analysis, development, and support
- Grants, incentives, and funding development
- Energy awareness and training activities
- Optional services

The specific categories used by each REM varied, reflecting the specific needs of their client. Some categories might not have any activities reported during a given period. REMs who listed activities for the month sometimes differentiated between current and on-going activities and noted future plans or key issues or problems.

The longer reports included tables of projects and estimates of savings. This does not mean the other REMs did not maintain this information; it just was not included in the monthly report. These tables listed projects/activities, status, and energy and cost savings. Some of the details provided in the tables were one-time, annual/on-going and cumulative savings; potential/tentative and identified/verified savings; project cost; payback; grants or rebates; and non-energy benefits. Note that these projects/activities included energy efficiency retrofit projects, low-cost/no-cost efficiency improvements that were operational in nature, utility rate analysis savings, and utility bill error savings.

Savings Analysis

The cost savings generated by REMs come in several different forms, including direct savings, direct income, energy and resource awareness activities and training, low cost/no cost efficiency projects, efficiency projects, and other value-added activities. The form of the activity and savings influence how the savings are determined and their certainty.

Direct Savings: Utility billing errors or savings from switching rate schedules are examples of direct savings. The savings are easy to calculate and have high certainty.

Direct Income: Efforts by the REM to obtain "other people's money" such as grants or utility rebates and incentives provide direct income to the client agency to make efficiency improvements. The income is easy to determine and has high certainty.

Energy and Resource Awareness/Training: The savings produced from energy and resource awareness activities and training are very difficult to measure because they are usually very small relative to overall resource consumption at a facility/installation. Savings from targeted activities may be evident in building meter data and can be estimated from a comparison of baseline consumption to consumption after awareness activities/training. Corrections can be made for differences in weather or building use. This type of saving estimate has a fair amount of uncertainty because changes in

energy/resource consumption due to differences in weather or building use are similar in magnitude to the change in use resulting from energy awareness activities/training. Because of this uncertainty, some REMs reported they took no savings credit for their energy awareness activities. Others reported they receive a fixed percentage of total energy use as the savings from their energy awareness activities. Values ranged from 5 percent to 0.1 percent of total consumption. The value selected should reflect how extensive energy awareness activities are and the level of participation from facility occupants.

Low Cost/No Cost Efficiency Projects: Low cost/no cost efficiency projects typically consist of turning off equipment that is not needed, adjusting temperature and control setpoints, and other operational type changes. Savings are difficult to directly measure because they are small relative to total facility consumption and are too small to justify direct metering. Engineering estimates for these types of measures are usually easy to make and the calculations are simple enough to explain to the client. While there is some uncertainty, if estimates are checked to be sure they are the correct magnitude, errors are not likely to be significant.

Efficiency Projects: Efficiency projects are likely to generate the largest savings. The feasibility analysis for a project will usually generate an engineering estimate of savings. Many REMs used engineering estimates for reporting savings from projects. Some effort should be made to verify the engineering estimate of savings using direct measurements before and after the efficiency measure is installed. A few REMs said they put meters on their energy projects or perform monitoring and verification of project performance when they can. ESPC and UESC projects will have some kind of verification plan to identify the savings achieved. The extent of monitoring and verification that is justified depends on the size of a project, its cost and its expected savings.

Other Value-Added Activities: REMs typically perform activities that provide value but do not produce energy or resource savings. Examples include helping to privatize utilities, conducting studies, producing reports, utility rate negotiation, and providing utility infrastructure support. These activities provide value. One REM reported they received credit for conducting a study the agency would otherwise have had to pay for. In general, the value of these types of activities was not accounted for in any quantitative way.

Discussion of Key Issues

There are several key issues that should be considered when reviewing how REMs report their performance: challenges measuring savings, activities that do not produce measurable savings, attribution of savings to the REM program, and pressure to produce short-term results.

Challenges Measuring Savings: Measuring savings from efficiency projects is often difficult because it is hard to control for a variety of factors like weather and facility use that can have a significant influence on energy/resource consumption. This is complicated by the fact that many large military installations have few utility or building

meters. If they have an energy management control system, it often only covers a small number of facilities. This lack of metering makes it difficult to make even relatively simple measurements of energy use and savings. As one REM noted, "A 10 percent change in one building is not a blip on the radar. It is like a drop of water in the ocean. You do not see it." Unless a project is large enough to justify installing short- or long-term metering, the ability of a REM to measure savings may be limited, leading to dependence on engineering estimates of savings. The recently passed Energy Policy Act requires that smart meters be installed at all federal buildings by September 2013, which will help rectify this situation. Many REMs are actively involved in the process of meeting this requirement at their facilities.

Savings That Cannot Be Measured: Many activities performed by REMs produce energy savings that are so small they cannot be easily measured, or they do not produce savings at all. If some credit is not given for these activities, it can be difficult to justify a REM program. Most REMs spend some of their time on these types of activities and some agencies may ask them to spend large portions of time on activities that do not generate savings. How savings or credit is determined for these activities should be specified in the REM contract. The cost of the REM that is going toward activities like privatizing utilities should be accounted for to get an accurate picture of whether REM program savings are offsetting costs.

Attribution of Savings: REMs work with agency staff to achieve savings and utilize agency resources. They may also work with other contractors or energy service companies to implement projects. Thus all the savings generated at a facility that has a REM program may not be attributable to the REM. Often REMs work fairly independently, generating direct savings and income as described above. This savings or income would not have occurred without the REM and so the savings and income can usually be attributed to the REM program. Efficiency projects can be less clear. For simple projects, the REM may identify the opportunity, define what needs to be done, and work with agency staff to implement the project. In this case, savings could be attributed to the REM program. For a large project, the REM may be helping an energy service company with development of an ESPC project. In this case the energy service company is doing a lot of the work and the project costs are being paid through energy savings. The REM program should get some credit for moving the project forward, but probably should not claim all the savings. One REM reported receiving credit for a portion of first-year energy cost savings for helping to facilitate an ESPC project that otherwise would have taken longer to implement.

The timing of savings is also important. Large efficiency projects may take several years to implement. The REM invests time up front to develop a project, but the savings may not occur for several years, assuming the agency decides to implement the project. Usually REMs identified savings from projects under development in their reports so they could take some credit for their work to develop those projects. This was described by one REM, "I can spend time identifying a project and doing the calculations. I list the potential savings and identified savings. There is a fine line if a project is not implemented—is it savings? But I did the work to get it to that point. They can decide

not to do it or sometimes it just takes time. I have to have it in the column of savings to justify my existence." However, it is important to differentiate between savings that have been achieved and savings from projects under development.

Projects also deliver savings over time. One federal agency contact indicated they only credit the REM program with the first-year cost savings from a project. Other REMs reported annual and cumulative savings. In some cases the REM may play a role in ensuring that projected savings from an efficiency project occurs. REM contracts with performance clauses need to clearly state how ongoing savings from an efficiency project are credited to the REM program.

Pressure to Produce Short-Term Results: Budget constraints and pressure to get quick savings can hamper the long-term sustainability of REM programs. REMs often have a steep learning curve to become familiar with an organization culture and how things work. They are faced with a variety of competing needs. They must balance the need to generate near-term savings with taking steps to reduce resource costs in the long-term. These later actions may not produce savings results for years, but they could ultimately have the greatest impact. Some REM programs put less emphasis on savings exceeding costs. These programs do establish clear goals and deliverables for the REM program that support the resource efficiency goals of the organization. So there is near-term accountability, but the goal is long-term success. Ultimately, if REM programs or REM-like activities are to become more common in the federal sector, the value of these activities needs to be expanded beyond the generation of short-term savings.

Guidance and Recommendations

The following guidance and recommendations offer suggestions on best practices for reporting the performance of REM programs. They reflect the information we collected during this assessment. However, it is important to recognize that the needs of each agency hiring a REM are different. One of the advantages of REM programs is their flexibility. Rigid reporting and performance requirements are likely to be time consuming and may limit the effectiveness of a REM program.

The REMs seemed to take fairly practical and straightforward approaches to documenting and determining savings from their efforts. What is most important is:

- Establishing clear expectations,
- Making sure reporting requirements respond to the expectations,
- Being clear on how savings are determined and what the REM program is given credit for,
- Keeping the approach for determining savings simple, flexible, and transparent, and
- Providing for basic review and validity checks of reported performance.

The following ideas present some of the things that should be considered when establishing the reporting requirements for a REM program.

- Produce regular reports. A cornerstone of a REM program is regularly documenting REM activities. At a minimum a REM should produce a monthly report highlighting how they are meeting the expectations of their contract. It may be helpful to match the reporting format to the services specified in the REM contract.
- Report different kinds of savings separately. The savings generated by REMs come in different forms. Savings should be reported separately for the different forms of savings described above: direct savings, direct income, low cost/no cost efficiency projects (proposed and completed), efficiency projects (proposed and completed), energy awareness/training, and other value-added activities. Some care should be taken in adding together these different types of savings because they may not be comparable. It may not be appropriate just to add everything together and do a cost-benefit calculation.
- Direct savings and income can be accounted for as they occur.
- Low cost/no cost efficiency project savings should be based on simple engineering estimates. There should be clear agreement whether the REM program is credited for just first-year savings.
- Efficiency projects under development can use engineering estimates to show potential savings. The REM program should receive some credit for potential savings they have helped identify.
- Efficiency projects that have been implemented should have some plan for verifying the engineering estimate of savings using some type of one-time, short-term or on-going measurement that is appropriate for the project. There should be clear agreement whether the REM program is given credit for just first-year savings or some portion depending on involvement of the REM.
- Energy awareness/training savings should be stipulated. Because savings from these activities are difficult to measure, a fixed savings amount or percentage should be specified if certain services are delivered or participation goals are met. We would not expect this amount to be more than a couple percent of consumption unless the awareness program is large and ongoing. A one-time event is likely to have limited ongoing impact.
- Some credit can be given to the REM program for value-added services that do not generate savings. This credit could be based on the cost avoided from hiring someone else to do the work or on the hours spent by the REM on the activity.

A report and savings analysis will not capture the overall value of a REM program and the experience a REM provides to a client, but this documentation is important for justifying the program. It is also important to recognize that the true benefit of a REM program emerges over time. Judging the success of a REM program on a few reports or even first-year performance may be selling the program short. Performance reporting shouldn't be used merely to justify a program's existence, but as an important tool for determining if the REM program is moving in the right direction and for making adjustments to ensure long-term program success.

REM Opportunities and Potential at Federal Facilities

We reviewed federal facility data to identify characteristics that are conducive for REMs. The sources of the agency data in this analysis are the *GSA Federal Real Property Profile* for September 2004 and *GSA Office of Real Property Summary Report* for FY2000 (fiscal year). The FY2000 summary includes data at the installation level – all installation-level analysis is based on FY2000 data. Energy data are from the *Department of Energy Annual Energy Report to Congress FY2003*. These data are supplemented with information collected in our interviews to determine the market potential for REM activities at federal sites and where the greatest potential exists.

Facility Characteristics

The federal government owned or leased over 3 billion square feet of buildings in the United States in 2004. Table 2 summarizes installation and area characteristics for agencies with more than 10 million square feet of facilities. The following points highlight the top agencies for each indicator in Table 2.

- Square feet: The Department of Defense agencies, GSA, and the U.S. Postal Service
- Number of installations: The Postal Service, U.S. Department of Transportation and U.S. Department of Interior
- Number of installations over one million square feet: The Department of Defense agencies, U.S. Department of Veteran Affairs, and GSA [Note: There are 568 federal installations greater than one million square feet]
- Total square feet of installations over 1 million square feet: Department of Defense agencies, Department of Energy, and Department of Veteran Affairs
- Buildings per installation: Department of Defense agencies, National Aeronautics and Space Administration (NASA), and Department of Energy
- Square feet per installation: NASA, Department of Defense agencies, Department of Veterans Affairs
- Square feet per building: GSA, Department of Veteran Affairs, Postal Service

Table 2. Installation and Area Characteristics

Agency	Total Square Feet (2004)	Number of U.S. Installations (2000)	Number of Installations over one million sq.ft. (2000)	Sq.ft. of Installations over one million sq.ft. (2000)	Bldgs/ Installation (2000)	Sq.ft./ Installation (2000)	Sq.ft./ Building (2000)
DOD							
-Army	698,193,705	1,119	129	705,502,365	115	682,004	5,921
-Air Force	593,335,073	1,066	108	542,945,775	88	565,839	6,430
-Navy	537,638,029	995	161	548,540,718	98	664,999	6,786
General Services Administration GSA	371,410,788	901	40	61,660,021	2	208,429	112,722
United States Postal Service USPS	270,650,138	10,697	13	20,820,211	1	20,438	18,770
Department of Veterans Affairs VA	149,304,106	306	47	64,046,769	15	448,164	29,936
Department of Energy DOE	126,676,568	491	23	109,961,760	31	253,888	8,251
Department of Justice DOJ	82,990,318	223	9	18,030,983	14	252,529	17,709
Department of the Interior DOI	68,022,675	2,017	3	6,513,594	17	36,371	2,157
Department of Agriculture USDA	62,104,546	1,140	1	2,439,851	18	32,572	1,846
National Aeronautics and Space Administration NASA	44,667,344	45	12	37,752,265	63	973,407	15,522
Department of Homeland Security DHS	40,963,860	NA	NA	NA	NA	NA	NA
Department of Health and Human Services HHS	32,818,306	181	3	11,091,494	14	116,606	8,345
Department of Transportation DOT	25,418,946	6,160	6	7,939,182	2	7,151	2,863
Department of Labor DOL	23,868,467	55	1	1,057,185	21	179,923	8,472
Corp of Engineers	16,268,710	580	1	3,028,888	19	28,831	1,543

The *Federal Real Property Profile* data distributes facility square footage into 12 types of facilities. In 2004, the largest share of federal square footage was for offices (25.5%), followed by housing (17.5%), service (14.2%), storage (12.0%), research and development (5.3%), school (4.9%), other institutional (4.3%), hospital (4.1%), industrial (3.6%), all other (3.5%), post office (3.3%), and prison (1.8%). Table 3 shows the percentage of square footage for different types of facilities by agency. The Department of Defense agencies have high proportions of housing and service facilities. GSA and the Postal Service have lots of office space. The Departments of Veterans Affairs has a high percentage of hospital space. The Department of Energy has a significant proportion of industrial and research and development facilities.

Table 3. Type of Building (2000 data)

Agency	Hsng. %	Office %	Srvc. %	Storage %	R&D %	School %	Hosp. %	Indust. %	Other Institutional %	Prison %	Post Office %	All Other %
DOD												
-Army	30.4	10.9	11.1	22.8	2.1	7.5	2.2	4.1	8.7	0.2	0.1	0.1
-Air Force	31.5	7.6	31.8	11.8	4.4	5.9	2.3	2.5	1.2	0.1	0.0	1.0
-Navy	33.9	7.8	25.9	14.2	4.5	6.0	1.6	2.0	0.8	0.0	0.0	3.2
General Services Administration GSA	0.0	90.2	0.0	8.6	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.1
United States Postal Service USPS	0.2	87.1	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	10.6	1.4
Department of Veterans Affairs VA	3.4	5.4	3.3	4.0	2.6	0.5	70.2	0.1	9.5	0.0	0.0	1.0
Department of Energy DOE	0.7	14.7	12.7	10.6	23.0	0.7	0.2	34.6	1.8	0.0	0.0	1.0
Department of Justice DOJ	2.0	1.0	0.2	1.6	0.0	0.1	0.2	5.4	0.2	87.2	0.0	2.1
Department of the Interior DOI	21.2	10.7	9.1	9.9	2.4	11.7	0.0	2.7	15.4	0.0	0.0	16.9
Department of Agriculture USDA	17.0	11.2	7.4	25.1	30.5	0.0	0.0	0.2	1.0	0.0	0.0	7.6
National Aeronautics and Space Administration NASA	0.7	18.0	13.9	8.6	43.4	2.0	0.2	12.0	0.0	0.0	0.0	1.2
Department of Homeland Security DHS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Department of Health and Human Services HHS	13.4	12.1	5.7	1.8	35.6	0.0	21.2	0.0	5.2	0.0	0.0	5.0
Department of Transportation DOT	28.7	7.3	23.1	8.9	4.6	3.3	0.1	0.3	1.4	0.0	0.0	22.3
Department of Labor DOL	26.2	7.9	1.5	7.9	0.0	34.1	1.7	0.0	9.0	0.0	0.0	11.8
Corp of Engineers	3.1	15.5	18.7	18.9	16.3	0.0	0.0	0.1	0.3	0.0	0.0	27.0

Energy Characteristics

In FY2003, federal agencies consumed 1,120,532 billion British Thermal Units (Btu) of energy at a cost of $9.6 billion. About 30 percent of this energy was consumed in buildings. Table 4 shows total and building agency energy consumption. The following points highlight the top agencies for the energy indicators shown.

- Total energy use: Department of Defense agencies, Postal Service, and Department of Energy
- Total energy for buildings: Department of Defense agencies, Department of Veteran Affairs, and Postal Service
- Building energy use per square feet: Department of Energy, Department of Justice, NASA
- Total energy for energy-intensive facilities: Department of Defense agencies, Department of Health and Human Services, and Department of Energy

Table 4. Energy Use

Agency	Total, Billion Btu	Bldg, Billion Btu	Btu/sqft	Energy Intensive, Billion Btu
DOD Total	904,356	204,435	101,522	28,615
-Army	NA	NA	NA	NA
-Air Force	NA	NA	NA	NA
-Navy	NA	NA	NA	NA
General Services Administration GSA	18,591	11,941	68,935	5,453
United States Postal Service USPS	42,606	23,969	67,882	0
Department of Veterans Affairs VA	29,645	28,471	185,853	0
Department of Energy DOE	30,701	16,992	238,434	7,404
Department of Justice DOJ	18,028	10,791	207,587	961
Department of the Interior DOI	7,559	4,408	79,816	0
Department of Agriculture USDA	7,217	2,631	64,147	2,209
National Aeronautics and Space Administration NASA	10,076	4,153	189,195	3,295
Department of Homeland Security DHS	18,335	4,616	118,642	93
Department of Health and Human Services HHS	8,660	237	87,500	7,843
Department of Transportation DOT	5,618	722	101,425	0
Department of Labor DOL	2,964	2,567	118,770	0
Corp of Engineers	NA	NA	NA	NA

Location

Resource Efficiency Managers can be most effective where there are high concentrations of facilities. This might include a large installation or a location where a number of installations are located near each other. There are concentrations of federal facilities in certain locations that may provide opportunities for REMs. Table 5 shows the distribution of federal facilities for the top ten states. California has more than twice as much facility square footage as any other state.

Table 5. Distribution of Federal Facility Square Feet by State (2000 data)

State	Total Sq.ft	Percent of Federal Facility Total Sq.Ft.
CA	416,495,934	14.0%
TX	206,364,846	6.9%
VA	151,977,779	5.1%
FL	112,133,693	3.8%
GA	111,905,838	3.8%
MD	111,784,796	3.8%
NY	107,530,114	3.6%
IL	87,854,619	3.0%
WA	86,842,594	2.9%
NC	86,375,461	2.9%

The concentration of facilities for individual agencies is similar to the concentration for all facilities (Table 6). California is one of the top five states for all of the largest federal agencies (in terms of square footage).

Table 6. Ranking of the Top States by Square Footage for the Largest Federal Agencies (2000 data)

Agency	CA	TX	VA	FL	GA	MD	NY	IL	PA	NM	NC
Air Force	1	2		3	5						
Army	2	1	4		3						
Navy	1		2	3							5
USPS	1	4					2	3	5		
GSA	2	4				3					
VA	2	3					1	4	5		
DOE	4									3	
DOI	2									3	
DOJ	4	1		5					3		

REMs might be able to focus their efforts on facilities in a smaller geographic area like a county. Table 7 shows the 12 counties with the highest concentrations of federal facilities. Four counties in Southern California are on this list and account for a little more than 6 percent of the total federal facility area. Texas has two top counties located in the southern portion of the state around Austin and San Antonio. Other top counties

are Honolulu and the District of Columbia. There are approximately 77 counties with more than 10 million square feet of federal facilities.

Table 7. Counties with the Largest Concentration of Federal Facilities by Square Feet

County	State	Total Sq.ft.	Percent of Federal Facility Total Sq.Ft.
San Diego	CA	86,988,857	2.96%
Honolulu	HI	73,702,986	2.51%
District of Columbia	DC	66,645,638	2.27%
Los Angeles	CA	39,350,191	1.34%
Bexar	TX	36,739,750	1.25%
Alameda	CA	33,923,472	1.15%
San Bernardino	CA	32,091,294	1.09%
Norfolk	VA	31,146,006	1.06%
Cumberland	NC	30,808,007	1.05%
Bell	TX	28,612,845	0.97%
Pierce	WA	27,821,978	0.95%
Montgomery	MD	24,835,851	0.84%

REM Potential in Federal Agencies

The agencies that show the most potential for Resource Efficiency Managers based on this preliminary analysis of facility data are the Department of Defense agencies (Air Force, Army, Navy), Department of Veteran Affairs, Department of Energy, General Services Administration, U.S. Postal Service, Department of Justice, and NASA. The facility characteristics we considered included energy use, energy intensity, facility area, size of installations, and facility type. The advantages and disadvantages of each agency are noted in the following points.

- DOD: The Department of Defense agencies (Army, Air Force, Navy) have the greatest facility area, energy use, number of installations, square feet per installation, and number of installations over one million square feet. However, a significant portion (two-thirds) of floor space consists of housing, service, and storage, which tend to be less energy intensive facilities with fewer savings opportunities. These types of facilities contribute to the lower building energy intensity for DOD facilities relative to some other federal agencies. DOD installations also tend to have large numbers of buildings resulting in a relatively low average building size. The Department of Defense agencies currently have almost all the active federal REMs and are expanding their REM programs.
- VA: The Department of Veteran Affairs has several characteristics that may make it one of the more attractive non-DOD agencies for REM activities. Among the non-DOD agencies it has the highest energy use for buildings, number of installations over one million square feet, the second highest square footage per installation and third highest per building, and one of the highest building energy intensities. Energy-intensive hospitals account for 70 percent of the total square footage. Hospitals have critical operations requirements and operate 24 hours per

day. These facilities will present some additional opportunities and challenges for REMs. To date, we are not aware of any REM activities at VA facilities.

- USPS: The Postal Service has the highest total energy use of any non-DOD agency and the second highest energy use in buildings. It also has the largest number of installations of any federal agency. However, while it has over 300 installations over 100,000 square feet, it only has 13 over one million square feet. Most of its installations are only one building and average about 20,000 square feet. Postal facilities also have one of the lowest energy intensities among federal facilities. The relatively similar nature of most of its facilities, which are offices/post offices, suggests that REMs may be able to serve multiple facilities. We understand the U.S. Postal Service has tried a REM in Florida and in California.
- GSA: The General Services Administration has the largest average building size among federal agencies at a little over 100,000 square feet. It also has 40 installations over one million square feet. Most GSA installations consist of just one or two buildings, suggesting that REMs might be located where they could serve more than one facility. About 90 percent of GSA facilities are offices, which can be a good fit for REM activities even though they tend to be less energy intensive than other federal facilities. GSA also has the highest portion of leased facilities, which account for more than 40 percent of total floor space; and it leases much of its space to other federal agencies. This could introduce challenges for a REM. Currently there is one regional REM serving in GSA facilities.
- DOE: The Department of Energy has the highest building energy intensity among federal facilities. About a third of its facilities are classified as industrial and a quarter as research and development. Among non-DOD agencies it has the highest facility area in installations over 1 million square feet. Over 80 percent of DOE's facility area is contained in 23 major installations. This concentration of facilities is favorable for REM activities, but the nature of research and industrial-type activities at DOE facilities might limit opportunities for savings. We believe DOE has tried using a REM at one of their facilities, but we are not aware of any REMs currently serving DOE facilities.
- DOJ: The Department of Justice has the second highest building energy intensity among federal facilities. Almost 90 percent of the floor area consists of prisons. These are energy-intensive facilities, but security issues could limit energy saving opportunities for a REM. While the DOJ has only nine installations over a million square feet, the similar nature of the facilities might allow a REM to implement the same types of actions at multiple facilities. We are not aware of any REMs serving DOJ facilities.
- NASA: The National Aeronautics and Space Administration has less total facility area than the federal agencies noted above, but most of this area is concentrated in 12 installations. This concentration of facilities, along with NASA's relatively high building energy intensity, may provide savings opportunities for a REM. However, over half of the facilities are used for research and development and

industrial purposes, which may limit savings opportunities. We are not aware of any REMs serving NASA facilities.

We asked federal staff members in our interviews about opportunities for REMs at federal agencies. Department of Defense, Veterans Affairs, the General Services Administration and the Department of Energy were most commonly mentioned as having the most potential. However, most people we talked to did not have an opinion about the potential for REMs at particular agencies. Some felt there could be opportunities in most federal agencies. While the potential is greatest at large installations, a few people we talked to said smaller agencies with multiple sites should not be ignored. If there is an annual energy bill of several million dollars for multiple sites, a REM can have an impact. Many of the non-DOD agency staff members said they were unlikely to hire a REM because they preferred to use in-house staff to manage energy and resource use. The need for REMs can also vary across an agency. Some regions or installations within an agency may have very capable and effective energy managers while others may be lacking this capability. So it can be difficult to talk in general terms about the potential for REMs at federal agencies. Ultimately it depends on whether there is a need for energy or resource management capability and if the agency is interested in hiring a REM for this work.

While many REMs serve at a particular installation or site, there are a growing number of regional REMs that serve multiple sites for an agency over a large geographic area. This approach expands the potential opportunities for federal REMs. A REM could be located where federal facilities are concentrated, serving facilities for a particular agency or multiple agencies in a specific geographic location. California has the most federal facilities, followed by Texas and Virginia. San Diego, Honolulu, and the District of Columbia are the counties with the highest concentration of federal facilities.

What is the potential for REMs at federal facilities? This is a difficult question to answer, but we offer the following simple analysis for making a ballpark estimate. There are several ways to look at this. Focusing on the largest facilities, there are about 570 federal installations greater than one million square feet, representing more than two-thirds of all federal building area. There are about 140 installations over five million square feet, representing about 40 percent of federal building area. Thirteen of these installations currently have a REM and one other had a REM. Focusing on geographic concentration, there are 77 counties with more than 10 million square feet of federal facilities, representing just over half of all federal building area. These metrics suggest there is potential for REM or REM-like approaches at facilities representing at least half of all federal square footage. If we assume 5 million square feet per REM, this would suggest the potential for more than 300 REMs. This gives an order of magnitude estimate. Different assumptions will give different estimates, but we think it is reasonable to estimate the potential for 200 to 400 REMs at federal installations. Because some agencies will choose to use in-house staff to carry out REM-like functions, the actual potential for contracted REMs may be less.

Key Findings and Recommendations

The first REM in the federal sector was established at Fort Lewis in 1996. Today there are more than 60 REMs serving federal facilities in the U.S. and abroad. REM programs have been successful, in some cases achieving savings eight to ten times greater than costs. This success was reflected in the comments we received in our interviews and the growth in federal REMs over the last ten years. Our preliminary analysis estimates there is potential for 200 to 400 REMs at federal installations. Because some agencies will choose to use in-house staff to carry out REM-like functions, the actual potential for contracted REMs may be less.

A fundamental question that has been raised in this assessment is not only how REM programs can be expanded in the federal sector to achieve their potential, but how they can be sustained. While REM programs have been slowly expanding at DOD agencies, there is little evidence this will occur within non-DOD agencies and budget constraints are limiting expansion at DOD facilities. Budget constraints also contribute to uncertainty about how long REM programs will be sustained. Our key findings and recommendations respond to these questions.

- **Finding:** REMs have been most successful at Department of Defense (DOD) sites. DOD agencies are expanding their REM activities. There seems to be a relatively high awareness of the benefits of REMs within the DOD.
  Recommendation: Identify key supporters within DOD who can help build on current successes to further expand DOD REM activities. Partner with these supporters to develop new REM programs at targeted DOD sites.

- **Finding:** Availability of start-up funding is a key factor limiting the continued expansion of REM programs. Agencies often do not have the budget needed to get a REM program started. Once the program is started and begins to generate savings, it becomes easier to justify the program.
  Recommendation: Identify sources of start-up funding for REM programs. Utilities may be a good source of funds to support program start up. There are a few utilities that have provided guarantees covering any first-year REM costs that exceed the cost savings generated by the program. Another option would be to establish federal funding for the first year of a REM program and require the local facility/installation to cover the costs of the second and third program years.

- **Finding:** Strained federal agency budgets threaten the continuity of existing REM programs. Many REM programs are renewed on an annual basis and most compete for funds with other critical needs. Even though REM programs generate savings, lack of available budget can threaten their renewal. Without sustainable funding sources, the long-term future of REM programs is uncertain.
  Recommendation: Consider sustainable funding mechanisms for REM programs. For example, the REM program could be paid through a surcharge on utility bills. In theory, energy savings generated by the program would keep utility bills below their previous levels. This approach could also help with start-up funding.

- **Finding:** We are aware of only two acting REMs at non-DOD agencies. Awareness of REM benefits seems limited at non-DOD agencies. Our interviews suggest these agencies are inclined to rely on in-house staff rather than contracting for a REM. Our interviews and analysis also suggest that some of these agencies could benefit from hiring REMs or adopting REM-like practices.
  Recommendation: Learn more about the opportunities at non-DOD agencies for contracted REMs to support in-house staff or in-house staff to adopt REM-like practices. Identify ways to encourage REM activities at non-DOD agencies.

- **Finding:** The primary motivation for hiring a REM is to provide dedicated resources focused on energy and resource management that are not otherwise available (often due to budget and staff cuts). The REM program produces reductions in energy consumption and costs and helps meet federal energy reduction goals.
  Recommendation: Promote how REMs can provide dedicated resources to help federal agencies reduce resource costs and meet federal energy reduction goals. This can be a valuable tool for agencies that do not have adequate staff resources to effectively manage their energy and other resource consumption.

- **Finding:** REMs and federal staff members involved with REM programs identified a wide range of key successes. Developing and implementing energy projects along with arranging for project funding was a primary success. The variety of "successes" mentioned highlights one of the most important strengths of REM programs – the ability to adapt to client needs.
  Recommendation: Promote the flexibility and adaptability of REM programs and their responsiveness to client needs.

- **Finding:** Federal staff members and REMs cited two key factors contributing to the success of a REM program. One was the support of customer staff, managers, and commanding officers, and the other was the experience and capability of the REM. REMs received support from fellow REMs and the firms they work for.
  Recommendation: Consider opportunities for working with REMs and the firms they work for to further enhance REM capabilities. This might include the development of on-line resources and training tools and networks of REMs.

- **Finding**: The firms providing REM services to federal agencies have at times had difficulty finding qualified candidates to fill REM positions. Since the experience and capability of the REM is a key for success, the pool of REM candidates needs to be expanded to meet any growth in demand for REMs.
  Recommendation: Work with firms providing REM services to identify, develop, and bring capable professionals into the REM field. Promotion, resources, training tools, and certification programs are potential ways to expand the pool of REM candidates.

- **Finding:** The REM programs tended to put the most emphasis on identifying, developing, and obtaining funding for energy efficiency projects. Some programs,

particularly those that had been in existence the longest, had strong energy awareness components.
Recommendation: Provide opportunities to share REM program best practices at conferences, through REM networks, and on-line, particularly in the area of energy awareness and education.

- **Finding:** One of the strengths of REM programs is the regular reporting and documentation of their activities and savings generated. This is part of the performance requirements or deliverables specified in their contracts. The REMs took practical and straightforward approaches to documenting and determining savings from their efforts. However, savings and costs come in many different forms and it is not simply a matter of adding them together to see if savings exceed costs. What we found to be most important for performance reporting is:
  - establishing clear expectations,
  - making sure reporting requirements respond to the expectations,
  - being clear on how savings are determined and what the REM program is given credit for,
  - keeping the approach for determining savings simple, flexible, and transparent, and
  - providing for basic review and validity checks of reported performance.

  Recommendation: Sharing how REMS account for savings and developing more consistent approaches could improve the value and effectiveness of REM performance reporting and could help promote wider adoption of REM programs in the federal sector.

- **Finding:** The REMs provide value in many ways that cannot be quantified in savings. In addition, we found that the emphasis on generating short-term savings can detract from efforts that generate long-term results.
  Recommendation: There is a need to expand the definition of how a REM provides value and how this is accounted for. REM programs should balance the need to generate short-term savings with taking the necessary steps to obtain long-term efficiency and lower costs. Resource efficiency takes a long-term commitment. While REMs can generate short-term savings to cover REM program costs, this is a drop in the bucket for installations that have multi-million dollar utility budgets. Consideration needs to be given to the opportunity that exists and the multi-year commitment that is needed to capture those savings.

- **Finding:** The Energy Policy Act of 2005 (EPACT2005) sets new requirements for federal agencies, including a 2 percent yearly energy reduction goal, new building performance goals, and the installation of smart meters at all buildings. Existing REMs are already taking steps to help their organizations meet these goals. REMs could play a valuable role helping other federal agencies strengthen their energy management efforts to meet the EPACT2005 requirements.
  Recommendation: The federal government needs to consider what role REM programs can play in meeting the EPACT2005 goals for federal agencies and how this can be supported. For the market to make REMs available in adequate numbers,

there need to be clear signals that there will be demand from the federal sector. If agencies prefer to use in-house staff to perform REM-like activities, consideration should be given to how to further expand and train these federal employees.

REM programs have been successful at federal agencies, particularly DOD installations. In this assessment we have reviewed successes, best practices, and opportunities, as well as challenges and uncertainties for federal REM programs. We believe there is potential for the expansion of REM programs or REM-like activities at federal agencies. Our findings and recommendations suggest that to build on current success and achieve the potential REMs can provide in the federal sector, mechanisms need to be in place to support the long-term sustainability of federal REM activities. These include sustainable funding, outreach and promotion (particularly to non-DOD agencies), on-line resources and training tools, and REM networks to facilitate the sharing of experience and information.