

How effective are ESPCs at integrating innovative water measures?

The Department of Energy's (DOE) Federal Energy Management Program (FEMP) administers energy savings performance contracts (ESPCs). These contracts form a partnership between energy service companies (ESCOs) and federal agencies to implement energy and water efficiency measures with guaranteed savings. As of 2014, DOE ESPC projects represent over \$3 billion in total investment. In 2014, FEMP tasked Pacific Northwest National Laboratory (PNNL) to investigate how effective DOE ESPCs are at integrating innovative water-efficiency measures and identify ways to improve the process. The research determined that only 3% of the total investment was dedicated to water-efficient measures. Of this 3%, nearly half of the water measures were exclusively plumbing fixtures retrofits (toilets, urinals, faucets, and showerheads).

Even though plumbing retrofits were the majority of the water measures, these measures had a relatively long average simple payback of 14 years. Other water-efficiency measures had shorter simple paybacks. For example, optimizing water processes such as increasing the efficiency of reverse osmosis systems had an average payback of less than 3 years.

While plumbing fixtures upgrades are an important component of improving water efficiency, there are a variety of other water measures that can have a significant impact on water reduction, such as

cooling tower water management, water-efficient irrigation, and water-efficient commercial kitchen equipment. But the PNNL study found that ESPCs rarely bundle these types of more innovative measures into ESPC projects, revealing a significant missed opportunity.

The assessment included a gap analysis that assessed each major phase of the ESPC process to better understand why so few innovative water measures are included in ESPCs and to determine the related impacts.

Phase 1: Project Planning

- **Gap:** Agencies receive limited guidance on how to specify water efficiency in the notice of opportunity (NOO) and request for proposal (RFP) processes
- **Impact:** Agencies without specific water-efficiency expertise will likely miss the opportunity to integrate water

projects into their ESPC at the beginning of the contract

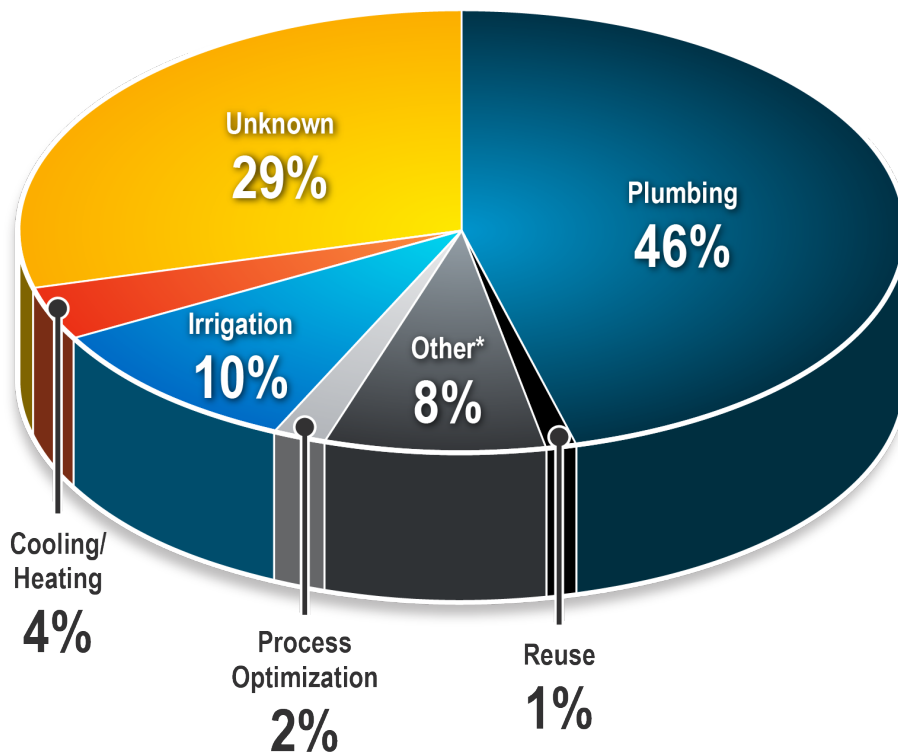
Phase 2: ESCO Selection

- **Gap:**
 - o Water expertise is typically not required in the ESCO selection
 - o No specific information on water expertise is required by the ESCO in their technical approach document
- **Impact:** Water expertise is unlikely unless it is specified by the agency

Phase 3: Negotiations and Award

- **Gap:** Water baseline and balance development is not typically required as part of the investment grade audit

Water Measure Type Breakout



*"Other" category includes leak repair, meters, kitchen, and sewer system upgrades

- **Impact:** The largest water users are not identified to help target innovative and cost-effective water-efficiency measures that will make a big impact in total site-level water reduction

Phase 4: Measurement and Verification (M&V)

- **Gap:** Lack of end-use metering and no specific guidelines for determining water use make M&V challenging
- **Impact:** ESCOs may be reluctant to implement innovative water measures without clear M&V protocols

Other findings of the assessment offered interesting insights on why there are missed opportunities in integrating innovative water measures into ESPCs:

- If water efficiency is not well understood by the ESCO, there is a perception that innovative water measures will increase their risk; ESCOs are risk adverse because of guaranteed savings requirement
- The agency site-level contact drives the level of technology innovation; if there is no site-level champion to drive water efficiency, then typically only plumbing fixtures are implemented
- Agencies need support to understand proven water technologies and are not getting adequate information on water efficiency
- There are limited water related technologies included in FEMP’s Technology Deployment program, which is used by agencies when selecting measures for ESPCs
- ESCOs do not currently have an incentive or requirement to hire water experts
- A comprehensive approach to water at the system level is not well understood, which can result in inferior design

Water Measure Type	Count of Projects	Average of Simple Payback
Process Optimization	5	2.7
Cooling/Heating	9	4.5
Irrigation	19	10
Unknown	57	11.1
Plumbing	90	13.7
Other*	15	16.1
Reuse	2	22.5

*“Other” category includes leak repair, meters, kitchen, and sewer system upgrades

Recommendations

Recommendations were identified as a result of these findings to help FEMP better incorporate innovative water measures into ESPCs:

- **Tools:** Develop a screening tool and specifications to help agencies identify the potential for effective water projects at the beginning of the contracting process
- **Education:** Educate agencies and project facilitators in comprehensive water management strategies
- **Technologies:** Add water-efficient technologies to the FEMP technology matrix
- **Contracting support:**
 - o Standardize the NOO and RFP process to include water-efficiency elements
 - o Require water expertise by ESCO or selected subcontractors
- **Certification:** Support personnel to attain water certification to identify qualifications and provide certification for water expertise (similar to

the Association of Energy Engineer’s Certified Energy Managers program)

- **Data management:** Improve ESPC data tracking of water measures by having distinct water measure categories (plumbing, irrigation, cooling, process, etc.)

Next Steps

In 2015, FEMP has utilized the results of the PNNL study to initiate improvements to the ESPC process including the development of:

- Water project screening tool to provide the overall potential for effective water-efficiency measures by major water end-use category to help agencies specify water efficiency at the beginning of the ESPC process
- Integration of specific water-efficiency components into the NOO template that allow the agency to choose specific water-efficient technologies in the NOO
- Future addition of water-efficient technologies recommended for deployment.
- Inclusion of water-efficient technologies in a FEMP webinar on underutilized technologies in ESPCs ■