

## 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

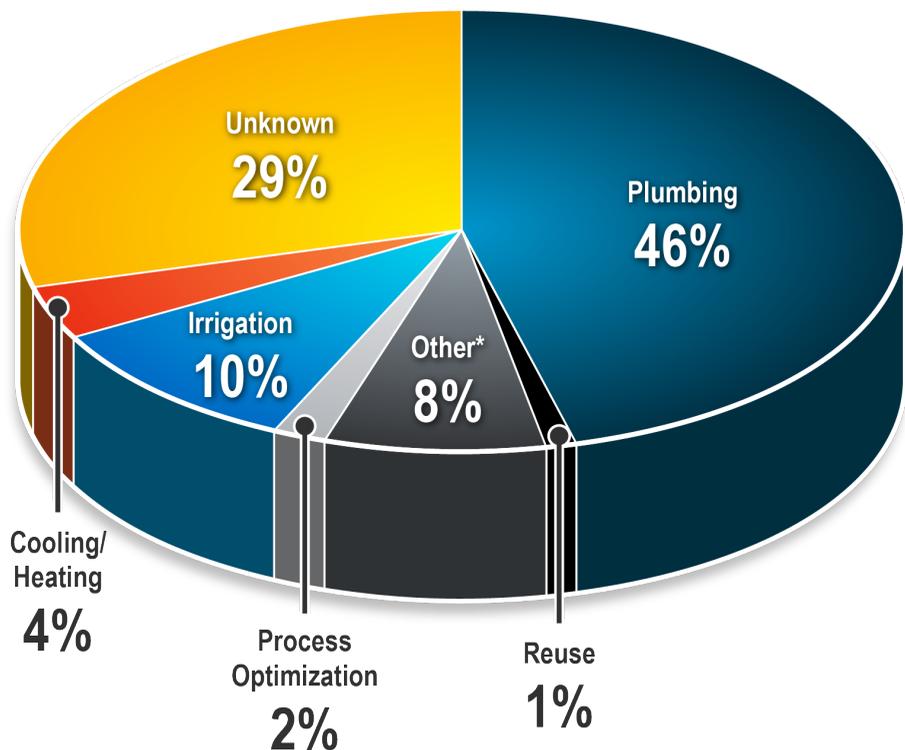
### Phase 2: ESCO Selection

- **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 ■