



U.S. DEPARTMENT
of ENERGY

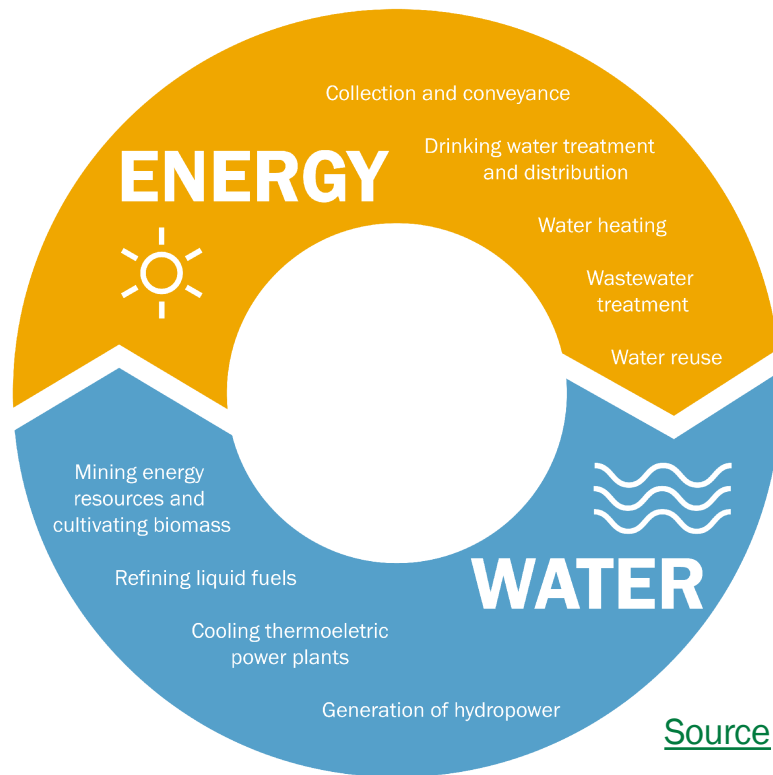
Modernizing Water Infrastructure with ESPC: Solutions for the Water-Energy Nexus

April 14, 2026

A copy of the slides from today's presentation will be provided to you for reference.



Agenda

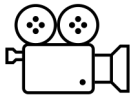


- 1) About ESPC
- 2) Water-Energy Nexus
- 3) How can ESPC account for this Nexus through projects?
- 4) Case Studies
- 5) Campaign Wrap Up

Virtual Housekeeping



Drop your questions in the Q&A box



A recording of this training will be posted online

Introductions

Speakers



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Speaker Bios

- **Chris Halpin** is the President of Celtic Energy, PLLC, based in Las Vegas, Nevada. He provides advisory services to organizations including ESC, the U.S. Department of Energy, Lawrence Berkeley National Laboratory, several universities, and other MUSH market clients. Chris has more than 40 years of experience in the energy efficiency industry and previously founded and led an ESPC Owner's Representative firm for over 18 years, overseeing more than \$2.5 billion in Energy Savings Performance Contract (ESPC) projects. He holds a B.S. in Mechanical Engineering, is a registered Professional Engineer in Nevada and Connecticut, and is certified by the Association of Energy Engineers as a Certified Energy Manager (CEM) and Certified Measurement & Verification Professional (CMVP). Chris is also a U.S. DOE FEMP-certified Project Facilitator and a nationally recognized speaker on ESPC, EaaS, CPACE, PPAs, and other energy industry topics.
- **Jamie Garrett** is the Founder and Owner of Trellis-Strategy, a company specializing in education and business strategy for Energy Savings Performance Contracting (ESPC) and clean energy solutions. Through Trellis-Strategy, Jamie advances investment in energy efficiency and infrastructure modernization. Jamie leads national efforts focused on coordination, communications, and strategic partnerships. Her work includes strategy development, technical assistance, and client-facing support for performance-based energy projects, helping organizations navigate complex ecosystems while accelerating implementation of high-impact solutions. Jamie brings a collaborative, market-informed approach to expanding ESPC adoption and supporting scalable clean energy investment nationwide.

About ESC



The Energy Services Coalition (ESC) is a national nonprofit organization composed of a network of experts from a wide range of organizations working together at the state and local level to increase energy efficiency and building upgrades through **E**nergy **S**avings **P**erformance **C**ontracting.

Local chapters; public and private sector individuals coming together to provide outreach and education.

Energy Savings Performance Contracting (ESPC)

ESPC

“ESPC is a financial mechanism used to pay for today’s facility upgrades with tomorrow's energy savings – without tapping your organization’s capital budget. Done properly, it has the performance of a hedge fund, with the risk of a T-bill.”

- Chris Halpin

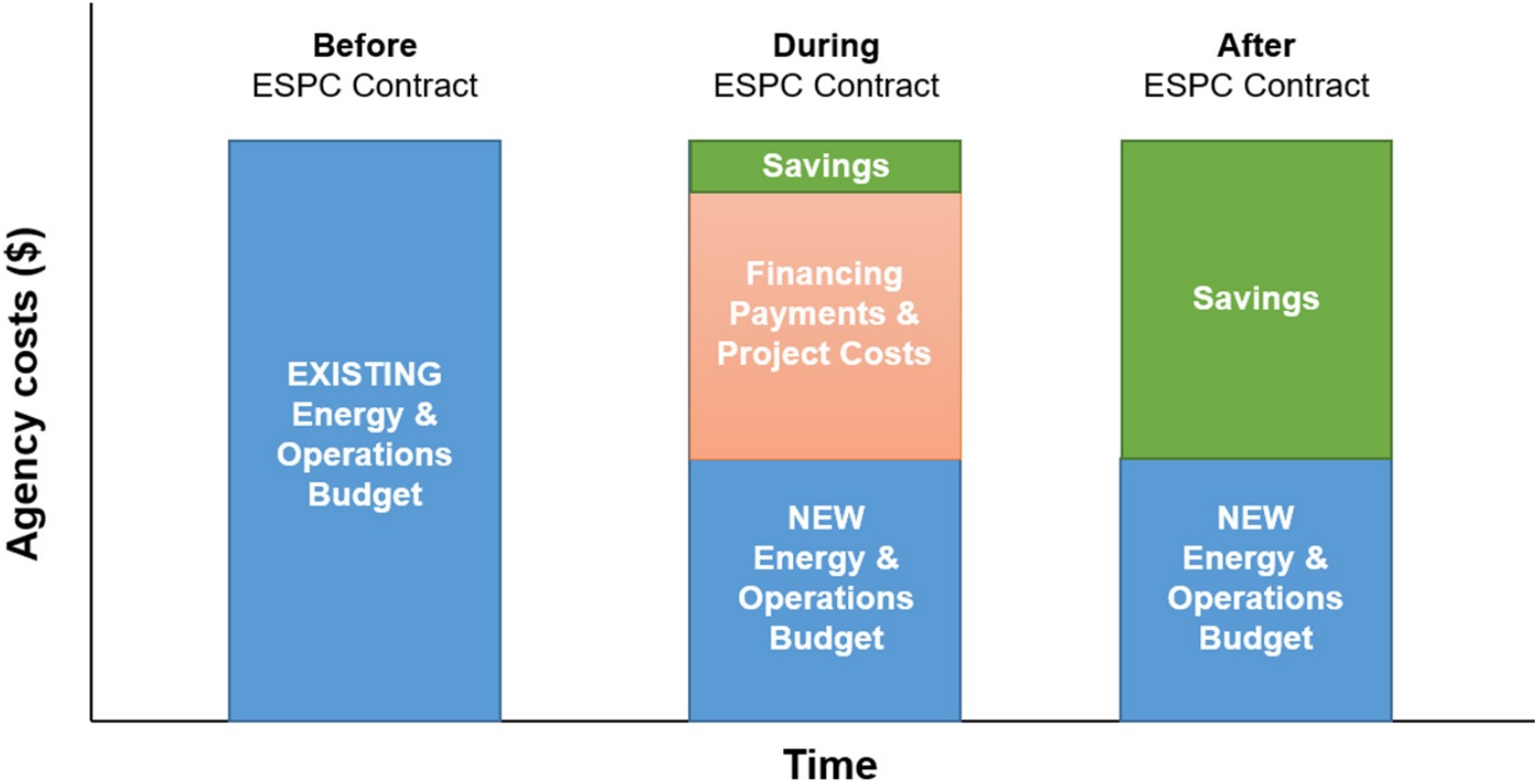
ESPC is “the use of **guaranteed savings** from the maintenance and operations budget (utilities) as capital to make needed upgrades and modernizations to your building environmental systems, financed over a specified period of time.”

- United States Department of Energy – 1999

A version of **design-build** contracting, with a focus on guaranteed energy savings.

What is ESPC?

Budget Cost Neutral



Roots of Energy Savings Performance Contracting (ESPC)

ESPC projects emerged in the late 1970s–1980s in response to energy crises and aging public infrastructure to help overcome barriers for Public Agencies:

- Long procurement cycles
- Strict budgets
- Conservative fiscal cultures
- Risk Aversion

(Source: DOE Better Buildings Solution Center)

Benefits

Budget-Friendly Modernization:

Enables upgrades without new taxes or bond measures.

Job Creation:

Drives demand for skilled trades and technical jobs.

Guaranteed Results:

ESCOs assume performance risk through contractual savings guarantees.

Resilience:

Improves community resilience to climate impacts like power outages, floods, etc.

Operational Efficiency:

Reduces long-term costs, freeing up funds for core services and educational mission.

Improved Environments:

Enhances comfort, safety, and productivity, lowers emissions.

ESPC: A Resilient Model Over Time and Through Change

ESPC has proven resilient across:

- Fluctuating federal/state funding
- Political transitions
- Economic downturns

It has Bipartisan Appeal:

- Privately financed (does not require taxpayer dollars)
- Adopted in both red and blue states
- Supports local economies by engaging contractors and suppliers.
- Ensures transparency through rigorous Measurement & Verification (M&V)
- Reduces operating costs for public sector organizations with over-burdened budgets

Result:

- Over \$30 billion in cost-effective upgrades financed through ESPCs across 45 states. [Source](#)

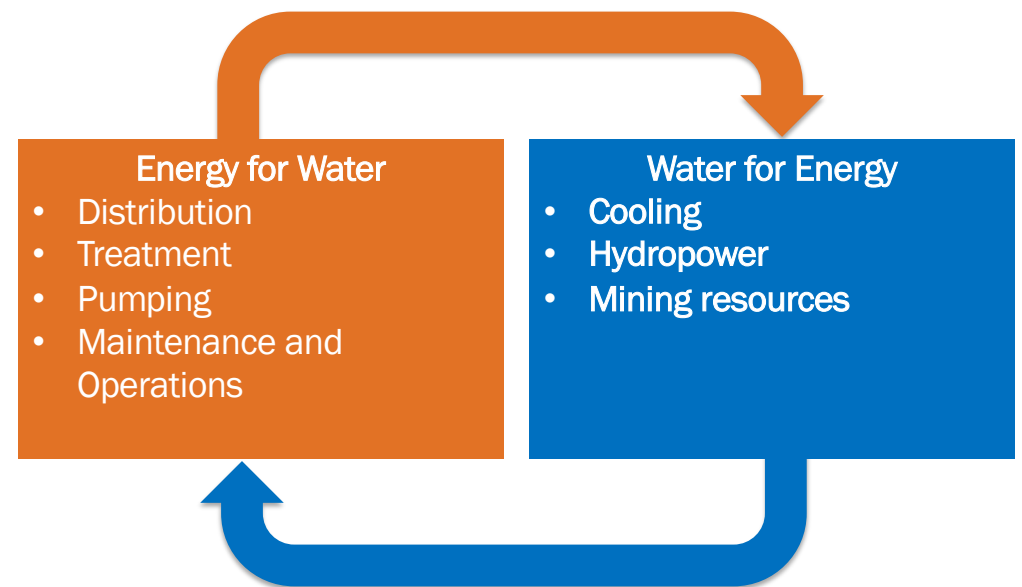
ESPC's budget-neutral structure and measurable results make it a politically neutral and fiscally responsible approach.



Water Energy Nexus

Water-Energy Nexus

- Energy systems depend on water
- Water systems are highly energy-intensive
- Water availability can directly impact energy system reliability
- **Saving water means saving energy**



Understanding the Water-Energy Nexus

Energy for Water

- Water treatment accounts for **1.8–5.4% of global electricity demand**
- U.S. water systems consume **~2% of national energy (45M tons CO₂/year)**
- Municipal facilities: water systems can represent **30–40% of total energy use**
- **Pumping is the largest driver**, accounting for **70–90% of energy use**
- Irrigation requires **significant energy** for pumping, transport, and pressurization



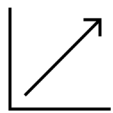
Water for Energy Generation

Cooling towers are a primary way water is used in energy generation

- Thermoelectric power plants rely on water for cooling and steam cycles
- Power generation accounts for **~40% of U.S. freshwater withdrawals**
- Hydropower



Why this matters today more than ever



Rapidly rising new demand: Development is stressing water resources. U.S. data center water use is projected to grow. U.S. data centers used **17.4 billion gallons of water in 2023**, projected to reach **38–73 billion gallons by 2028**.



Food systems dominate water use: Our population is growing, and there are more mouths to feed. Agriculture accounts for ~70% of global freshwater withdrawals, linking water availability directly to energy use for irrigation, processing, and transport.



Extreme imbalance across the U.S.: Some regions face chronic drought (e.g., Southwest), while others experience flooding and water surplus conditions, creating infrastructure strain in both directions.

[Hyper scaled data centers consume 3-5 MGD of water, just for cooling!](#)¹

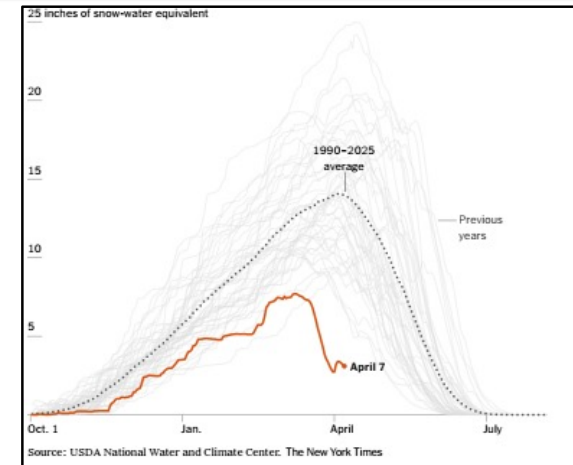
Too Little and Too Much

Southwest USA

Rising water costs and drought pressures are increasing operational and financial risk.

In parts of the southern [Colorado River Basin](#), a 250,000-square-mile watershed spanning seven states in the southwest, snowpack is lowest on record.

Courtesy : CU Boulder Today "[Winter never came to Colorado. What does it mean for water supplies?](#)"



Southeast USA

Flooding in the Southeast severely impacts energy infrastructure by inundating power plants, substations, and transmission lines, causing widespread blackouts and reducing generation capacity [Source](#)

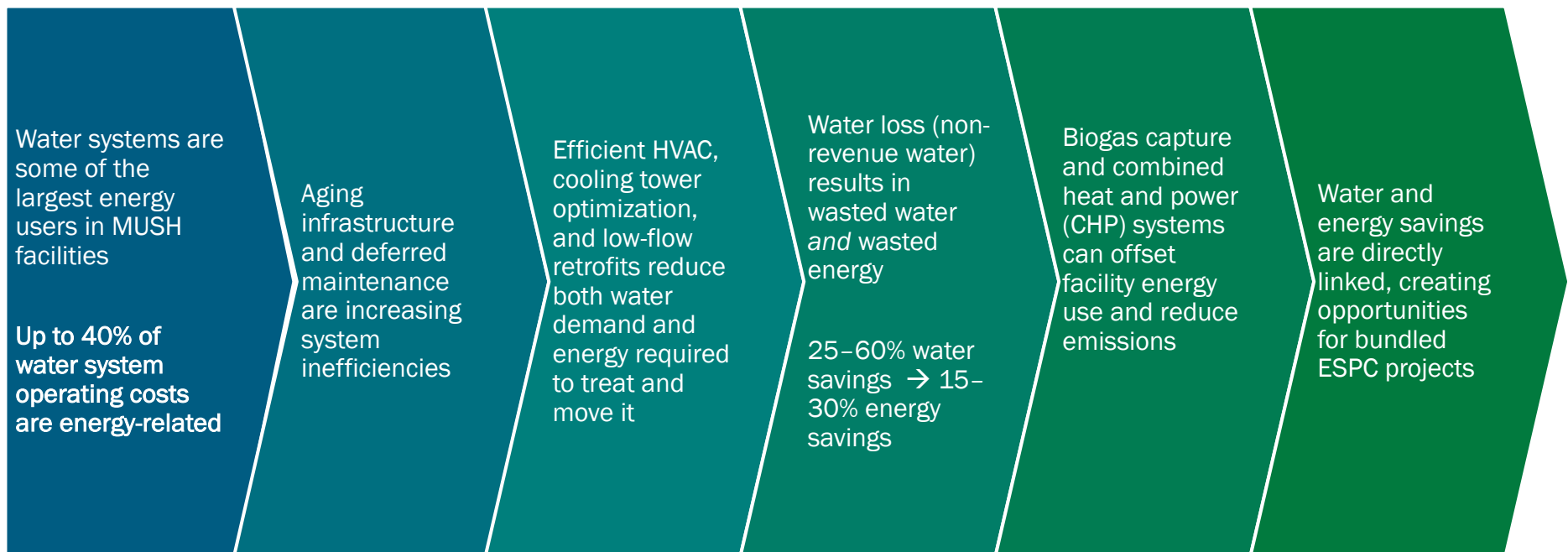
By 2050, Southeast coastal communities are expected to face 55 to 85 high-tide flooding days per year. (NOAA)



How can ESPC address the Water Energy Nexus

How can ESPC can support MUSH agencies along the Nexus?

ESPCs don't solve regional water scarcity, but they are one of the most practical tools MUSH entities have to **reduce the energy intensity of water systems and improve local resilience.**



So, when it comes to water... When you have too little, conserve. And put what you have to beneficial use!

[Source](#)

Measurement & Verification for Water Conservation Measures

Performance contracting relies on guaranteed savings. How does water fit in?

Cost savings in ESPC water meter replacement projects are determined by calculating the sum of increased revenue from improved meter accuracy, reduced water loss (leaks), and significantly lower operational and maintenance (O&M) costs, such as eliminating manual reading labor.

And water rates are significantly increasing

Owners and ESCOs must be careful not to too be overly aggressive in expected cost reductions.

IPMVP (Option A & B)

Option A ("Retrofit Isolation: Key Parameter Measurement") is often the most appropriate and cost-effective for water projects, using measured key parameters alongside stipulated values.

Option B ("Retrofit Isolation: All Parameter Measurement") is suitable for constant monitoring.

FEMP M&V Guidelines (Version 5.0)

This is the gold standard for federal projects and commonly used by states.

It provides specific procedures for water conservation, operations and maintenance, and cogeneration projects.

...But even if no attributable savings, direct energy and operational savings “bundle” as part of the full project to pay for water conservation improvements.

If you are a K-12 school or in Higher Education

- Irrigation controls for athletic fields
- Low-flow fixtures and plumbing upgrades
- Leak detection and submetering
- HVAC optimization
- ESPC can bundle water + energy upgrades into one project

Schools can scale impact across campuses



If you are a City or County



- Advanced metering infrastructure (AMI) and leak detection
- Pumping optimization (VFDs)
- Weather-based, EPA WaterSense labeled “[Smart Irrigation](#)” controls for parks and public spaces
- Wastewater treatment plant (WWTP) upgrades

ESPC enables large-scale infrastructure modernization

If you are a University or Hospital

- Cooling tower optimization
- Process water efficiency improvements
- Central plant upgrades
- Water reuse opportunities

High energy savings potential makes these strong ESPC candidates

[EPA's Water Saving Tips for Hospitals](#)



If you are a Water or Wastewater Agency



- Upgrade pumps, air compressors, motors, and controls (VFDs, smart sequencing, SCADA)
- Optimize aeration systems in wastewater treatment
- Fix leaks and reduce non-revenue water (less water treated = less energy used)
- Biogas utilization

U.S. DOE Guide: ESPC for Water Resource Recovery Facilities

”In recent years, a growing number of utilities responsible for cleaning wastewater have been moving from a strict focus on wastewater treatment to an integrated focus on water resource management, some formally renaming themselves water resource recovery facilities (WRRFs)”

With an estimated capital improvement need of \$271 billion over the next 25 years —combined with general industry concerns about energy supply reliability, resiliency, and sustainability— **many WRRFs are considering alternative project delivery methods.**

Published in March 2018

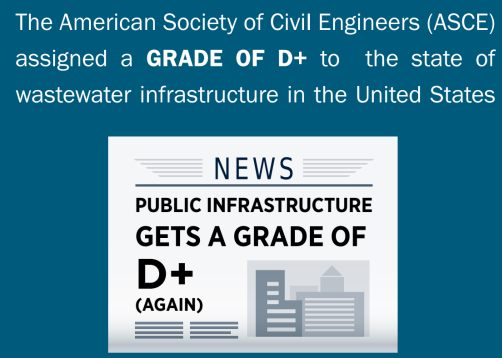
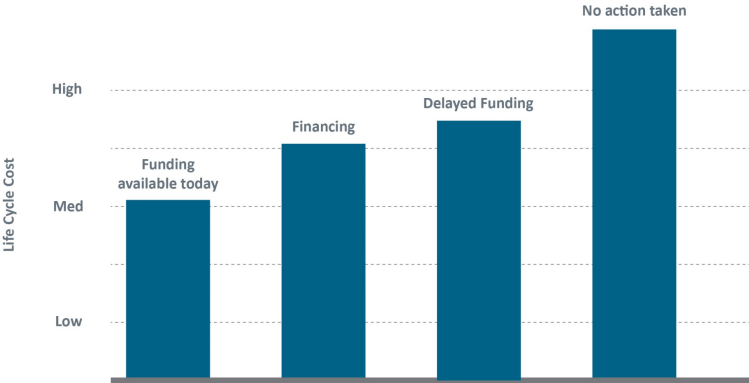


Figure 2: Cost of Doing Nothing



ESPC Benefits for Water-Energy Nexus

Financial

Cost savings from reduced energy and water consumption, improved system performance, and bundled infrastructure upgrades delivered through guaranteed savings

Environmental

Reduced greenhouse gas emissions, water conservation, improved system efficiency, and enhanced long-term resource sustainability

Operational

Improved system reliability, reduced maintenance needs, enhanced performance of aging infrastructure, and increased resilience of water and energy systems

Case Studies

Los Angeles County Sanitation Districts – ESPC Program

LACSD is one of the top water treatment organizations in the US, treating 510 MGD, and a global leader in water recycling, making about **165 MGD of treated wastewater available for reuse daily.**

The Sanitation Districts have a dedicated Energy Recovery Section whose mission is the safe, clean, and cost-effective utilization of energy resources. **Saved \$80M since 2006.**

To date, the Sanitation Districts have initiated four ESPCs:

- The JWPCP Replacement of Cryogenic Oxygen Plant Nos. One and Two project was approved by the Board 9/2020, and construction will be completed by the end of 2026.
- The Valencia WRP North Aeration Process Improvements project was approved by the Board of 6/2020 and construction was completed in 2025.
- The San Jose Creek WRP and Long Beach WRP plants ESPC projects are expected to begin in 2027.



**LOS ANGELES COUNTY
SANITATION DISTRICTS**
Converting Waste Into Resources



Colorado Department of Human Services Case Study

Improvement Measures

- 46,000 LED Lights across 200 buildings
- 2 solar arrays totaling 4.42MW
- **Smart irrigation controls & low flow domestic fixtures**

Project Stats and Results

- Project cost: \$29M, self funding with capital lease
- \$4.7M projected for federal solar Investment Tax Credit
- Over \$450,000 in rebates from 29 utility providers
- \$1.4M in year 1 projected utility savings
- **28% water usage reduction**
- 25% of electric usage offset by renewables

Project Impact

- Reduced utility costs and improved system performance
- Addressed deferred maintenance across facilities
- Demonstrated the value of bundling water and energy measures

ESCO: Schneider Electric



Garfield School District RE-2 (Rifle, CO) Case Study

Improvement Measures

- LED Lighting upgrades with dimmable controls
- **High-efficiency water fixtures and irrigation controls**
- HVAC system replacement (boilers, rooftop units, air handling units)
- Building automation system integration
- Safety and security upgrades (panic alarms, window security film)
- Major school facility renovations (roof, windows, exterior, flooring)



Project Stats and Results

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- Over \$450,000 in rebates from 29 utility providers
- \$1.4M in year 1 projected utility savings
- **28% water usage reduction**
- 25% of electric usage offset by renewables
- \$15.8M total project cost
- \$17.1M guaranteed savings over project term
- \$2.1M in operations and maintenance savings
- \$300K in utility rebates + \$1.8M state grant
- 14 buildings upgraded across
- 905,761 sq ft 20-year contract term

Project Impact

- Addressed deferred maintenance without upfront capital
- Improved energy and water efficiency across the district
- Enhanced safety, comfort, and learning environments for students

ESCO: Johnson Controls

City of Laurel, Montana Case Study

Improvement Measures

- **Advanced metering infrastructure (AMI) with radio transmitters**
- **Leak detection and improved water usage monitoring**
- Energy efficiency upgrades across 12 municipal buildings
- Lighting upgrades, programmable thermostats, and insulation improvements
- Boiler replacement and energy management control system

Project Stats and Results

- \$1.7M total project cost
- ~\$97,000 in annual utility and operational savings
- **2,353 residential and commercial water meters upgraded**
- 12 municipal buildings improved
- Funded through tax-exempt municipal lease



Project Impact

- **Reduced water loss and improved billing accuracy**
- Increased system visibility through real-time data
- Enabled infrastructure upgrades without upfront capital

ESCO: Johnson Controls