Rapidly Scaling Water Reuse Across Texas
Using Property Assessed Clean Energy (PACE) Financing

Jonathon Blackburn, Sharlene Leurig, Katherine Jashinski, Jennifer Walker, and Jorge Losoya

National Wildlife Federation
Texas Coast and Water Program

TEXAS WATER TRADE

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ABOUT THE AUTHORS

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Texas Water Trade and National Wildlife Federation would like to thank Austin Water for its continued efforts to make water reuse concepts and planning tools publicly accessible. The tools they have created for public use can be found in our Resources section.

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Cover image: Austin city center skyline from Lady Bird Lake. Photo by Max Miner.

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EXECUTIVE SUMMARY

Increasing the development of water reuse projects in Texas is a matter of statewide urgency. The 2022 State Water Plan for Texas identifies municipal water conservation and water reuse as supply strategies yielding almost 800,000 acre-feet of water (AF) per year by 2030. That is equivalent to three-quarters of a billion gallons a day of municipal water conservation and reuse that the state urgently needs to bring online. Direct non-potable reuse is a significant component of that supply strategy, accounting for 4.4% of overall new state water supplies by 2030 (179,029 AF).

Direct reuse can be enabled by many sources, including utility-scale "purple pipes" bringing non-potable water from centralized wastewater treatment plants and onsite water sources such as rainwater, air conditioning condensate and wastewater produced within a building. The high capital cost of water reuse projects, and the additional cost they impose on building owners, can pose a financial deterrent to property owners integrating water reuse projects into their development projects.

Fortunately, Property Assessed Clean Energy (PACE) financing was enabled by the Texas Legislature in 2013 to address similar financial disincentives for distributed energy generation, energy efficiency and traditional water conservation investments. Since then, more than $155million has been mobilized for energy and water efficiency PACE projects in Texas. The core strength of PACE financing is that it allows property owners to invest in energy and water improvements with little to none of their own upfront capital. PACE is essentially long-term financing covering up to 100 percent of the cost of allowed projects and can be used for a term as long as the projected useful life of the improvements. This results in utility cost savings that exceed the amount of the repayment—meaning that PACE programs help property owners save more than they spend to implement energy and water projects.

Recognizing the importance of lowering the financial barrier for integrating water reuse into developments, Texas Water Trade and the National Wildlife Federation looked at the potential of PACE financing to offset the upfront costs of onsite water reuse projects (where the storage, treatment and piping are all self-contained onsite) and the costs incurred by private landowners to connect to the centralized reclaimed water system (for example, dual plumbing a building to use water from the city's reclaimed water pipeline). Working with the Texas PACE Authority and Austin Water, we modeled the savings of various water reuse approaches for typical commercial and multi-family residential buildings to determine whether water reuse projects could meet stringent PACE financial tests.

Our findings indicate that PACE is an effective tool for enabling water reuse projects, although the economics of these projects may require either utility rebates or co-financing with energy efficiency measures to meet the financial tests applied to PACE-financed projects.

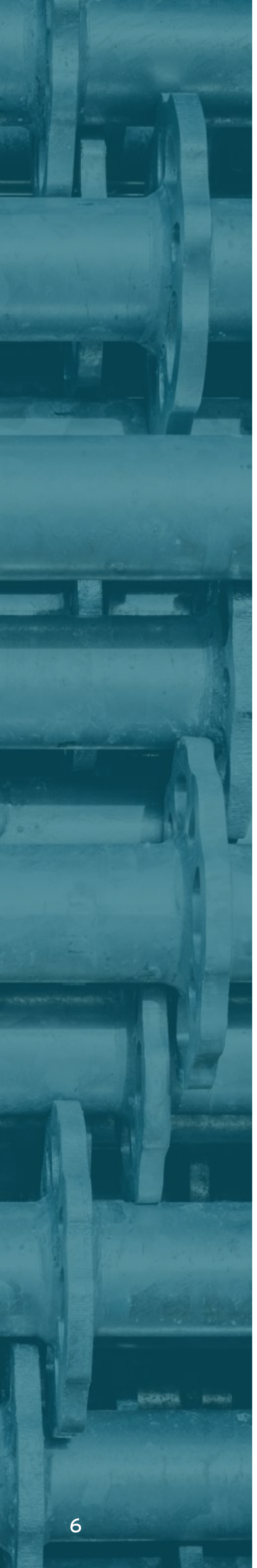
To capture the opportunity posed by PACE financing, we recommend the following actions:

COUPLE WATER REUSE WITH ENERGY EFFICIENCY MEASURES: The relatively high cost of energy helps energy efficiency projects deliver more competitive savings than water reuse projects. Therefore, we recommend that project developers seeking to use PACE to implement water reuse measures also implement energy efficiency measures. Coupling water reuse and energy efficiency in this way can make a big difference in allowing water reuse projects to qualify for PACE financing.

DEVELOP INCENTIVES FOR WATER REUSE: The relatively low cost of water makes water reuse projects harder to finance with PACE. In this pricing environment, utility incentives (such as customer rebates or reduced utility connection fees) can make or break the ability to finance onsite water. Offering incentives is a win-win for utilities and customers, since PACE can put commercial capital to work developing important water supplies, thereby sparing utility ratepayers' and real estate developers' pocketbooks. Where no utility incentives are available, combining energy efficiency and water reuse will frequently be essential to meet PACE criteria.

MUNICIPAL AND SCHOOL PROJECTS SHOULD FINANCE WATER REUSE WITH LOANSTAR: PACE financing is restricted to private real estate projects, making public properties ineligible. However, the Texas Comptroller of Public Accounts administers a similar loan program, called LoanSTAR, for properties owned by the State of Texas, local governments, and public entities. LoanSTAR offers engineering services and lower financing costs than PACE loans, which are administered by commercial lenders. As a result, water reuse projects are even more likely to generate the savings required to be LoanSTAR-eligible.

THE LEGISLATURE SHOULD EXPAND PACE TO INCLUDE GREENFIELD DEVELOPMENT: The statute enabling PACE financing in Texas limits its applicability to previously developed building sites. While this does not limit PACE to use in existing buildings (building renovations and new-builds on previously developed land are both eligible) it does exclude the many new developments coming online across Texas on so-called greenfield sites. For PACE to unlock the water reuse opportunities that all new development offers, the Legislature should expand PACE to allow for greenfield developments or authorize similar financing for such properties.



BACKGROUND

With rising pressure on water supplies in Texas from population growth and climate change, there is an increasing awareness of the importance of water reuse. Both public reclaimed water and onsite water reuse technologies can meet non-potable water needs including irrigation, toilet/urinal flushing, laundry machines and cooling towers (see Figure 1). The options for such technologies are varied both in cost and complexity.[1] Regardless, for public entities, business owners, and nonprofits, strategies for efficiently financing such solutions (either voluntarily or through mandates) are critical to maintaining a healthy business while also recognizing the reality of water supply challenges in Texas.

This project explores the feasibility of using Property Assessed Clean Energy (PACE) financing for offsetting the capital cost of typical water reuse measures. Originally implemented by the State Legislature in 2013 and now adopted by 59 local governments, PACE is a financial tool that allows Texas property owners to upgrade facility infrastructure with little or no capital outlay. PACE programs enable owners to lower their operating costs and use the savings to pay for eligible water conservation, energy efficiency, resiliency, and distributed generation projects. Owners gain access to affordable, long-term, private financing that is not available through traditional funding avenues. PACE is essentially long-term financing covering up to 100 percent of the cost for allowed projects and can be used for a term as long as the projected useful life of the improvements, resulting in utility cost savings that exceed the amount of the repayment. Since inception, more than $155 million has been mobilized for energy and water projects in Texas using PACE.

PACE has two key benefits. First, the lender is protected from potential default through placement of a lien that conveys to the new owner should the property change hands before the loan is fully paid. The other key benefit of PACE is the means by which an efficiency project can be financed in a "cash flow positive" way, such that the building owner spends no money out of pocket and immediately realizes savings that outweigh the cost of the financing. This loan design means that developers do not need to tie up their working capital into water or energy efficiency measures—a unique benefit of PACE; in most development scenarios, the developer is not the beneficiary of long-term water or energy savings.

Put another way, through PACE, it is the water and energy users in the building who pay for the efficiency measures that are installed. However, thanks to the way that PACE is structured, even while paying back the loan, tenants see a net reduction in their occupancy costs in the form of lower utility bills. Thus, through PACE, project sponsors and tenants experience no capital constraints or additional financing costs and see a reduction in the financial outflow they would have otherwise incurred to proceed "business as usual."

1 Identifying and costing water reuse opportunities can be a challenge in itself. Austin Water Utility has developed some free tools that can assist in the process—see the Resources section at the end of this report.

PACE has its own limitations. First, it is only authorized for use by private building owners and cannot be used in public schools or government buildings. Fortunately, these sorts of buildings can be improved through LoanSTAR, a revolving fund operated by the State Comptroller's Office. LoanSTAR loans are structured very similarly to PACE (in fact, the LoanSTAR program was a preexisting program that inspired the Legislature to enable PACE for financing efficiency measures in private properties). Additionally, PACE cannot be used to finance efficiency measures in new buildings constructed on previously undeveloped land. Since much of Texas' growth is greenfield development, the latter is a significant impediment to use of PACE for advancing resource conservation across the state's rapidly growing urban landscape. It is important to note, however, that new buildings can be eligible for PACE as long as they are built on land previously occupied by a structure.

Toyota's new headquarters in Plano, TX utilizes harvested rainwater for irrigation saving about 11 million gallons of potable water annually. See "Toyota HQ" on page 23.
Photo: Toyota Pressroom.

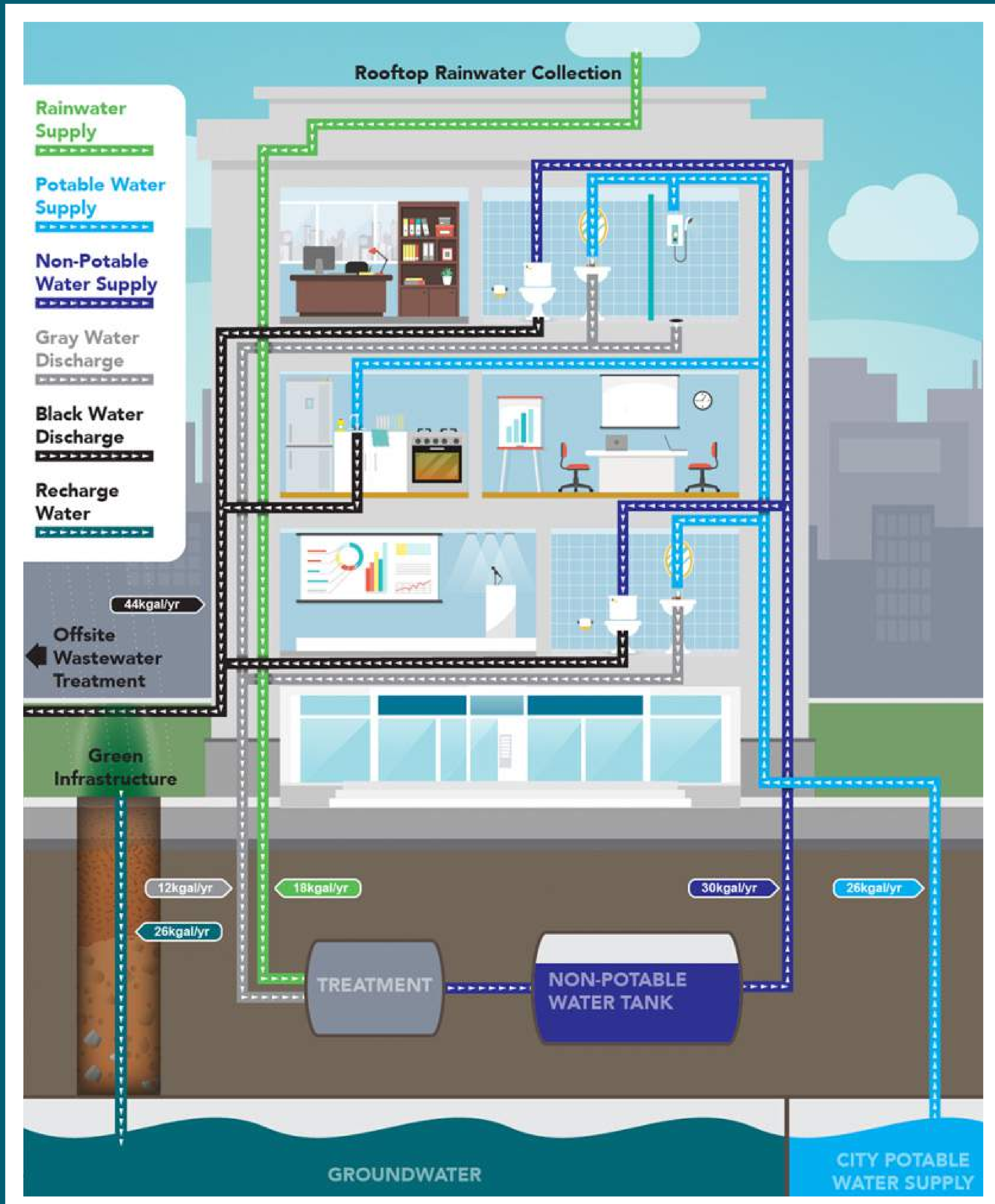


Figure 1. An illustration of the types of water available for reuse in a building. Source: Office of Energy Efficiency & Renewable Energy. Available at energy.gov/eere/femp/scenario-2-mainstream-net-zero-water-building.

CORE PACE CONCEPTS

SAVINGS TO INVESTMENT RATIO OVERVIEW

In Texas, all PACE projects undergo a cost/benefit analysis, where the financial savings expected to result from a particular efficiency strategy (known as Utility Cost Reduction Measure or UCRM) are compared to the expected costs of developing said project. The key outcome of this analysis is the Savings to Investment Ratio, or SIR. The SIR is a ratio of the sum of the project savings over the life of the UCRM divided by the sum of the costs of implementing the project. In order to be approved for the use of PACE financing, typically a project must demonstrate an SIR of greater than or equal to 1, essentially meaning that the overall financial benefits of a project exceed that project's cost. Next we detail what is meant by Savings and Investment.

SAVINGS

Savings are generally defined as anything that has a cash benefit as a result of the UCRM implementation. There are a number of ways a project can deliver financial savings, and each of these are allowed to be counted in the analysis. The savings streams analyzed for each water project UCRM are detailed as follows:

WATER SAVINGS

The most obvious savings expected from a water reuse project is the reduction in water that otherwise would have been purchased from the local utility. The magnitude of savings is a function of both the quantity of water saved and the utility rate structure.

TAX SAVINGS VIA DEPRECIATION AND INTEREST EXPENSE

Tax savings due to UCRM projects should be counted as part of the savings analysis. As these projects are typically capital improvements, they are eligible for depreciation. This is typically assumed to be straight line over the useful life of the UCRM. In addition, as PACE is similar to a loan, typically the interest expense portion of the PACE note can be assumed to be an interest expense. The savings for both depreciation and interest expense is a function of the owner's tax rate; the savings are effectively realized through a reduction in income taxes. For this analysis, the current corporate tax rate of 21% was selected.

REBATES

Any rebates or incentives offered by the local water utility can be counted as savings, occurring in the first year. For this analysis, rebate and incentive structures via Austin Water were assumed.

ENERGY

For this analysis we have used two versions of project implementation: the first assumes a water reuse project was implemented as a standalone measure, and the second assumes the water reuse project was combined with a typical energy efficiency project. PACE generally incentivizes more holistic building retrofits, and it is often more capital efficient to implement multiple efficiency measures simultaneously. For this analysis, we analyzed actual energy efficiency projects implemented in Texas

PACE financings dating from January 2020 and created a standardized generic energy efficiency project that was scaled per building size. The analysis yielded a median energy project cost of $2.72/square foot, and a median annual energy savings of $0.43/square foot. To be conservative we then adjusted the savings to yield an energy project measure with a 10-year payback and implemented such a project in our analysis.

AVOIDED COST OF CAPITAL (ACC)

PACE financing is typically a lower-cost way of financing an efficiency project than an owner's other options. Absent PACE, an efficiency project will generally need to be paid for either via expensive equity capital or in some cases mezzanine or high interest debt. Hence, savings due to avoided cost of capital can be included in the SIR analysis. Such savings are limited to 50% of the total savings. For this analysis, we also analyzed past PACE projects for typical expected Avoided Cost of Capital savings to apply to each of our scenarios. The analysis yielded a median annual savings of $0.031 / dollar financed per year. (The magnitude of the savings due to ACC scales with the amount of the financing).

INVESTMENT

Investment is defined as the total cost of implementing the UCRM. This normally consists of two components, the amount financed (principal) and the interest expense. This is calculated by taking the sum of the PACE payments over the life of the PACE assessment. For this analysis, we assumed a 5.78% interest rate and a 25-year PACE assessment period, values that we consider representative of current PACE terms.

The Travis County Civil and Family Courts Complex stores, filters, and cleans captured rainwater and A/C condensate for the toilets and landscape irrigation. See "Travis County Civil and" on page 25. *Image: Hunt Development Group/Gensler*

METHODOLOGY

As with traditional water conservation projects, water reuse projects' eligibility for PACE financing hinges on demonstration that the cost savings from water utility bills over time would create a positive cash flow over the lifetime of the financing. Demonstrating this requires cashflow modeling consistent with PACE regulations as defined by the State of Texas[1] and a knowledge of the costs and supply yields of water reuse projects.

To evaluate water reuse projects' PACE-eligibility, we selected five building types to model (Table 1). These types of buildings were chosen because they represent the most typical commercial and multifamily residential projects being built today in urban Texas. For each of these building typologies, we found an actual building in the City of Austin, some with onsite water reuse systems and/or public reclaimed water connections. These buildings' actual square footage and layout were used to estimate costs of the three scenarios of reuse water we modeled for each building.

Typology	Number of Units	Sq. Footage	Year Built	Stories
Hotel high-rise	150 guest rooms	125,525	2016	17
Office mid-rise	1,000 employees	250,000	2019	4
Municipal building	25 courtrooms	391,012	2019	12
High-rise apartment	221 apartments	221,438	2013	24
Mixed use	150 apartments with ground floor retail	212,053	2007	4

Table 1. Building Typologies

1 See Texas Local Government Code section 399, available at https://statutes.capitol.texas.gov/Docs/LG/htm/LG.399.htm.

We then calculated water balances for each building. Here, water balance is a comparison of the water that a building has available to it for reuse and the building's non-potable demands which could be met by those water reuse sources. The water balance calculation is a critical step to quantifying the water savings for a given project.[2] In the example illustrated in Figure 2, note that the output shows the potential to offset non-potable demands from all available onsite supplies. While the Water Balance Calculator estimates all possible water reuse opportunities as a first step, not all of them can be captured simultaneously due to trade-offs between different water sources and demands. Combinations of these varying onsite water opportunities were then selected within the Water Balance Calculator for the scenarios we modeled.

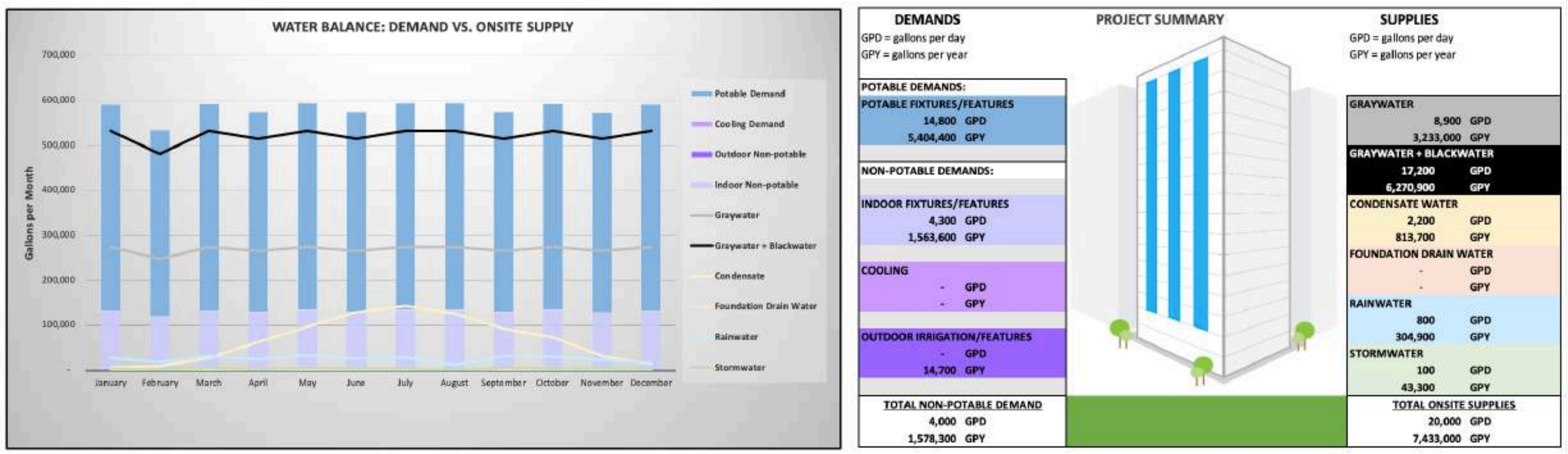


Figure 2. A snapshot from Austin Water's Water Balance Calculator evaluating the onsite demands and potential supplies for our High-Rise Apartment Building typology. The calculator is freely available for public use on Austin Water's website.

For each of these buildings, we modeled three scenarios that represent different tiers of potential water reuse projects: first, a partial offset of non-potable water needs from an onsite collection and reuse system, second, a full offset with onsite water resources (when sufficient supplies are available[3]), and third, a full offset via connection to a public reclaimed water system[4]. The specific Utility Cost Reduction Measures (UCRMs) implemented in each tier vary slightly by building typologies (for example, hotels and apartments require water use for laundry systems, whereas other typologies do not). The UCRMs modeled in each tier are laid out in Table 2. Figures 3-5 offer examples of the types of reuse technologies required for each of the three water reuse scenarios.

While actual costs were not available for all water reuse features of each building, where available, we assembled actual costs from filings with the City of Austin and supplemented those cost data with estimates based on consultations with real estate, engineering and water professionals. An example of the costs associated with each Utility Cost Reduction Measure (UCRM) is represented in Table 3, along with any relevant rebates and utility savings from reduced water demanded from the utility.

2 Austin Water's Water Balance Calculator tool can be downloaded on their webpage for use in analyzing a project's potential water savings in a water reuse project. See austintexas.gov/department/onsite-water-reuse-systems.

3 Some buildings produce more non-potable water than they demand; others produce less than they demand. This depends on the occupancy of the building (for example, residential buildings demand and produce more wastewater than office buildings which are occupied less consistently) and physical building characteristics (such as rooftop area, cooling towers and so on).

4 For our modeling, we assumed that the closest reclaimed water line is 300 feet from the property. Connecting to the water line would be a cost incurred by the property owner.

Typology	Scenario 1	Scenario 2	Scenario 3
Hotel high-rise	Rainwater Harvesting and A/C Condensate Collection for Laundry + Irrigation Uses	Graywater Collection for Toilets, Laundry + Irrigation Uses	Municipal reclaimed water extension and connection for Toilet, Laundry + Irrigation Uses
Office mid-rise	Rainwater Harvesting and A/C Condensate Collection for Irrigation Use	Rainwater Harvesting and A/C Condensate Collection for Irrigation Use + Black-water Collection for Toilet/Urinal Use	Municipal reclaimed water extension and connection for Toilet/Urinal + Irrigation Uses
Municipal building	Rainwater Harvesting and A/C Condensate Collection for Irrigation + Cooling Uses	Rainwater Harvesting, A/C Condensate and Blackwater Collection for Irrigation + Cooling Uses	Municipal reclaimed water extension and connection for Toilet/Urinal, Irrigation + Cooling Uses
High-rise apartment	Rainwater Harvesting and A/C Condensate Collection for Toilet + Irrigation Uses	Graywater Collection for Toilet, Laundry + Irrigation Uses	Municipal reclaimed water extension and connection for Toilet, Laundry + Irrigation Uses
Mixed use	Rainwater Harvesting and A/C Condensate Collection for Irrigation Use	Rainwater Harvesting and A/C Condensate Collection for Irrigation Use + Gray-water Collection for Toilet + Laundry Uses	Municipal reclaimed water extension and connection for Toilet, Laundry + Irrigation Uses

Table 2. Water Reuse Utility Cost Reduction Measures Modeled

Kubota Headquarters in Grapevine employs a rainwater harvesting system for irrigation purposes. See "Kubota HQ" on page 23. *Image: Venture Mechanical, Inc.*

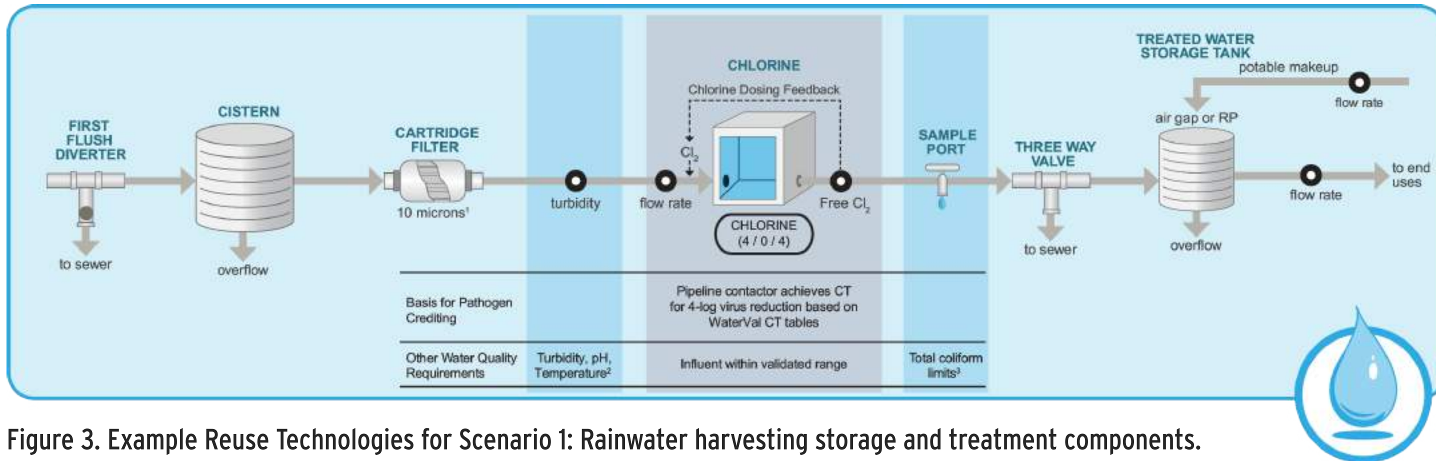


Figure 3. Example Reuse Technologies for Scenario 1: Rainwater harvesting storage and treatment components.
Image: Austin Water

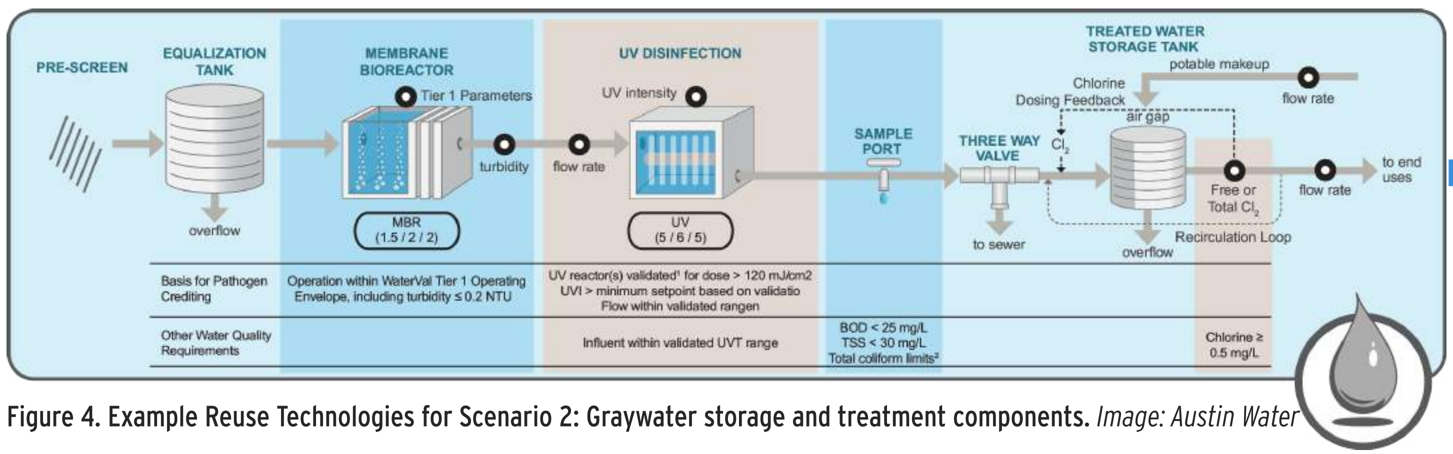


Figure 4. Example Reuse Technologies for Scenario 2: Graywater storage and treatment components. *Image: Austin Water*

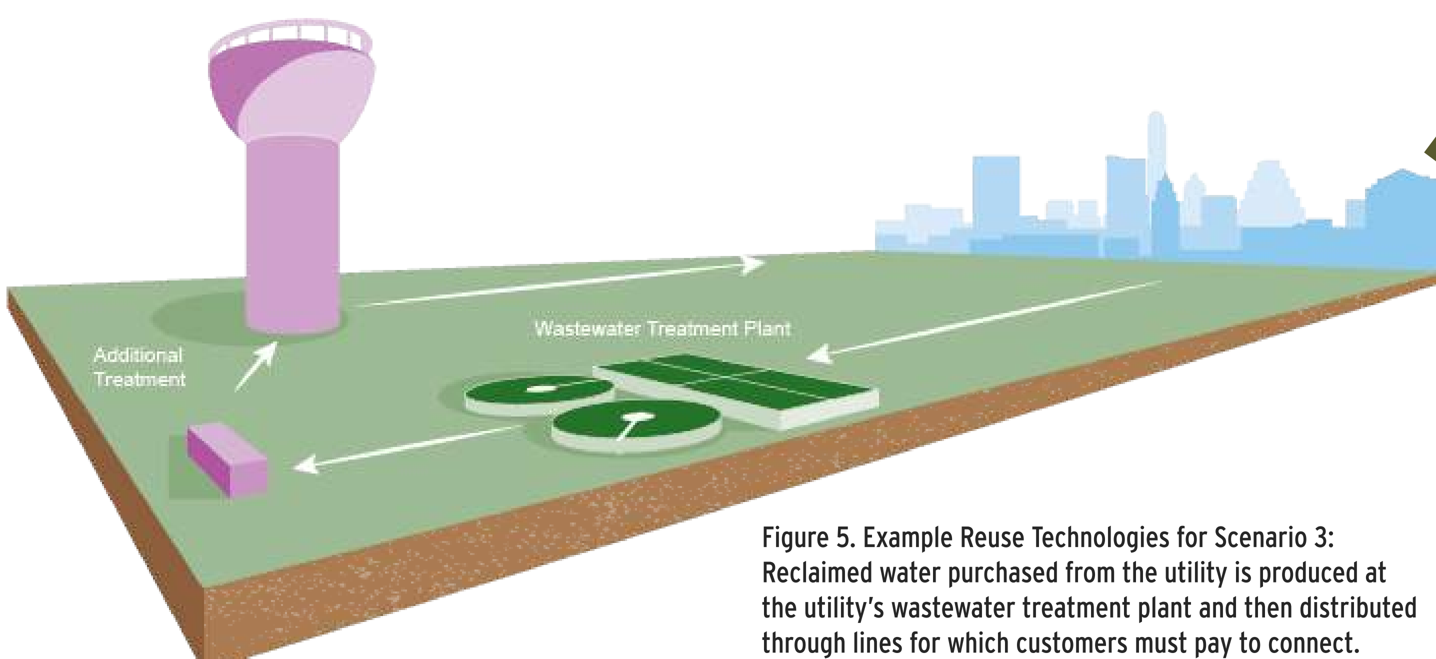


Figure 5. Example Reuse Technologies for Scenario 3: Reclaimed water purchased from the utility is produced at the utility's wastewater treatment plant and then distributed through lines for which customers must pay to connect.
Image: Austin Water

UCRM SUMMARY										
	UCRM Info				Annual Savings				Detail on Installation
	Measure Number	Measure Description	Measure Cost ($)	Useful Life (yrs)	Rebate ($)	On Peak Water (Gal/yr)	Off Peak Water (Gal/yr)	Waste-water (Gal/yr)	*Dual Plumbing, tank size, water treatment daily capacity etc.*
Scenario 1	UCRM-1	Rainwater Harvesting and A/C Condensate Collection - Toilets + Irrigation	$137,667	30	$5,000	320,589	425,712	0	Tank Size 10,000 gal + filter, pumps and disinfection unit
Scenario 1	UCRM-2	Dual Plumbing - Toilets Only	$80,000	30	Included Above	Included Above	Included Above	0	Cost for additional non-potable supply plumbing
Scenario 2	UCRM-3	Graywater System (Total Indoor/Outdoor Offset)	$490,000	30	$250,000	521,306	1,042,611	1,563,917	Daily treatment capacity 5,000 gal/day
Scenario 2	UCRM-4	Separate Graywater Drain Piping	$400,000	30	Included Above	Included Above	Included Above	Included Above	Cost for additional drain pipe on 16 of 24 floors
Scenario 2	UCRM-5	Dual Plumbing - Toilets + Laundry	$200,000	30	Included Above	Included Above	Included Above	Included Above	Cost for additional non-potable supply plumbing
Scenario 3	UCRM-6	Reclaimed water Connection	$252,945	30	$97,050	521,306	1,042,611	0	Cost for 300 feet of main extension and connection

Table 3. Utility Cost Reduction Measure Summary (High-rise Apartments)

First, we modeled the savings of water reuse measures alone (Table 4), while including the incentives currently offered by the City of Austin for specific water reuse projects. For onsite water reuse projects, the city currently offers up to $500,000 in reimbursements of installation costs per project, depending on the type of system installed as well as the amount of potable water being offset. For reclaimed water projects, the city offers reduced utility connection fees when fewer building fixtures require potable water. For the buildings modeled, these fee reductions ranged from $70,000-$130,000, depending on the number of fixtures in the buildings. Even with these incentives, given the relatively low cost of water, we anticipated that some water reuse measures may on their own not generate the cash-positive savings required to qualify for PACE financing.

As a result, we also modeled the savings of incentivized water reuse measures coupled with generic energy efficiency upgrades (Table 5). It is common for more expensive energy projects or water conservation measures to be paired with energy efficiency measures to generate cash flow positivity in line with PACE eligibility. As anticipated, the coupling of energy efficiency projects with water reuse projects were instrumental for allowing the water reuse projects to be PACE-eligible.

As a final comparison, we modeled the savings from water reuse projects without incentives, but coupled with the generic energy efficiency measures to see if these projects could be PACE eligible in cities where water reuse incentives do not exist (Table 6).

Blue Hole Primary in Wimberley employs an array of direct water reuse technologies and sustainable landscape practices. See "Blue Hole Primary School" on page 24 for details.
Image: Corridor News.

FINDINGS

The results of our modeling are summarized in Tables 4, 5 and 6. Green highlighted cells are those in which the Savings to Investment Ratio (SIR) exceeded 1 (making them PACE-eligible); red cells show an SIR less than 1, and hence need to demonstrate additional savings to be viable.

Projects	Scenario 1	Scenario 2	Scenario 3
Hotel High Rise	0.89	1.01	0.87
Office Mid Rise	0.71	0.88	0.84
Municipal Building	1.58	1.12	0.95
High Rise Apartments	0.96	1.07	0.87
Mixed Use	0.97	0.96	0.87

Table 4. Savings to Investment Ratio—Water Reuse Projects with Utility Incentives

Projects	Scenario 1	Scenario 2	Scenario 3
Hotel High Rise	1.84	1.34	1.54
Office Mid Rise	1.68	1.34	1.83
Municipal Building	2.34	1.92	2.05
High Rise Apartments	2.14	1.72	1.79
Mixed Use	2.32	1.43	1.73

Table 5. Savings to Investment Ratio—Water Reuse Projects (With Utility Incentives) Coupled with Energy Efficiency Upgrades

Projects	Scenario 2		Scenario 3	
	With Rebate	Without Rebate	With Rebate	Without Rebate
Office Mid Rise *(With Energy Efficiency Measures)*	1.34	1.28	1.83	1.80
Municipal Building *(Without Energy Efficiency Measures)*	1.12	0.93	0.95	0.90

Table 6. Savings to Investment Ratio—Water Reuse Projects (With and Without Incentives) Coupled with Energy Efficiency Upgrades (Without Incentives)

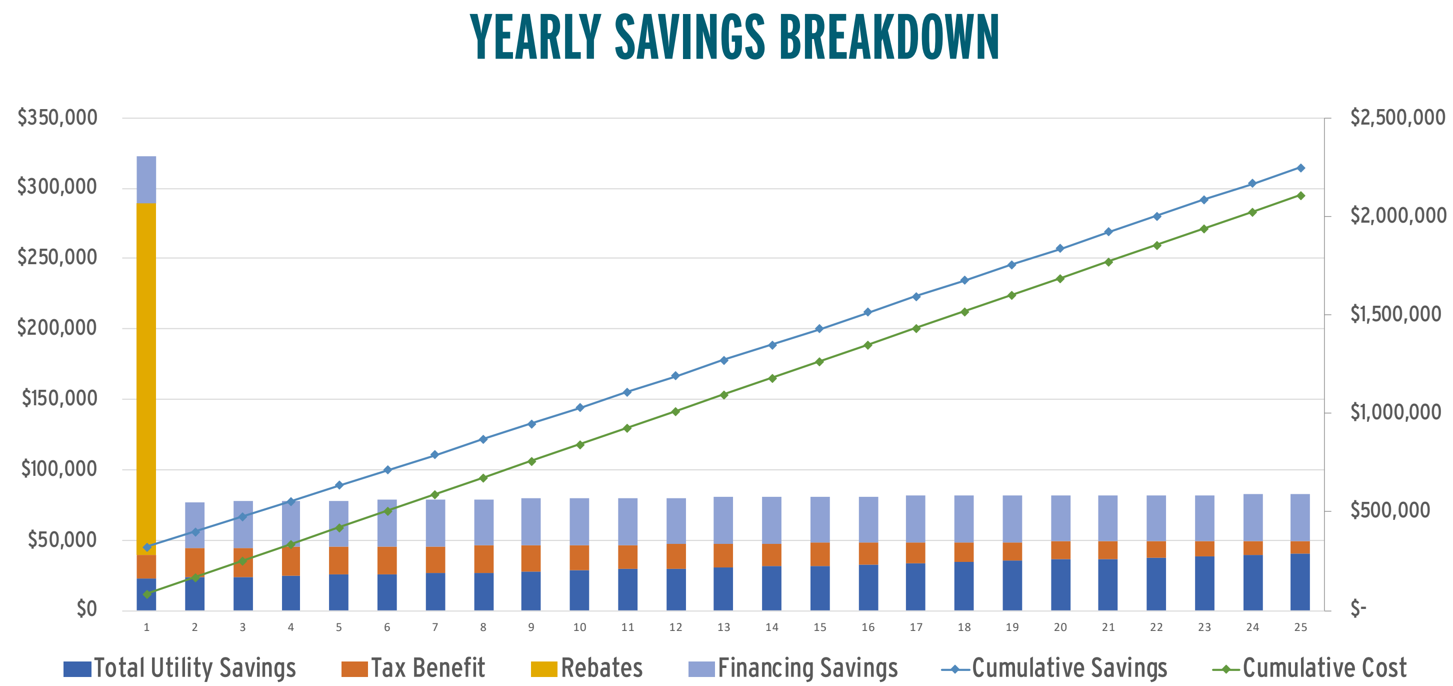


Figure 6. High Rise Apartment Savings Summary. The cumulative savings (blue plot line) exceeds cumulative costs (green plot line), thanks to a utility rebate applied in Year 1.

FINDINGS: PACE-FINANCING INCENTIVIZED WATER REUSE ALONE

Water reuse projects evaluated without any additional building efficiency improvements tended not to meet the Savings to Investment Ratio required for PACE financing. Exceptions included commercial projects with cooling towers and multi-family and hotel projects reusing graywater for toilets, laundry and irrigation. This is likely due to the fact that these projects achieve a greater economy of scale by treating more water onsite to meet large cooling demands and additional laundry demands once the investment to install the onsite reuse system is made. Yet even those projects required addition of a generous onsite water reuse system incentive ($250,000-$500,000 per project) to make the cut (see Table 4).

We use our High-Rise Apartment building to illustrate the role of financial incentives in helping water reuse projects to meet PACE financing criteria (see Figure 6). We applied actual incentives offered for water reuse projects by Austin Water for which this building's modeled water reuse measures would have been eligible.[1] Looking at Figure 6, you can see that in Year 1, a $250,000 utility rebate (the yellow bar) is applied to offset a portion of the water reuse system cost. The cumulative savings (blue plot line) exceeds cumulative costs (green plot line) in the years following, thanks to the upfront rebate. Clearly, utility incentives—such as rebates or reduced connection fees defraying some of the costs of water reuse—are important for lowering the barriers to PACE financing of water reuse projects.

FINDINGS: COMBINING INCENTIVIZED WATER REUSE AND ENERGY EFFICIENCY TO MEET PACE CRITERIA

We then tested our assumption that energy efficiency projects would help water reuse meet PACE financial tests. For this model run, we used typical energy efficiency costs and savings from actual PACE projects, as described in the Savings section of "Core PACE Concepts." In this model run, we also included the water reuse rebates that had been applied in our first model run.

1 See austintexas.gov/news/council-approves-onsite-water-reuse-pilot-incentive-program and austintexas.gov/department/onsite-water-reuse-systems.

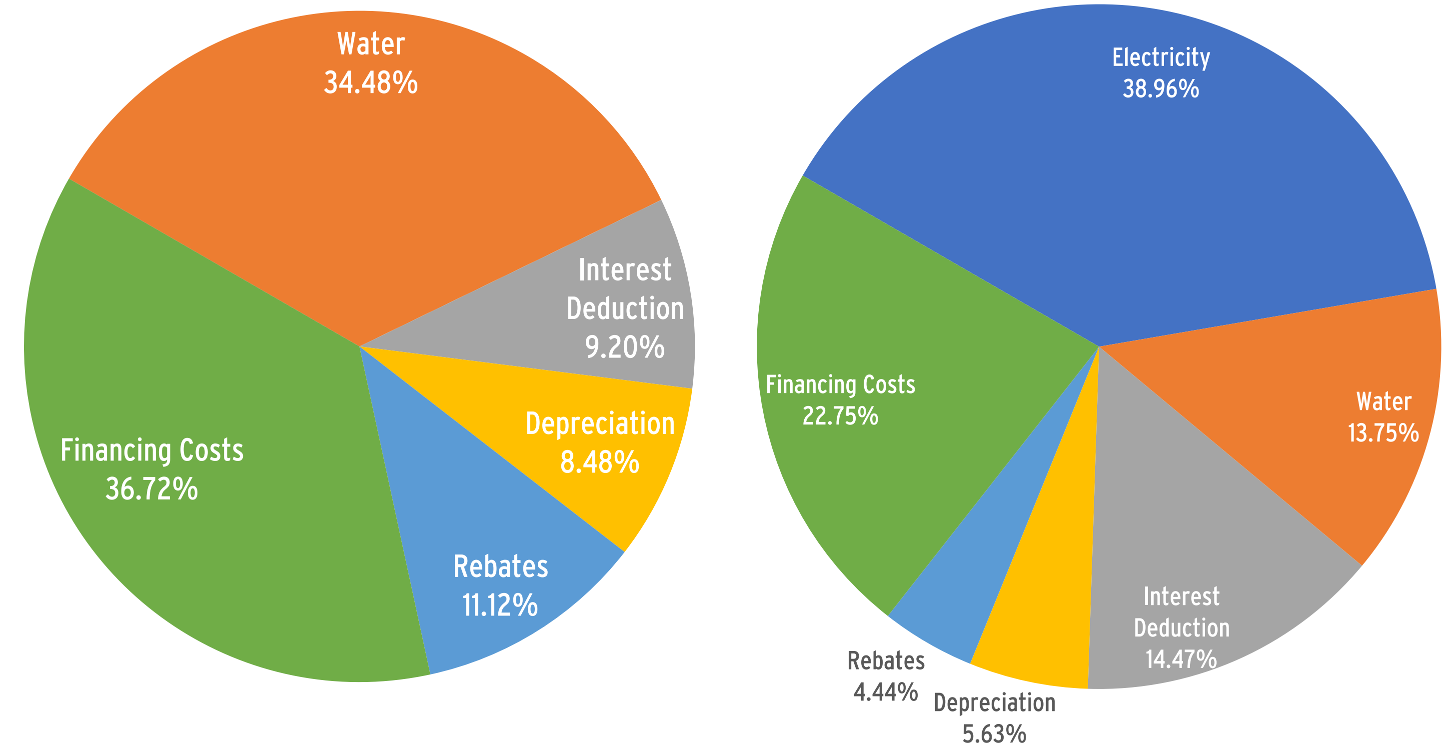


Figure 7. High Rise Apartments Savings by Category: Water Alone (Left) versus Water and Energy (Right)

We present a graphical representation of where the savings are expected to originate, for projects with and without an energy efficiency measure, again using the High Rise Apartment Building, Scenario 2 as our example. As Figure 7 shows, energy projects tend to be larger both in cost and savings, and hence have a much larger impact on a building's financials than does water; an effective strategy for water reuse projects is to incorporate them as part of a larger efficiency upgrade comprising energy as well.

With energy efficiency upgrades financed alongside the incentivized water reuse projects, all scenarios qualified for PACE financing (see Table 5). Clearly, a water reuse project combined an energy efficiency project is more likely to be approved for PACE financing and to yield better project financials than water reuse as a standalone.

FINDINGS: COMBINING WATER REUSE (NO INCENTIVES) AND ENERGY EFFICIENCY TO MEET PACE CRITERIA

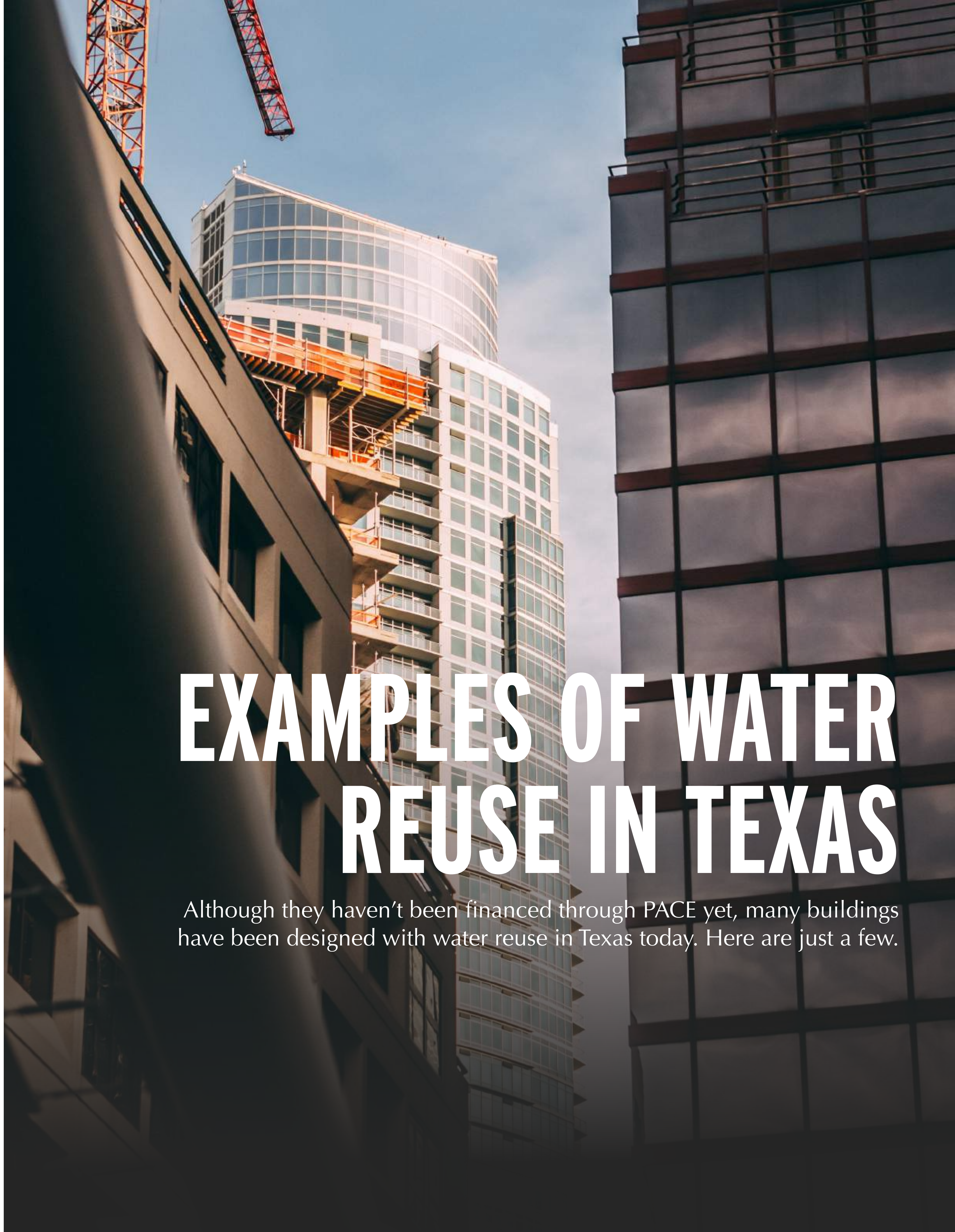
While it is clear that utility incentives can make the difference in water reuse projects meeting the cost savings metrics for PACE financing, most utilities do not offer financial incentives for water reuse projects. As a result, we tested the ability to use PACE financing for water reuse projects without any rebate. We did so using the Mid-Rise Office Building, as it presented the toughest economics among our five building typologies (as indicated by it having the lowest Savings to Investment Ratio of all building types). By testing this one building type with the most challenging water reuse financials, we effectively tested the ability of water reuse projects in all of our building types to meet PACE criteria without financial incentives, with the financial boost offered by energy efficiency. Our sensitivity test on the Mid-Rise Office Building typology was run without any rebate applied for Scenarios 2 & 3.[2] Those results are shown in Table 6, both with and without the energy efficiency project and without utility rebates for water reuse.

2 We did not run Scenario 1 as the rebate in that scenario is nominal and not likely to have a meaningful effect.

For the Mid-Rise Office Building, combining the financing of energy efficiency and water reuse projects was sufficient to make water reuse PACE-eligible. As can be seen, the rebate provides a meaningful boost to the project's economics; however, combining water reuse projects with building-wide energy efficiency measures still results in projects whose cumulative savings meet the hurdle required for PACE funding. This was one of our most important findings, as it indicates that water reuse projects are not dependent on incentives to be PACE-eligible—though many projects may depend on the greater savings ratio of energy efficiency projects to conform to PACE lending standards.

SUMMARY

To summarize, water reuse projects can be financed with PACE, but rebates and energy efficiency measures may be needed to make some types of water reuse projects PACE-eligible. Using PACE to fund water reuse is therefore an important but underrecognized tool to scale direct reuse statewide. PACE financing can allow us to dramatically scale up direct water reuse across the state without placing additional burdens on project developers' working capital or on utility balance sheets. Utilities, water planners and state agencies should take a closer look at PACE as a tool to help our communities meet their future water needs.



EXAMPLES OF WATER REUSE IN TEXAS

Although they haven't been financed through PACE yet, many buildings have been designed with water reuse in Texas today. Here are just a few.

AUSTIN CENTRAL LIBRARY

AUSTIN, TEXAS

Rainwater Harvesting, A/C Condensate Collection, Connection to Centralized Reclaimed Water Line

The Austin Central Library is a 200,000 sq. ft. public library equipped with various on site water reuse strategies. With a total of 6 floors, the library provides a variety of resources and amenities such as learning rooms, reading space, computers, gallery space, an event space and coffee shop.

Its rainwater harvesting and condensate reuse system offsets the facility's use of potable water. The water is treated using bag filters and UV disinfection. It is then used for irrigating the landscaping and flushing toilets and urinals. A 700,000 gallon tank holds water before being treated and transferred to a 1,200 gallon cistern after treatment. The library is connected to the City of Austin's centralized recycled water system.

Additionally, the library is also Platinum LEED certified, equipped with a rooftop garden, solar installations, and energy saving strategies.

Image: Austin Public Library

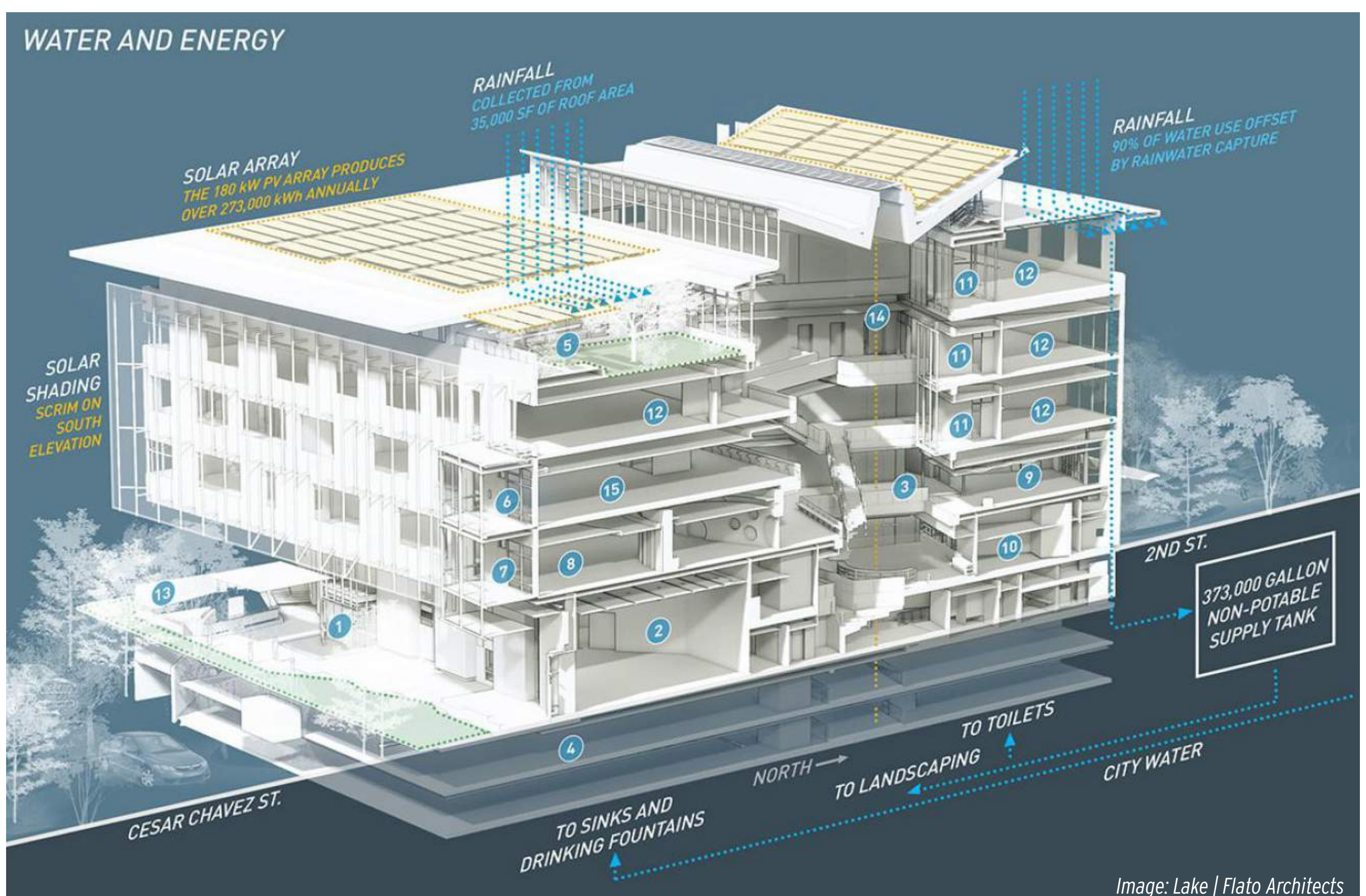


Image: Lake | Flato Architects

KUBOTA HQ

GRAPEVINE, TEXAS

Rainwater Harvesting

The Kubota headquarters is a 193,000 square foot, three-story office building featuring water conservation strategies and sustainable construction practices. The office accommodates around 280 employees. It contains a cafeteria, kitchen, conference rooms, and a fitness room.

The building's rainwater harvesting system is used for irrigation purposes. The dedication to water conservation is further exemplified by the use of native plantings.

Moreover, the construction of the facility also promoted sustainable practices by keeping all existing trees on the 3 - acre site, using recycled material, and limiting materials sent to waste facilities.

Image: Community Impact

Image: Goodwin & Marshall, Inc

Image: Toyota Pressroom

Image: KDC

TOYOTA HQ

PLANO, TEXAS

Rainwater Harvesting

The Toyota Motor North American headquarters is a 2,000,000 square foot campus incorporating various water efficiency and energy conservation practices. The 100 - acre campus holds up to 4,500 employees, consisting of seven buildings, a courtyard, dining area, conference rooms, and fitness center.

The campus utilizes harvested rainwater for irrigation and stored in a 400,000 gallon cistern. This supply strategy is estimated to save about 11 million gallons of potable water annually.

Other water efficiency features include drought tolerant landscaping and a green roof. Moreover, the building received LEED Platinum certification and includes various energy saving and efficiency features such as solar panels and energy efficient lighting and building envelope.

BLUE HOLE PRIMARY SCHOOL

WIMBERLEY, TEXAS

Rainwater Capture, A/C Condensate Collection, Grey/Black Water Collection & Treatment

The One Water school is a 85,000 square foot campus part of the Wimberley Independent School District with an array of direct water reuse technologies and sustainable landscape practices.

A reclaimed water system services the school's toilets and landscape irrigation. The building features an onsite reuse and treatment system for the greywater and blackwater produced by the school. The treated water is used to irrigate sports fields through subsurface drip irrigation. The school has 200,000 gallons of water storage.

Coupled with these onsite water reuse strategies, the school is equipped with water saving fixtures and green infrastructure. The innovative practices reduce water consumption for the school to about 90% of comparable buildings. Overall, the building is projected to save approximately $800,000 over a 30 year period.

THE AUSTONIAN

AUSTIN, TEXAS

A/C Condensate Collection

Sitting in downtown Austin, the Austonian is a 56 story, 638,358 square foot residential building engaging in water saving and green building practices. The building has a total of 166 residences, along with a recreation area, dog park, saltwater pool, fitness center, ground level commercial space.

To lower potable water demand, the building's condensate reuse system provides water for irrigating the green roof terrace. Other water conservation measures include the use of low water plantings, low flow toilets and showerheads.

Moreover, the Austonian has a four star rating from the Austin Energy Green Building rating system.

CREDIT HUMAN BUILDING

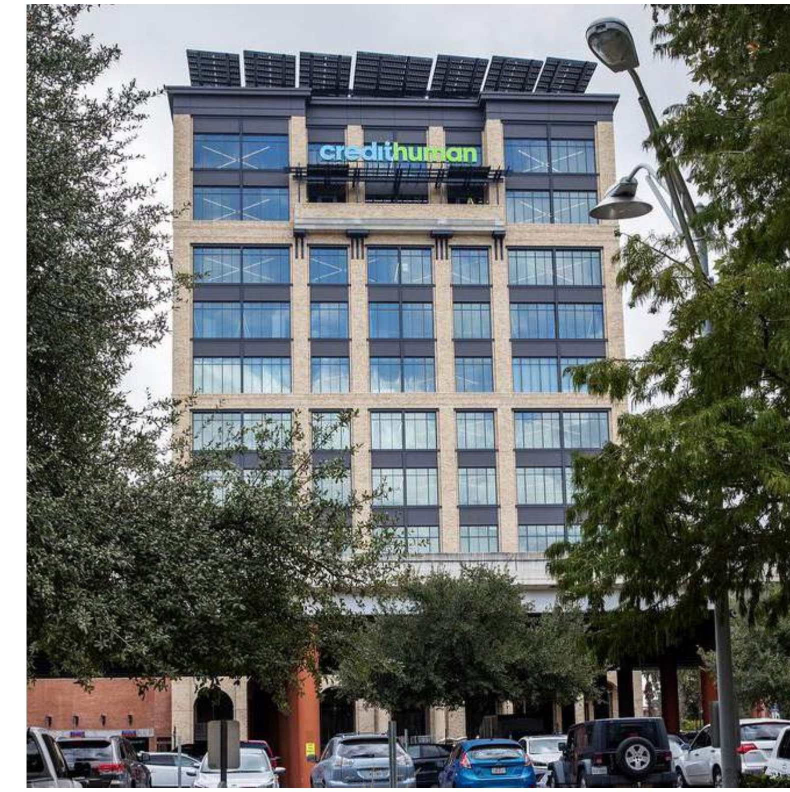
SAN ANTONIO, TEXAS

Rainwater Harvesting, A/C Condensate Collection

The Credit Human building pairs water and energy saving practices. Sitting at 200,000 square feet and 12 floors high, the building accommodates about 500 employees on a 3 acre site.

Rainwater harvesting and collected A/C condensate provide the buildings non - potable water utilized for toilets and irrigation. Water is stored in a 139,000 gallon cistern. The building is connected to the City of San Antonio's recycled water system to serve as a back - up supply. This facility is poised to use 97% less potable water than a comparable building.

Moreover, its energy saving strategies make it 40% more efficient than similar buildings. These features include rooftop solar panels, energy efficient windows and building envelope, and a geothermal loop cooling and heating system.



TRAVIS COUNTY CIVIL AND FAMILY COURTS COMPLEX

AUSTIN, TEXAS

Rainwater Harvesting, A/C Condensate Collection

The Civil and Family Courts Complex is a 435,000 square foot and 12 stories high facility on 1.46 acres. The complex includes a community plaza, 25 courtrooms, a cafeteria, public event room, and engaging urban design.

The building stores, filters, and cleans captured rainwater and A/C condensate for the toilets and landscape irrigation. The complex is set to connect to the City of Austin's centralized recycled water system. Moreover, the facility's low flow plumbing fixtures, utilization of rain gardens and other landscaping features provide additional sustainable water management measures.

The building's use of "Great Streets" design principles engages and activates mobility and activity at the street level through wide sidewalks, trees, bike racks, and sitting areas.

THE UNIVERSITY OF TEXAS AT AUSTIN

AUSTIN, TEXAS

A/C Condensate Collection, Groundwater Capture

The University of Texas at Austin is composed of 150 buildings on 431 acres, serving a population of about 75,000 students, faculty, and staff. Through the use of alternative water sources, the Utilities and Energy Management department of the university saves more than 100 million gallons of potable water a year.

The university's reclaimed water is sourced from HVAC condensate and groundwater capture using French drains. This water is used for chilling stations and cooling towers. The university's reclaimed water provides seven percent of UT's total water supply. The City of Austin's recycled water system serves as backup. From 2012 to 2016 the use of non-potable water saved the university two billion dollars.

Future water conservation strategies include constructing a small sanitary sewage treatment plant and expanding the use of reclaimed water for irrigation demands.

Image: UT Austin

Image: UT Austin

APPENDICES

Detailed pro forma reports outlining the three water reuse scenarios for each of the five building types (High-Rise Apartment, Hotel High-Rise, Mixed-Use, Municipal Building, and Office Mid-Rise) are available at: texaslivingwaters.org/pace-appendices

RESOURCES

Austin Water Onsite Water Reuse Systems Website
austintexas.gov/department/onsite-water-reuse-systems

Austin Water Water Balance Calculator
austintexas.gov/sites/default/files/files/Water/AW_Water_Balance_Calculator_v1.xls

Austin Water Onsite Water Reuse Program Guidebook
austintexas.gov/sites/default/files/files/Water/AlternativeWater/AW_OnsiteWaterReuse_Guidebook.pdf

Onsite Non-potable Reuse Practice Guide. William J Worthen Foundation (2018)
static1.squarespace.com/static/5c73f31eb10f25809eb82de2/t/5d62f94154372300016bf9bb/1566767439639/WaterReuseGuide_FINAL.pdf

National Wildlife Federation
Texas Coast and Water Program

TEXAS
WATER
TRADE