

Water Conservation Task Force

Report to

Lower Colorado River Authority

November 2008

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Glossary and Abbreviations

Domestic water user: Owners of property near the Highland Lakes who pump water directly from the lakes for domestic (household) uses. This could include drinking, washing, cooking, lawn irrigation, a small family garden or orchard, or for use by domestic animals.

Firm water customer: Water supplies managed by LCRA are divided into "firm" and "interruptible" stored water. Firm water is available even during a severe drought. Cities, industries and electric power plants rely on firm water supplies. During water shortages, interruptible water, which is mostly used for agriculture, is subject to rationing or curtailment first, before firm water supplies.

HET: High Efficiency Toilets

Hill Country Landscape: The Hill Country Landscape Option is tool to help homeowners create a well designed, resource efficient landscape. By following these guidelines, one can have a successful landscape that saves water, as well as time and energy.

ICI: Institutional, Commercial, and Industrial entities

LCRA: Lower Colorado River Authority

Multi-Family Residential: A building that is designed to house more than one family. Examples include four-plexes, condominiums, or apartment buildings.

Municipal water user: Municipal users can include cities, water districts, water supply corporations, and others. An entity that uses potable water within a community or municipality and its environs for domestic, recreational, commercial or industrial purposes or for the watering of golf courses, parks and parkways, or the use of reclaimed water in lieu of potable water for the preceding purposes or the application of municipal sewage effluent on land.

Raw water customer: Raw water is water that has not yet been treated to a level suitable for potable use. LCRA sells raw water by contract to cities, water districts, golf courses, industry and agriculture.

Regional Council: LCRA Regional Councils were created to provide a two-way communication link between LCRA and communities on LCRA issues, projects and activities. Members of the councils will represent their communities and work with them and LCRA to promote clear and accurate understanding of LCRA-related matters.

Water IQ: The "Water IQ: Know your Water" campaign is a public awareness water conservation program that educates Texans about water conservation. Through Water IQ, the Texas Water Development Board (TWDB) and numerous community partners provide

general information on water efficient practices, raise awareness about the importance of water conservation and help Texans use less water.

Wholesale water provider: An entity that supplies water to another for resale to the public. LCRA provides water from the lower Colorado River and Highland Lakes to retail water providers. In most cases LCRA is not the potable water provider to the end user.

Executive Summary

ES.1 Introduction

LCRA is currently preparing a long-term water plan, including updating its water conservation plan. These efforts will include a 5-year implementation plan that will guide effective water conservation throughout LCRA's rapidly growing service area.

To strengthen the partnership between LCRA, its wholesale raw water customers and other stakeholders during this process, LCRA asked a diverse group to participate in a Water Conservation Task Force. Our assignment was to develop a list of conservation measures to consider for implementation, rank and prioritize these measures, and provide implementation recommendations regarding those measures. This report provides a summary of our activities and includes recommendations developed during our meetings.

ES.2 Key Task Force Findings

The task force spent the past seven months studying conservation measures and the role of conservation in securing a long-term water supply for the basin. During the course of the study, the task force came to a consensus that conservation should be an essential part of LCRA's long term efforts. Four major conclusions that the task force wishes to emphasize include:

1. Conservation is now widely accepted as the most cost-effective way to extend water resources. It is an expectation of responsible stewardship of water resources within the Colorado River watershed;
2. Conservation programs are only successful if they have a long-term focus and continual stakeholder involvement. We encourage establishing a permanent stakeholder committee, the LCRA Water Conservation Advisory Council, to support conservation efforts over time;
3. Wide-ranging partnerships with customers and community interests are a critical component of successful conservation programs; and
4. To be effective, LCRA's conservation program must have a continuous source of funding.

In addition to these fundamental findings, the task force also prioritized specific conservation measures for further analysis and/or implementation. These are discussed in more detail in the Water Conservation Task Force Report.

ES.3 Task Force Process

LCRA created a task force composed of a diverse group of interests, including retail water providers, business interests, developers, residents, landscape interests, golf course operators and other stakeholders. The Water Conservation Task Force membership is presented in Exhibit One in the main body of this report.

The process included the identification of possible water conservation strategies for either LCRA or its customers to implement, definition of the screening criteria with which to rank these strategies, and assignment of a ranking based on each criterion. We then chose the measures to be analyzed both technically and financially, based on the resulting rankings, our local knowledge of actual feasibility, and the ability to easily enumerate water savings due to the measure. The task force also recommended other measures for consideration that do not lend themselves to analysis or need further research before being implemented.

ES.4 Results and Recommendations

ES.4.1 Policy Modifications

The task force recommends that the LCRA Board of Directors take the following actions to ensure a successful water conservation program:

- Actively and affirmatively support state legislation for cost-effective conservation measures and policies;
- Use its rule-making authority to enhance current conservation requirements for its firm raw water customers;
- Adopt better tools for enforcement and actively enforce its conservation rules; and
- Review what other river authorities have done regarding domestic water use and address non-compliance. LCRA should first encourage voluntary compliance, and, if necessary, take appropriate enforcement actions.

ES.4.2 Measures Selected for Analysis

LCRA is already implementing some water conservation measures, specifically customer water conservation rule requirements and education efforts. Thus, the measures selected for analysis and other recommendations by the task force do not constitute the entire LCRA water conservation program.

Based on selection by the task force, the following conservation measures were selected for further technical analysis to estimate potential savings and costs to implement.

ES.4.2.1 Rebates or Other Incentives:

- High efficiency toilets for residential, multi-family residential, and commercial users
- Water efficient showerheads for residential and multi-family residential users
- Water efficient clothes washers
- Irrigation system rain/freeze sensors for residential, multi-family residential and industrial, commercial, and institutional users
- Water efficient irrigation technologies for residential, multi-family residential and industrial, commercial, and institutional users
- Large rainwater harvesting systems (over 500 gallons) for residential and multi-family residential users
- Low water use urinal for commercial users
- Water efficient spray rinse valve distribution for commercial users
- Water efficient commercial ice machines
- Water efficient equipment and/or processes for industrial, commercial, and institutional customers
- Wholesale customer conservation loan, grant or rebate program (up to a set dollar per gallon saved)
- Audits of industrial, commercial, and institutional customers with cooling towers

ES.4.2.2 Additions to LCRA Conservation Rules for Raw Water Customers

Municipal wholesale customers should be required to:

- Implement residential, multi-family residential, and commercial irrigation standards
- Implement residential, multi-family residential, and commercial soil minimum standards, to include depth and quality
- Offer residential, multi-family residential, and industrial, commercial, and institutional irrigation audits for customers having significant peak usage indicating high outdoor water usage

ES.4.3 Conservation Measures with Indirect Savings or Savings that are Difficult to Quantify

The task force also made recommendations that include measures with indirect water savings or water savings that are difficult to measure. These recommendations are divided into categories: rebates/incentives, additions to LCRA conservation rules for raw water customers, public education and outreach, evaluation and management, power plants, and other conservation-related measures.

ES.4.3.1 Rebates or Other Incentives:

- Development of a water conservation certification program for golf courses
- Development of a certification program for new homes and/or other facilities
- Development of a web-based self home audit
- Installation and maintenance of water efficient landscape demonstrations

ES.4.3.2 Additions to LCRA Conservation Rules for Raw Water Customers

Amend LCRA Conservation Rules to require that:

- Municipal wholesale customers establish a rate structure that encourages water conservation (e.g., inclining block rate, excess use, or seasonal rate structure)
- Municipal wholesale customers notify the top 10 percent of end users about their water use as it compares to other users in that system
- All customers consider wastewater reuse as part of their conservation plan
- All customers designate a conservation coordinator
- All customers submit an annual conservation report, which includes water savings
- LCRA add penalties for raw water customer non-compliance

ES.4.3.3 Public Education and Outreach

- Continuation of the Water IQ water awareness campaign in partnership with customers, as well as promotion of the Hill Country Landscape
- Continued education through the LCRA Nature Parks, as well as working directly with the schools through campus audits and school conservation certification programs
- Bulk purchase and distribution of rain barrels
- Utilization of the Regional Councils to communicate conservation messages consistent with the LCRA programs

- Employment of all communication methods that are appropriate to the customer demographic, including the use of bill inserts, Internet marketing and e-mail

ES.4.3.4 Evaluation and Measurement

We believe, if LCRA conducted these activities, the following would also provide water savings:

- Conduct a water use survey of industrial, commercial, and institutional entities to determine more precise magnitude of potential savings
- Reevaluation of water conservation pricing as it applies to LCRA's raw water rate structure (reservation versus take or pay methods)
- Develop metrics for tracking LCRA conservation program effectiveness, evaluate these metrics at a certain frequency, and post the results on the LCRA Web site
- Develop and assist customers with utilizing consistent conservation metrics

ES.4.3.5 Power Plants

Related to all power plants receiving water from LCRA, LCRA should:

- Require water audits
- Develop a per megawatt hour or other metric for tracking savings over time
- Require proof of "reasonable use"
- Add a conservation or water efficiency component to all agreements associated with the request for new or additional water

ES.4.3.6 Other Conservation-Related Measures

We believe LCRA should execute the following:

- Support their raw water customers in developing partnerships with realtors so they encourage clients to equip homes with high efficiency toilet (HETs) upon resale
- Actively and affirmatively support state legislation to require that all new toilets sold in Texas must be HET
- During the next two years, conduct a study producing potential water savings related to separate irrigation meters. If estimated savings merit implementation, LCRA should amend the conservation rules accordingly.
- Develop model ordinances regarding the limitation of irrigated landscaped areas and work with customers and homeowner associations to enact them

ES.4.4 Other Priority Measures

Further, additional rebates/incentives and rule modifications were discussed, and we recommend that they receive further study, implementation, and/or consideration at a later date due to a lack of information or “match” with the LCRA service area at this time.

ES.4.4.1 Rebates or Other Incentives

- Water softener rebates
- Hot water on demand system rebates
- “Instant On” water heater system rebates
- Water efficient residential, multi-family residential, or commercial dishwasher rebates
- Irrigation timer distribution for hose-end sprinklers
- Weather-based (“smart”) residential, multi-family residential, or commercial irrigation controllers rebate or funding for irrigation audit programs coupled with distribution of these
- Installation of native or adapted residential, multi-family residential, or commercial landscape rebates
- Soil amendment rebates for builders of new homes or commercial users
- Water efficient commercial car wash equipment rebates
- Waterless urinal rebates
- LCRA-provided audits of hotels and motels within the service area
- LCRA to encourage and provide guidance for low income housing leak detection and repair programs
- On-site gray water reuse-associated incentives
- Encourage customers to require submetering of multi-family and commercial end-users.

ES.4.4.2 Additions to LCRA Conservation Rules for Raw Water Customers

- Required irrigation rain/freeze sensors for all new residential, multi-family residential, and commercial irrigation systems
- Water waste restrictions (in the form of an ordinance or tariff) to be implemented by municipal wholesale customers, e.g. year-round water waste restrictions

1 Introduction

LCRA is currently engaging in long-term water planning, to include updating its water conservation plan. These efforts will include a 5-year implementation plan that will guide effective water conservation throughout LCRA's rapidly growing service area.

LCRA is developing a comprehensive action plan that will become part of the 2009 Water Conservation Plan, as well as be incorporated into the LCRA long-term Water Supply Resource Plan. As a major raw water provider, LCRA's plan will differ from most water purveyors' conservation efforts; LCRA must rely on and work with their wholesale customers to implement the conservation measures included in any plan. This is the first effort of its kind in the state and provides LCRA the opportunity to serve as an example to other wholesale water providers.

To strengthen the partnership between LCRA, its wholesale customers, and other stakeholders during this process, LCRA asked a diverse group of stakeholders to participate in a Water Conservation Task Force. We represent a diverse group of stakeholders providing a wide range of perspectives regarding water conservation objectives and practices. By agreeing to become Task Force members, we agreed to participate in a series of meetings between April and October of 2008 to provide input and guidance on how LCRA can promote and implement water conservation practices. Our efforts focused on the following activities:

- Developing a list of conservation measures to consider for implementation;
- Developing screening criteria to evaluate conservation measures;
- Prioritizing conservation measures based on numerous factors;
- Recommending policies, regulations and other means of increasing water conservation by LCRA and its customers; and
- Reviewing LCRA's proposed Conservation Implementation Plan.

As a task force, we encouraged open discussion of ideas, views and priorities of each of our members. Our recommendations seek to balance costs with effective conservation measures. We also sought to balance incentive programs with regulations and enforcement. We believe these recommendations represent solutions that will address the needs of end-users and wholesale customers.

We appreciate the opportunity to provide input to LCRA during development of the Conservation Implementation Plan and present this Water Conservation Task Force Report as a consensus document. This report provides a summary of our activities and includes recommendations developed during our meetings.

2 Task Force Process

The following section provides information regarding the makeup of the task force and the process we followed to produce a set of recommendations to present to the LCRA Board of Directors.

2.1 Membership

LCRA created a Task Force composed of a diverse group of interests, including retail water providers, business interests, environmental interests, developers, residents, golf course operators and other stakeholders. Entities were asked to provide a representative, and, as those representatives, we were asked to provide input from our unique perspectives. The Water Conservation Task Force membership is included in Exhibit One.

EXHIBIT ONE

Water Conservation Task Force Members

Name	Organization	Title
Carole Baker	Alliance for Water Efficiency Wholesale Customer End User	Chair
Bill Cornman	Bay City Golf Club	Manager
Richard Eason	Lakeway Municipal Utility District	General Manager
Richard Fadel	Texasclapes	President
Deborah Gernes	Travis County WCID No. 17	General Manager
Ken Gorzycki	Barton Creek Resort and Country Club	Director of Golf Course Mgmt
Barbara Johnson	Austin Area Research Organization	Executive Director
Ken Manning	Former LCRA Environmental Protection Manager	General Environmentalist
Ray Marshall	Pedernales Country Club	General Manager
Jody McDaniel	Greater Texas Landscapes	Branch Operations Manager
Judy Miller	City of Marble Falls	City Manager
Jayne Mortensen	Building Industry Association of the Highland Lakes	Executive Vice President
George Murfee	Murfee Engineering	President
Nell Penridge	Hill Country Alliance	President
Chris Rather	Horseshoe Bay Resort	Director of Agronomy
Rick Redmond	Volente Beach Park (Lake Travis and Cedar Park)	Owner

EXHIBIT ONE
Water Conservation Task Force Members

Name	Organization	Title
David Smith	Blanco San Miguel	Engineer
Hank Smith	Capital Area Homebuilder's Association C. Faulker Engineering, L.P.	Engineer
Sonja Stefaniw	City of Austin	Water Conservation Manager
Janet Stephenson	LCRA Water Utilities	West Travis County Regional Manager
Ingmar Sterzing	LCRA Wholesale Power	Fuels Manager
Bob Vann	Protect Lake Travis Association	Board Member
Jennifer Walker	Sierra Club	Water Resources Specialist
Wayne Watts	City of Leander	Director of Public Works
Jon White	Travis County Transportation and Natural Resources	Environmental Officer
Katherine Woerner	City of Cedar Park	Asst to City Manager

2.2 Course of Action

We followed a structured process in which we first identified possible water conservation strategies for either LCRA or its customers to implement. LCRA staff provided numerous conservation measures for consideration. Others were added through task force brainstorming during our meetings. Information regarding various conservation measures was provided by LCRA staff. Additionally, speakers from retail water providers (City of Austin, City of San Marcos and San Antonio Water System) spoke to the task force regarding their programs, best practices and lessons learned. We also heard from Seattle Water Utilities on conservation practices and implementation approaches appropriate for a wholesale water provider.

To meet the ultimate goals of the task force, we reviewed the water use of LCRA's firm water customers and other water users in the LCRA system. This provided a basic understanding of water use characteristics throughout the basin (i.e., how much water is used by residential, multi-family residential, and commercial customers and monthly use patterns). This information provided insight into which conservation measures were likely to have the biggest impact. Information specific to particular end-users, including golf courses; industrial, commercial and institutional customers; and large-scale commercial irrigators was also provided. The task force appreciates the speakers who addressed the group and the written material on conservation practices provided.

The task force first studied measures that addressed how water is used – inside and outside homes, in businesses, in utility delivery systems, etc. To assist in the examination of measures related to specific water use, the strategies were divided into the following categories for discussion and evaluation:

- Residential Indoor
- Residential Outdoor
- Institutional, Commercial and Industrial (ICI)
- Utility Measures
- Water Rates
- Alternative Water Sources
- Public Information/Education and Outreach
- Rates, Regulations and Other Policy Measures

Using a process based on the American Water Works Association’s Manual M52, Chapter 3, *Analysis of Water Use and Water Savings*, we, as a group, then defined the screening criteria with which to rank these strategies. The staff made recommended rankings based on their knowledge and experience and as they related to the following four criteria:

- ***Cost-Effectiveness*** – How much does this measure cost to implement vs. how effective is it in saving water from LCRA’s perspective?
- ***Technology/Market Maturity*** – Is the technology available commercially and supported by the local service industry?
- ***Certainty of Water Savings*** – How reliably does the measure save water? Factors could include reliability of the device, required behavior change, and ability to measure savings.
- ***Potential Magnitude of Water Savings*** – How much water can potentially be saved across LCRA’s service area over time with this measure? This would assume that behavior changes occur, the device works, the measure is enforced, etc.

Our focus as a Task Force was on the following three criteria:

- ***Service Area Match*** – This criterion caused us to consider the customer profile of the service area, possible saturation of the measure and whether or not the measure is quickly scalable.

- ***End-user/Public acceptability*** – Will the end-user and /or the public be willing to implement the measures? What penetration rate is expected? Are measures equitable, i.e., will all categories of customers receive or even be interested in benefits?
- ***Customer ability to implement*** – How feasible will it be for LCRA's customers (retail water provider, golf course, industry) to implement the measure? Factors could include legal, financial, and political components, among others.

Once the criteria were chosen, each task force member assigned a ranking between 1 and 5, 5 being the highest, for each of those three criteria to each of the conservation measures. Throughout the process, LCRA provided an extensive amount of applicable information and data to ensure informed decisions and recommendations. We recognized early in the process that the staff was best suited to provide technical analysis regarding water savings and cost, and our role was generally best suited to evaluating criteria related to public acceptance and customer willingness to implement particular measures.

The individual rankings, equally weighted, were then used to calculate an average ranking, and the top measures were identified. These rankings can be seen in Attachment 1. We then chose the measures to be analyzed both technically and financially, based on the resulting rankings, our local knowledge of actual feasibility, and the ability to easily enumerate water savings due to the measure. Some measures not selected for analysis at this time are currently underway as part of the existing LCRA conservation program; others are recommended for implementation but have indirect water savings or water savings that are difficult to measure, making analysis difficult. Additionally, some measures not selected for analysis may be more appropriate in the future due to modified LCRA policies, advances in technology, public education efforts, further study, but are not recommended for implementation at this time. After the measures for analysis were identified, the task force reviewed and developed recommendations related to other conservation measures, to include:

- Measures with indirect water savings or savings that are difficult to quantify,
- Measures lacking clear LCRA authority, and
- Measures for further study, implementation, or consideration at a later date.

These recommendations are included in the following section.

3 Results and Recommendations

3.1 Policy Modifications

The Task Force recommends the LCRA Board of Directors take the following actions to ensure a successful water conservation program:

- Actively and affirmatively support state legislation for cost-effective conservation measures and policies.
- Use its rule-making authority to enhance current conservation requirements for its firm raw water customers.
- Adopt better enforcement tools and actively enforce its conservation rules.
- Review what other river authorities have done regarding domestic water use and address non-compliance. LCRA should first encourage voluntary compliance, and, if necessary, take appropriate enforcement actions.

3.2 Measures Selected for Analysis

Based on our initial rankings, discussion, and implementation options, we selected the following tangible conservation measures for further analysis, to include financial analysis and expected potential water savings if the measure was implemented. While we reviewed dozens of measures, we realize LCRA has limited resources to analyze and implement conservation measures. Additionally, not all measures can be quantitatively analyzed. Therefore, we chose the top ranked measures based on estimated water savings and other criteria described in section 2.2. For further description of each measure, please see Attachment 2.

LCRA is already implementing some water conservation measures, specifically customer water conservation rule requirements and education efforts. Thus, the measures selected for analysis and other recommendations by the Task Force do not constitute the entire LCRA water conservation program.

3.2.1 Rebates or Other Incentives

- High efficiency toilets for residential, multi-family residential, and industrial, commercial, and institutional users
- Water efficient showerhead for residential and multi-family residential users
- Water efficient clothes washer

- Irrigation system rain/freeze sensor for residential, multi-family residential, and industrial, commercial, and institutional users
- Water efficient irrigation technologies (e.g., multi-stream rotating nozzles) for residential, multi-family residential, and ICI users
- Large rainwater harvesting system (over 500 gallons) for residential and multi-family residential users
- Low water use urinal (high efficiency urinal) for commercial users
- Water efficient spray rinse valve distribution for commercial users
- Water efficient commercial ice machines
- Water efficient equipment and/or processes for ICI users
- Wholesale customer conservation loan, grant or rebate program (up to a set dollar per gallon saved)
- Audits of ICI customers with cooling towers

3.2.2 Additions to LCRA Conservation Rules for Raw Water Customers

The Task Force believes municipal wholesale customers should be required to:

- Implement residential, multi-family residential, and commercial irrigation standards.
- Implement residential, multi-family residential, and commercial soil minimum standards, to include depth and quality.
- Offer residential, multi-family residential, and ICI irrigation audits for customers having significant peak usage indicating high outdoor water usage. Note that each raw water customer might have a different monthly threshold; however, users with consumption more than 25,000 gallons of water per month is a typical value used.

3.3 Conservation Measures with Indirect Water Savings or Savings That Are Difficult to Quantify

The Task Force also made recommendations that include measures with either indirect water savings or water savings that are difficult to measure. These measures are presented in this section.

3.3.1 Rebates or Other Incentives

- Development of a water conservation certification program for golf courses
- Development of as a certification program for new homes and other facilities

- Development of a web-based self home audit
- Installation and maintenance of water efficient landscape demonstrations

3.3.2 Additions to LCRA Conservation Rules for Raw Water Customers

Amend LCRA Conservation Rules to require that customers:

- Establish a rate structure that encourages water conservation (e.g., inclining block rate, excess use, or seasonal rate structure)
- Consider direct wastewater reuse
- Designate a conservation coordinator responsible for plan implementation
- Submit annual conservation plan implementation metrics
- Definition of penalties for raw water customer non-compliance within contract

3.3.3 Public Education and Outreach

- Continuation of the Water IQ water awareness campaign in partnership with customers, as well as promotion of the Hill Country Landscape program (bill boards, radio, TV, outreach events)
- Continued education through the LCRA Nature Parks, as well as working directly with the schools through campus audits and school conservation certification programs
- Bulk purchase and distribution of rain barrels
- Use the Regional Councils to communicate conservation messages consistent with LCRA programs
- Employment of all communication methods that are appropriate to the customer demographic, i.e. consider new electronic methods for reaching younger audiences, including the use of e-mail, internet marketing, You Tube, Face Book and other online methods. Continue the use of bill inserts for audiences who do not use the internet.

Additionally, within education efforts, we believe the focus should be on the following messages:

- Where does your water originate?
- Water is a finite resource
- Ownership and responsibility for taking care of our water sources
- How much water should you be using?
- The relationship between the actual cost of water and water rates

- Water conservation and water quality are connected
- You can make a difference

3.3.4 Evaluation and Measurement

The task force believes, if LCRA also conducted the following activities, water savings would be realized.

- Conduct a water use survey of industrial, commercial, and institutional entities to determine more precise magnitude of potential savings
- Reevaluation of water conservation pricing as it applies to LCRA's raw water rate structure (reservation versus take-or-pay methods)
- Develop metrics for tracking LCRA conservation program effectiveness, evaluate these metrics at a certain frequency, and post the results on the LCRA Web site
- Develop and assist customers with utilizing consistent conservation metrics

3.3.5 Power Plants

All suggested measures are relevant to all power plants served by LCRA, not simply the LCRA-owned power plants.

- Conduct water audits on all facilities and implement recommendations every 5 years.
- Develop a per megawatt hour or other water conservation metric for each power plant to measure water conservation savings over time (note that a study to do this for LCRA-owned power plants is already scheduled and the Texas Water Conservation Advisory Council is planning to develop metrics for power plants next year).
- Require proof of "reasonable use" by those requesting water from LCRA to ensure requests do not exceed actual need. Defined reasonable use must be updated with some frequency based on new technology.
- Add a conservation or water efficiency component in all agreements associated with the request for new or additional water

3.4 Measures Lacking Clear LCRA Authority

LCRA is a conservation and reclamation district created by the Texas Legislature. LCRA is tasked with supplying electricity for Central Texas, managing water supplies and floods in the lower Colorado River basin, developing water and wastewater utilities, providing public parks, and supporting community and economic development within its service area. There are statutory limits on what LCRA is able to require of its raw water customers. The following measures are recommended by the task force but may require clarification or expansion of LCRA's authority for implementation.

- Residential, multi-family residential, and/or commercial toilet replacement program required or encouraged upon resale or due to plumbing code changes or some other threshold chosen by the municipal wholesale customer, which may include requiring high efficiency toilets in all new construction

Issue: Utilities are often not aware when a property has sold. If this occurs within a city, the utility is not part of the inspection process. Mandatory replacement could also be difficult for lower income families.

Task Force Recommendation: LCRA should encourage customers to adopt a mandatory retrofit upon resale. LCRA should support its raw water customers in developing partnerships with realtors to market the replacement of toilets as a "green" feature.

- Modify plumbing codes to require high efficiency toilets (HETs) in all new and remodeled homes and buildings

Issue: LCRA does not have a plumbing code and many LCRA wholesale municipal water customers do not have the ability to develop a plumbing code. This requirement could be included as part of a new customer agreement. However, it would be difficult to enforce.

Task Force Recommendation: LCRA is to actively and affirmatively support state legislation to require HETs (1.28 gallons per flush) as the only available option for purchase in Texas after a certain date.

- Require LCRA wholesale municipal customers to inspect all irrigation systems using over 25,000 gallons per month (or some other set threshold that will vary due to customer demographic and weather, e.g. those using 10 percent more than the average user or the top 10 percent of users)

Issue: The threshold will change due to end user demographic, season, and annual rainfall, among others.

Task Force Recommendation: LCRA should require the municipal wholesale customer to offer these audits and require them to notify the top 10 percent of users about their water use as it compares to other users in that system.

- Implementation of a program including separate irrigation meters for new large landscapes

Issue: Requiring all wholesale municipal customers to require separate irrigation meters for their customers may be expensive and it is unclear as to whether this measure would save water.

Task Force Recommendation: During the next two years, factual information regarding estimated and actual savings resulting in separate landscape meters should be acquired or developed so as to determine likely water savings from this measure. If estimated savings merit implementation, LCRA should amend their rules accordingly.

- LCRA should require wholesale municipal customers to adopt either deed restrictions or ordinances limiting the amount of irrigated landscape for end-users.

Issue: LCRA can require conservation measures that limit water waste, but it can not dictate what size of landscape is considered "reasonable". If a large landscape is using water efficiently, then LCRA can not consider the water used as wasted water. Many LCRA customers do not have the ability to enforce this type of measure.

Task Force Recommendation: LCRA should develop "model" ordinances and work with raw water customers, municipalities, homeowner associations and developers regarding deed restrictions and ordinances that promote water conservation and limiting those restrictions that promote high water use.

3.5 Conservation Measures for Further Study, Implementation or Consideration at a Later Date

Further, additional rebates/incentives and rule modifications were discussed, and we recommend that they receive further study, implementation, and/or consideration at a later date due to a lack of information or "match" with the LCRA service area at this time. The following conservation measures are believed to be viable methods of saving water. We encourage LCRA to consider these measures for future implementation.

3.5.1 Rebates or Other Incentives

- Water softener rebates
- Hot water on demand system rebates
- "Instant On" water heater system rebates
- Water efficient residential, multi-family residential or commercial dishwasher rebates
- Irrigation timer distribution for hose-end sprinklers
- Weather-based ("smart") residential, multi-family residential, or commercial irrigation controllers rebate or funding for irrigation audit programs coupled with distribution of these controllers
- Installation of native or adapted residential, multi-family residential, or commercial landscape rebates
- Soil amendment rebates for builders of new homes or commercial users
- Water efficient commercial car wash equipment rebates
- Waterless urinal rebates
- LCRA-provided audits of hotels and motels within the service area

- LCRA to encourage and provide guidance for low income housing leak detection and repair programs
- On-site gray water reuse-associated incentives
- Encourage customers to require submetering of multi-family and commercial end-users.

3.5.2 Additions to LCRA Conservation Rules for Raw Water Customers

- Required irrigation rain/freeze sensors for all new residential, multi-family residential and commercial irrigation systems
- Water waste restrictions (in the form of an ordinance or tariff) to be implemented by municipal wholesale customers, e.g. year-round water waste restrictions

4 Conclusions

Over the last seven months, the task force studied specific conservation measures, as well as the role of conservation in securing a long-term water supply for the basin. During the course of the study, the Task Force came to a consensus that conservation should be an essential part of LCRA's long-term efforts. As LCRA is a wholesale water provider, this is the first effort of its kind in the state and provides LCRA the opportunity to serve as an example to other wholesale water providers. As part of the process, the group developed consistent themes that we believe to be critical for any water conservation program. Thus, the following are major conclusions that the task force wishes to emphasize.

1. **Conservation is the first priority to meet long-term water needs.** Conservation is now widely accepted as the most cost-effective and environmentally sustainable way to extend water resources. It is part of the every day life of people around the world and in this region. This was very clearly demonstrated during the water supply planning public workshops held in 2008, in which conservation was identified as the first priority in meeting LCRA's water supply needs. It is expected that LCRA implement an effective conservation program as part of its responsible stewardship of water resources within the Colorado River watershed.
2. **Conservation success includes long-term thinking and stakeholder inclusion.** Conservation programs are only successful if they have a long-term focus and continual stakeholder involvement. We encourage establishing a permanent stakeholder committee, the LCRA Water Conservation Advisory Council, to support conservation efforts over time. This council would participate in both tactical and strategic planning. Strategic planning reflects the overriding mission and purpose and the desired future direction. Strategic planning also includes defining alternatives should the original plan not meet expectations. Tactical planning refers to implementing specific measures to ensure the strategic goals are met.
3. **Partnerships are vital.** Wide-ranging partnerships with customers and community interests are a critical component of successful conservation programs. Besides municipal wholesale customers, critical partners include environmental interests, homebuilder and developer groups, commercial entities that sell conservation-related items and/or can effect large water savings, end users of water, and community-gearred organizations, among others.
4. **Funding must be confirmed and available over the long term.** To be effective, LCRA's conservation program must have a continuous source of funding identified and protected over the long-term.

Attachment 1: Conservation Measure Rankings

LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/ Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
Indoor Measures												
Toilet Replacement Program	Community Targeted Implementation	I	4	5	5	4	3.87	4.40	3.77	4.29	✓	✓
	Free units/ giveaway HETs	I	5	5	5	4	3.80	4.67	3.83	4.47	✓	✓
	Rebates / refund	I	4	5	4	4	3.93	4.67	3.98	4.23	✓	✓
	Require replacement upon resale	R	5	5	5	4	2.97	2.38	3.07	3.92	A	✓
Showerheads & Aerator Replacement	Plumbing Code Changes (for new construction)	R	5	5	5	4	3.47	3.90	3.73	4.30	B	✓
	Free to anyone in service area	I	5	5	5	3	3.88	4.31	4.00	4.31	✓	✓
Water Softeners	Provide rebate for replacing older water softeners (prior to 1999) that flush less often	I	3	3	3	3	2.00	2.66	2.36	2.74	✓	✓
	Hot Water on Demand	I	2	4	3	3	3.06	3.38	2.88	3.04	✓	✓
Instant on Water Heater	Provide rebate for point of use water heaters	I	1	4	3	2	3.00	3.53	2.67	2.71	✓	✓
	Low Income Home Leak Detection and Repair	S	3	5	5	2	3.75	3.80	3.40	3.71	✓	✓
Clothes Washer Replacement Program	Provide Clothes Washer rebates	I	3	5	5	3	3.33	4.07	3.57	3.85	✓	✓

¹Type of program: I=Incentive; S=service; E=education; R=rule or regulation; O=other, such as a study

LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
Installation of native/adapted Landscapes	Rebate to replace high water use turfgrass with native/well-adapted plants and grass	I	3	5	2	2	4.07	3.20	3.40	3.24	✓	✓
Soil amendments in new homes	Rebate to builders to install at least 6" of soil for all irrigated landscaped areas.	I	2	5	3	2	4.43	3.57	3.50	3.36	✓	✓
Soil amendments in new homes	Amend LCRA Rules for Water Conservation to require municipal wholesale customers to require 6" minimum soil depth and 20% compost for all irrigated landscaped areas in all new developments	R	5	5	3	4	4.07	2.85	3.29	3.89	✓	✓
Soil amendments in new homes	Amend LCRA Rules for Water Conservation to require municipal wholesale customers to offer irrigation audits for customers using more than 25,000 gal/month.	R	5	5	3	3	4.21	3.14	3.07	3.78	✓	✓
Landscape Irrigation Audits	LCRA offers the audits to customer end-users that use over 25,000 gal/month.	S	3	5	3	3	4.21	3.79	3.50	3.64	✓	✓
Landscape Irrigation Audits	Amend Rules for Water Conservation to require municipal wholesale customers to require inspection of all irrigation systems using over 35,000 gal/month by licensed irrigator once every three years.	R	5	5	3	3	4.21	2.79	3.21	3.74	E	✓

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LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
Landscape Irrigation Audits	Community implementation of irrigation audits- e.g. teach boy scouts/ingo's to do audits and submit to retail water provider (or LCRA?) for incentives	I/S	2	3	2	2	3.29	3.21	2.29	2.54	✓	✓
Self-audit program	Create on-line worksheets to facilitate self-irrigation audits	E	5	5	4	2	3.60	2.87	2.73	3.80	✓	-
Separate irrigation meters for new large landscapes	Amend Rules for Water Conservation to require mini-wholesale customers to require these meters (based on meter size or lot size).	R	2	5	1	2	4.13	2.93	3.47	2.93	F	-
Water Saver New Home Program	Provide incentives to builders/developers to become a 'water saver home' that would include conservation landscape measures such as limited landscaping around house.	I	3	4	3	4	4.07	3.40	3.00	3.50	✓	-
Installation of Conservation Landscaping	Partner with builders and/or customers to install & maintain conservation landscape demonstrations.	I/E	2	5	3	1	3.67	3.40	2.87	2.99	✓	-
	Offer incentive to developers to adopt building "envelope" concept (limited landscaping around house)	I	3	5	5	1	3.80	2.53	3.13	3.35	✓	-

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LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/ Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
Limited irrigated landscaped area	Amend LCRA rules for water conservation to require municipal wholesale customers to have a landscape ordinance or deed restriction include maximum irrigated landscape area (e.g. 50%) in all new residential development	R	5	5	5	3	3.75	2.75	3.13	3.95	G	
Rainwater harvesting for residential landscapes	LCRA will bulk purchase rain barrels and provide to wholesale customers at a discount Provide rebates based on gallons stored for large RWH systems	E	1	5	3	1	4.00	3.60	3.07	2.95	-	
		I	2	5	5	2	3.73	2.93	2.73	3.34	-	✓

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LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/ Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
ICI Measures												
Commercial Irrigation System	Amend LCRA Rules for Water Conservation to require municipal wholesale customers to adopt and implement TOEQ standards.	R	5	4	4	4	4	4.69	4.07	4.00	✓	✓
Irrigation Rain Sensors	Require rain sensors on all existing and new commercial irrigation systems by a cutoff date	R	5	4	3	2	4.44	4.19	4.19	3.83	✓	✓
Weather-Based/Smart controllers	Provide a rebate for a selected list of controllers	I	2	3	2	2	3.71	3.65	3.24	2.80	✓	✓
MP (matched precipitation) rotator heads.	Provide rebate to replace traditional sprinkler heads with MP rotator nozzles.	I	3	4	3	2	3.88	3.63	3.38	3.27	✓	✓
Installation of native/adapted landscapes	Rebates to ICI customers for replacement of turf with native/adapted plants.	I	3	5	2	2	4.14	3.20	3.20	3.22	✓	✓
Soil amendments in new commercial landscapes	Rebate to commercial builders to install at least 6" of soil for all irrigated landscaped areas	I	1	5	3	2	4.56	3.63	3.63	3.26	✓	✓
Soil amendments in new commercial landscapes	Amend LCRA Rules for Water Conservation to require municipal wholesale customers to require 6" min soil depth and 20% compost for all irrigated landscaped areas in all new developments.	R	5	5	3	3	4.47	3.29	3.65	3.92	✓	✓
Commercial Landscape Irrigation Audits	Amend LCRA Rules to require wholesale customers to offer irrigation audits to large commercial landscapes	R	5	5	3	2	4.27	3.87	3.47	3.80	✓	✓
Commercial Landscape Irrigation Audits	LCRA offers audits to large commercial customers.	S	3	5	3	3	4.47	4.13	4.33	3.85	✓	✓

¹Type of program: I=Incentive; S=service; E=education; R=rule or regulation; O=other, such as a study

LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
Athletic Field Water Audits	LCRA provides water audit service to athletic fields	S	3	5	3	2	4.43	3.93	4.00	3.62	✓	✓
Golf Course certification	Develop certification program for water efficient golf courses.	I/E	1	3	3	2	4.56	3.69	3.50	2.96	✓	-
Rainwater harvesting and condensate reuse	Provide rebates to ICI customers for use of large RWH systems to collect both rainwater and AC condensate.	I	2	5	5	2	3.88	2.64	2.69	3.32	✓	✓
Car Washes	Offer rebates to car washes for efficient equipment (e.g. different nozzles)	I	3	4	4	1	3.56	3.06	2.63	3.04	✓	✓
Cooling Tower Audit	Conduct audits of commercial cooling towers above certain size	S	3	5	4	2	3.75	3.31	2.88	3.42	✓	✓
Commercial Toilet Replacement Program	Provide rebate to replace old toilets in commercial buildings	I	4	5	4	2	4.64	4.50	4.14	4.04	✓	✓
Multi-family toilet replacement program.	Mandatory retrofit by certain date	R	5	5	5	2	4.23	2.46	3.29	3.85	H	✓
Multi-family showerhead/aerator Replacement	Provide rebate to replace old toilets in MF buildings	I	4	5	4	2	4.36	4.36	3.79	3.93	✓	✓
Commercial Urinal Replacement	Mandatory retrofit by certain date	R	5	5	5	2	3.85	2.85	3.15	3.84	H	✓
Commercial Urinal Replacement	Free distribution of showerheads	I	5	5	5	2	3.93	3.50	3.64	4.01	✓	✓
Commercial Dishwasher Replacement	Waterless Urinal Rebate	I	4	3	5	2	3.57	2.29	2.57	3.20	✓	✓
Spray Rinse Valve replacement program	Low Water Use Urinal Rebate	I	4	4	5	2	4.14	3.50	3.57	3.74	✓	✓
Commercial Ice machines	Offer rebate for inefficient commercial dishwashers	I	4	5	5	2	4.00	3.29	3.00	3.76	✓	✓
	Free distribution to replace commercial pre-rinse spray valves	I	5	5	5	1	4.36	3.79	3.79	3.99	✓	✓
	LCRA provides rebates to replace water cooled with air cooled ice machines.	I	5	5	5	2	4.36	4.00	3.79	4.16	✓	✓

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LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
ICI audits	LCRA provides outside services to conduct water use audits and recommendations for water savings for large industrial users.	S	3	4	3	2	4.19	4.20	3.81	3.46	✓	-
Commercial/Industrial Process/Equipment incentives	LCRA provides rebate up to a certain dollar amount, based on water savings.	I	3	4	4	2	4.24	4.35	3.88	3.64	✓	✓
Hotel/motel water audits	LCRA provides outside services to conduct water use audits and recommendations for water savings for hotels/motels.	S	3	4	3	2	4.53	4.27	4.20	3.57	✓	✓
ICI Water Use Survey (NOTE: will be combined with ICI audit measure)	Survey ICI entities likely to have equipment that could be rebated/audited to determine more precise potential magnitude of savings	S	4	5	5	2	2	5	4	3.86	✓	-
Utility Measures												
System water audits: includes meter testing; meter repair and/or replacement; leak detection.	LCRA grant or loan program developed for utility infrastructure and technology measures that wholesale customers can be eligible for.	I	4	5	3	4	4.64	4.27	4.27	4.17	✓	✓
Submetering	Encourage cities to amend plumbing codes to require submetering for in new multifamily/commercial properties developments.	E	2	5	2	2	3.55	3.27	3.27	3.01	✓	-

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LCRA Water Conservation Task Force:
Combined Water Conservation Measures

Conservation Measure	Implementation Strategy	Type of Program ¹	Cost Effectiveness	Technology Maturity	Certainty of Savings	Potential Magnitude of Savings	Service Area Match	End User/Public Acceptability	Customer Ability to Implement	Average	LCRA Ability to Implement (see footnote A, B, etc)	Measureable
Water Waste Restrictions	Amend LCRA rules to require municipal raw water customers to adopt a year-round water waste restrictions in the form of an ordinance or in tariff.	R	4	5	4	3	4.36	3.27	3.45	3.87	✓	-
Water Rates												
	Amend LCRA Rules for Water Conservation to require municipal wholesale customers to require either an inclining block, excess use, seasonal rate structure.	R	5	5	2	2	4.64	3.27	4.45	3.77	✓	I
Water Conservation Pricing	Relook at the current LCRA raw water rate structure relating to reservation vs take-or-pay methods.	O					4.73	4.64	4.91	4.76	✓	-
Alternative Water Sources												
Wastewater Reuse (reclaimed water)	Require wholesale municipal and industrial water customers to consider and evaluate direct reuse as part of their water conservation plan.	R	5	5	3	2	4.36	3.45	3.18	3.71	✓	-
On-site greywater reuse	Explore incentives LCRA can provide to encourage more use of greywater.	O	2	3	4	2	4.00	3.09	2.36	2.92	✓	-

Colors:

Yellow = LCRA has the ability to implement and is also measureable.

Blue = Measures will be analyzed for potential water savings.

Green = Average of all rankings

Orange = Task Force removed from consideration or modified for implementation

¹ Type of program: I = incentive; S = service; E = education; R = rule or regulation; O = other, such as a study

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LCRA Combined Measures: Implementation Footnotes

Measure	Footnote Letter	Comments
Mandatory toilet replacement on resale (residential).	A	Concerns for a mandatory program include LCRA's ability to enforce across its entire service area, as well as to enter residences to inspect. POTENTIAL ALTERNATIVES: Institute a toilet incentive program of some variety and work with realtors to make homebuyers aware of the incentives. Encourage LCRA wholesale customers to institute programs where feasible.
Mandate that customer plumbing codes be amended to require High-Efficiency Toilets in new construction.	B	Ability of wholesale customers to enact or enforce plumbing code is a concern. Availability of HET's may be an issue.
Mandatory Irrigation Rain Sensors on all existing and new irrigation systems by a certain date (by muni customers for both outdoor and commercial)	C	Concern is related to reasonableness of requiring that existing irrigation systems be retrofitted (water savings vs. cost), and ability to inspect to ensure compliance. Furthermore, need to provide sufficient time for retrofit. POTENTIAL ALTERNATIVE: Institute an incentive program for rain sensors.
Mandatory 6-inch soil depth for new developments (by muni customers for both outdoor and commercial)	D	Concern is related to reasonableness of a rule mandating the soil depth and application and enforcement across entire service area. POTENTIAL ALTERNATIVE: Encourage wholesale customers to adopt the requirement.
Mandatory inspection of all irrigation systems using over a certain amount (35,000 gallons) of water per month	E	Concern is related to reasonableness of making inspections mandatory, availability of inspectors across service area, and allowing time for new TCEQ inspector license. POTENTIAL ALTERNATIVES: Encourage wholesale customers to adopt the requirement. Require that wholesale customers contact users of greater than a certain amount to offer free irrigation inspections.
Mandate separate irrigation meters for new large landscapes	F	Concern is related to reasonableness of mandating measure and ability to demonstrate water savings. The impact fee amount needs to be considered. POTENTIAL ALTERNATIVE: Encourage wholesale customers to adopt the requirement or to make available and promote separate irrigation meters. Conduct study to determine savings and how impact fees for customers are developed.
Landscape ordinance or deed restriction with a maximum irrigated landscape area (e.g. a percentage) in all new residential developments.	G	Concerns relate to lack of authority over land use. POTENTIAL ALTERNATIVES: Encourage wholesale customers who have land use authority to adopt the requirement. Provide incentives to homebuilders. Create landscape certification program.
Mandatory toilet replacement by a certain date (multifamily and commercial)	H	Concerns for a mandatory program include LCRA's ability to enforce across its entire service area. POTENTIAL ALTERNATIVES: Institute a toilet incentive program of some variety. Encourage LCRA wholesale customers to institute programs where feasible.
Amend LCRA rules to require that muni wholesale customers have inclining block, excess use, and/or seasonal rate structures for residential customers	I	LCRA can require some form of "water conservation pricing," but cannot dictate the exact structure. TCEQ has oversight on rate issues.

attachment1-combined measures ranked FINAL NOV.xls

Attachment 2:

Conservation Measure Descriptions

The Task Force explored numerous water conservation strategies and measures. Note that many of the measures were not adopted as recommendations by the Task Force. Unless otherwise noted, rebates and/or incentives include a subsidy for part or all of the purchase cost of preapproved models of the relevant equipment.

Residential Indoor Measures

Clothes Washer Rebates and/or Incentives: Clothes washers manufactured after 1992 use between 25 and 40 gallons per load (gpl); prior to 1992, washers used up to 60 gpl. Newer clothes washers must meet stricter efficiency standards by the year 2011.

Dishwasher Rebates (Residential, Multi-Family Residential, or Commercial): Dishwashers are one of the top four water-using appliances in most households. Newer, water and energy efficient models have been estimated to save 500 to 800 gallons per year compared to using an average model, as well as an additional approximately 6,500 gallons per year due to the elimination of the need to pre-rinse. A list of qualifying models would be provided to those applying for rebates.

High Efficiency Toilet (HET) Rebates, Incentives and/or Distribution: Toilets in houses older than 1992 can use between 3.5 and 7 gallons per flush (gpf). The current standard is 1.6 gpf; HETs use only 1.2 gpf. This measure is most effective in older communities and tends to have high water savings reliability as toilet use is the largest indoor residential use of water.

Hot Water on Demand System Rebates: When an end user turns on a hot water faucet, heated water from a traditional water heater will then enter the in-house plumbing system, and the existing water in the lines is wasted down the drain. Installing a point of use pump can eliminate the waste; water providers throughout the country are providing rebates for these systems. Point of use pumps send cold water that would normally go down the drain back to your water heater through the cold water line. The pump recirculates the water until it reaches the desired temperature.

“Instant On” Water Heater System Rebates: Also called tankless water heaters, these water heaters are placed close to the need for hot water, e.g. the kitchen or bathroom. Units can be electric or heated by natural gas. When an end user turns on a hot water faucet, heated water from a traditional water heater will then enter the in-house plumbing system, and the existing water in the lines is wasted down the drain. With a tankless water heater, the water is heated at the source, and hot water is limitless. Several water providers do not provide rebates for these systems as some systems have been known to increase energy use.

Showerhead Rebates, Incentives and/or Distribution: Showerheads and faucets without aerators in houses older than 1992 can use between 3 and 8 gallons of water per minute (gpm). The current maximum standard is 2.5 gpm. This measure is most effective in older communities.

Water Softener Rebates: Some models of water softeners recharge using a time clock, thus recharging whether it is necessary or not, e.g. while a resident is away on vacation. Some providers offer rebates to replace timer-based water softeners (owned or leased) with a new demand initiated regeneration (DIR) water softener. Modern units have a water meter or hardness sensor to control regeneration. Thus, soft water is produced only as it is needed, and regeneration is typically more infrequent than clock controlled regeneration.

Irrigation, Soil and Landscaping

Irrigation System Rain/Freeze Sensor Rebates, Incentives and/or Distribution: Rain/freeze sensors can be incorporated into an automatic irrigation system so the system does not operate and/or does not perform after 1/8" of rainfall occurs or upon freezing temperatures. LCRA could provide rebates on or free distribution of these sensors. Requiring sensors for all new residential, multi-family residential, and commercial irrigation systems is something LCRA may be able to encourage or mandate in the future.

Irrigation Technology Rebates and/or Incentives: Irrigation technology continues to evolve, and irrigation-related companies will continue to offer equipment that enables irrigation systems to use less water. For example, the latest conservation-related innovation includes multi-stream rotating nozzles. This type of sprinkler is a multi-stream rotor the size of a spray nozzle. It fits any conventional spray head body or shrub adapter, and offers high uniformity and low application rates.

Irrigation Timer Distribution for Hose-End Sprinklers: The simplest way to apply water evenly over a large surface is by sprinklers. Sprinklers, however, can have a negative side if they waste water. Water waste can occur when wind blows water away from the desired target before it reaches the ground and when water is sprayed onto a hard surface or simply becomes runoff. When used properly, hose-end sprinklers can be an efficient distribution of water. Numerous types of hose end sprinklers are available for use. Different brands will have different precipitation rates (the rate at which water is applied by the sprinkler), which will affect the needed run time (how long your sprinkler should stay on). One can calculate an amount of time that is the most efficient use of irrigation water and attach a timer to the hose such that the water is turned off at the appropriate time.

Native or Adapted Residential, Multi-Family Residential, or Commercial Landscape Rebates: As provided by Hill Country Landscapes, choosing plants that are well adapted to the soil and climate conditions of your yard is most water efficient. Native plants maintain the look and feel of the Hill Country and provide a haven for birds and butterflies. Well adapted plants are easy to maintain and less likely to be stressed by the thin soils and

climate extremes of Central Texas area. Hill Country Landscapes provides a list of native and adapted plant species. LCRA could provide a rebate for any of those listed.

On-Site Gray Water Reuse-Associated Incentives: Gray water is defined as untreated wastewater produced from baths and showers, clothes washers, and bathroom sinks that a homeowner collects and re-uses, most often for landscape irrigation. LCRA could provide rebates on infrastructure used to collect, store, treat (via settling tanks), and distribute the gray water; they could also provide rebates on installation costs.

Rainwater Harvesting System, Large (over 500 gallons) Rebates and/or Incentives for Residential and Multi-Family Residential Users: Due to rapid urbanization, infiltration of rain water into the soil has decreased drastically and recharging of groundwater has diminished. A homeowner can purchase a tank with which to capture rainwater and use it for irrigation and other purposes, using the water more efficiently than had it become runoff in an urban watershed.

Soil Amendment Rebates for Builders of New Homes or Commercial Users: Amending soil with organic material has multiple benefits. Organic matter particles can hold moisture in the soil for extended periods, allowing water to be available to plants over a longer period of time. Organics can also provide small amounts of key nutrients nitrogen, phosphorus, and potassium and also increases microbial activity, which improves plant root growth. This addition also “opens” clay soils, allowing for better drainage, and “closes” sandy soils, preventing water from leaching away too quickly. LCRA could provide rebates for purchase and installation of organic plant material. This measure could also include soil inspection, similar to Denver’s program.

Weather-based (“smart”) Residential, Multi-Family Residential, or Commercial Irrigation Controllers Rebate or Funding for Irrigation Audit Programs Coupled with Distribution of These: Weather-based controllers are irrigation clocks that automatically adjust irrigation run times in response to environmental changes. These controllers use sensors and weather information to manage watering times and frequency. As environmental conditions vary, the controller increases or decreases irrigation. They have the ability to turn off sprinklers automatically during rain, high wind or low temperature, and they reduce outdoor water use by an average of 15 to 30 percent. They also reduce over watering, which can cause fungal disease and insect problems. Rebates for these systems are common; LCRA could also combine irrigation audits with weather-based controller distribution, i.e. those receiving audits would receive weather-based controllers as applicable.

Industrial, Commercial and Institutional Indoor

Commercial Car Wash Equipment Rebates: Commercial car washes can implement numerous practices to more efficiently use water. For example, regular replacement of wash nozzles is necessary to avoid leaks. Additional water savings can be achieved by installing weep management systems, either weep recovery or intermittent weep systems, to control bleed-off from nozzles during freezing weather. Other possibilities include installing a

water reclamation system and replacing plastic or brass nozzles with stainless steel nozzles. LCRA could provide rebates for car wash equipment that has demonstrated water savings.

Commercial Ice Machine Rebates and/or Incentives: With this, LCRA would provide incentives to replace water-cooled ice machines with air-cooled units. More water is used in water-cooled ice makers to cool the system than to make the ice itself. Commercial ice-makers typically use 15 to 25 gallons of water to produce 100 pounds of ice flakes or cubes, depending on the quality of the ice. Older water-cooled ice machines use as much as 90 gallons to produce the same quantity of ice, and these quantities do not include the water used to cool the machine. It takes 130-180 gallons of cooling water per 100 pounds of ice in a typical water-cooled ice machine.

Cooling Tower Audits: Cooling towers are heat removal devices used to transfer process waste heat to the atmosphere. Cooling towers may either use the evaporation of water to remove process heat and cool the working fluid or rely solely on air to cool the working fluid. Common applications include cooling the circulating water used in oil refineries, chemical plants, power plants and building cooling. A cooling tower audit is an on-site evaluation of cooling towers and cooling water systems. A team of experts evaluate the general condition of the cooling tower, the cooling water system, and the water treatment program. The intent of the audit is to find more efficient ways to use water for cooling. The audit team, in a subsequent

Equipment and/or process rebates and/or incentives for ICI Users: ICI customers would receive incentives to install industry-specific water-saving equipment, which will reduce water consumption. One of the main goals of the program would be to shorten the payback period associated with large water saving projects, thus making their implementation more feasible from an economic standpoint. For example, LCRA could subsidize an entity planning to install infrastructure that would capture rainwater, stormwater, or a/c condensate and enable this water to be reused onsite.

Hotel and Motel Audits: LCRA could provide professionally trained staff to perform audits of those hotels and motels within the service area that agree to be audited or to every hotel or motel. This program would be free and would help educate hotel and motel staff in ways that could reduce their water use, thus reducing their water bills. Similar to the Southwest Florida Water Management District, part of a program could involve a linen and towel reuse program that launders bed linens and towels every third day of a guest's stay, unless requested otherwise by guests.

Low Water Use Urinal (High Efficiency Urinal) Rebates and/or Incentives for ICI Users: A high efficiency urinal (HEU) uses no more than 0.5 gallons per flush or 1.9 liters per flush. This is a reduction from the current standard of 1.0 gallons per flush or 3.8 liters per flush as required by the Energy Policy Act of 1992. By this definition, water free urinals are categorized as HEUs. Prior to 1994, urinals used between 1.5 and 3.0 gallons per flush.

Spray rinse valve distribution for ICI Users: LCRA would offer an incentive for the purchase and installation of a more efficient pre-rinse spray valve used by restaurants. The

efficient valves utilize a 'knife-edge' spray rather than a 'shower-type' spray to better focus the available energy and remove food particles more efficiently. A standard pre-rinse spray valve uses 2 to 6 gallons of water per minute; low-flow sprayers use 1.6 or less gallons of water per minute.

Waterless Urinal Rebates: Waterless urinals do not use any water when flushed; instead, they utilize a trap insert filled with a sealant liquid instead of water. The lighter-than-water sealant floats on top of the urine collected in the U-bend, preventing odors from being released into the air. Although the cartridge and sealant must be periodically replaced, the system saves anywhere between 15,000 and 45,000 gallons of water per urinal per year. LCRA could provide ICI customers wishing to install these with rebates for each urinal purchased.

Wholesale Customer Measures (Incentives and Rules)

Conservation Coordinator: Assigning someone to be responsible for implementing any required water conservation measures, whether a new or existing employee, will increase the success of any conservation program. People support what they create. Having a conservation coordinator responsible for water conservation ensures someone has taken ownership of the success (or failure) of the program.

Irrigation audits to be implemented by municipal wholesale customers: Detecting leaks and establishing proper sprinkler and irrigation timer settings can save a substantial amount of water for large irrigation users. Typically, audits are conducted on customers with peak use of over 25,000 gallons (or other threshold appropriate to the wholesale customer) in any month, to include most ICI customers, e.g. schools, restaurants, and industrial customers. The audit includes a system assessment by a licensed professional to identify any increased efficiency opportunities.

Irrigation standards to be implemented by municipal wholesale customers: Landscape irrigation drives summer peak water usage. Well-designed irrigation systems accompanied by appropriate practices can reduce outdoor water use. Irrigation standards would ensure the design and installation of irrigation systems that prevent the waste of water, promote the most efficient use of water and apply the least amount of water required to maintain healthy individual plant material or turf. The Texas Commission on Environmental Quality (TCEQ) has established irrigation standards that LCRA is considering adopting.

Notification of the Top 10 Percent of End Users About Their Water Use: Notifying the top 10 percent (or some other customer-appropriate threshold) of water users served by a specific utility informs those users of their relatively high use of water, which has been the impetus for conservation measures, or at least less wasteful behaviors, in many utilities.

Partnerships with Realtors to Encourage Equipping Homes with High Efficiency Toilets (HETs) Upon Resale: While some entities have had conservation success with a toilet replacement program upon resale or due to plumbing code changes or other threshold,

utilities are often unaware of if and when a property sells and mandatory replacement could place a burden on lower-income families. While many on the Task Force voiced support for mandatory retrofit upon resale, the recommended actions include that LCRA encourage their raw water customers to adopt a mandatory HET retrofit upon property resale, as well as support their raw water customers in developing partnerships with realtors to market the replacement of toilets as a positive thing and/or a “green” feature.

Rate Structure that Encourages Water Conservation: Rate structures and practices that promote the efficient use of water include drought demand rates, excess use rates or excess surcharges, inclining block rates, and seasonal rates. Price can be used to modify customer behavior to use less water at the tap, stop and prevent leakage and waste, and send less wastewater for treatment. The repeal of volume discounts is also a type of conservation pricing as their elimination would remove any existing disincentive for conservation. Charging a higher unit price as use rises is a common form of conservation pricing (inclining blocks rates).

Soil minimum standards, to include depth and quality, to be implemented by municipal wholesale customers: Inadequate soils do not retain sufficient moisture, thus resulting in frequent lawn and landscape irrigation. Organic content in soils increases water-holding capacity of the soil. Requiring new homes to have an adequate depth of quality soil reduces watering requirements.

Water Waste Restrictions: Some LCRA raw water customers do not have the ability to create an ordinance or tariff. However, for those that do, LCRA could require or encourage water waste restrictions, potentially year-round, in the form of an ordinance or tariff to be implemented by municipal wholesale customers. Examples include restricted watering schedules and penalties for improper sprinkler placement (such that the water is falling on an impervious surface).

Wholesale customer conservation loan, grant or rebate program (up to a set dollar per gallon saved): Utility budgets are often completely allotted, and non-emergency projects can become lower priority. In this program, customers would receive loans, grants, rebates or other incentives to implement water conservation measures. Utility programs to decrease total water use can save substantial volumes of water. In this scenario, wholesale customers could apply for funds that would enable them to implement any approved water conservation measure, to include utility-specific loss reduction programs, such as leak detection and repair efforts and meter testing and replacement. Customers would ultimately repay the funds to LCRA (if LCRA opts for a loan program).

Other Measures

Conservation Metrics: Defining metrics with which to measure the success of a conservation program and maintaining the data necessary for calculating these metrics will allow the customer and/or LCRA to determine if implemented conservation measures are saving water and how much. If the amount saved is less than expected, these metrics can

then be used to determine if the current strategies should be continued as is or if modifications would increase water savings. For the raw water customer, a summary of how their conservation program compared to the defined metrics would be required annually. For LCRA's power plant customers, LCRA would develop a water used per megawatt hour or other metric appropriate to each power plant for tracking water savings over time. Separately, LCRA would compile the metrics defined for the program as a whole at some frequency and make the results available to the public, e.g. posting on the LCRA website.

Conservation or Water Efficiency Component to all Agreements Associated with the Request for New or Additional Water: For every request for new or additional water by a power plant, LCRA would place a conservation or water efficiency component into the contract. This component would require the use of conservation best practices to the extent possible, among other requests and/or requirements.

Evaluation of Water Conservation Pricing as it Applies to LCRA's Raw Water Rate Structure: Under LCRA's current standard contract, the firm raw water rate is applied through a two-step process that takes into account the amount of water a customer diverts and the amount of water a customer has contractually reserved. First, a customer is billed the firm raw water rate for each acre-foot used in a month. Second, at the end of each calendar year, to the extent that a customer does not take all of the water contracted, the customer must pay a reserved water charge of one-half of the firm raw water rate for each acre-foot reserved but not used. The reservation fee helps pay LCRA's cost of storing and managing the reserved water supplies. A take-or-pay contract is defined as one that requires the buyer to either purchase a minimum volume of water at a set price ("take") or pay for that minimum without taking delivery ("pay") but retaining a right to take delivery of that water in the future. As a customer must pay both for water that it does and does not use, there is less incentive to use less water. Eliminating this type of rate structure could potentially encourage more conservation than there would have been otherwise.

Low income housing leak detection and repair programs: Some utilities have obtained a relatively large amount of savings by providing free leak repair at the homes of those who are below the poverty line. The relevant utility would use leak detection equipment to determine whether and where leaks are occurring on the premises. If any leaks were found, that raw water customer would then provide a plumber to the end user to repair the leaks for free. The Task Force believes LCRA should provide guidance for such a program and encourage the raw water customers to create such a program.

Model Ordinances Regarding Water Use Efficiency: Some homeowners' associations and other neighborhood organizations implement rules that discourage water conservation. For example, some might set a minimum amount of turf that must be visible from the street or a minimum level of landscaping. LCRA can require conservation measures that limit water waste but it can not dictate that what size of landscape is considered reasonable. If a large landscape is using water efficiently, the LCRA can not consider the water used as wasted water. Additionally, many LCRA raw water customers do not have the ability to enforce

this type of measure. LCRA can not currently require that all wholesale customers adopt either deed restrictions or ordinances limiting the amount of irrigated landscape for end users. The Task Force has asked that LCRA develop model ordinances, though, and work with raw water customers, municipalities, homeowner associations, and developers to encourage deed restrictions and ordinances that promote water conservation and limit those that promote high water use.

Penalties for Raw Water Customer Non-Compliance within Contract: While contractual requirements will certainly increase water conservation implementation among customers, utility budgets are often already stretched thin and employees are so busy that most actions are reactive rather than proactive. If LCRA has no ability to enforce these requirements, these customers have zero repercussions for non-compliance with conservation requirements. Penalties ensure the customer commits to implementing the requirements. Penalties also can aid the customer in acquiring funding for implementation from their Board of Directors or City Council, etc.

Power Plant Requirements For those power plants served by LCRA, not simply the LCRA-owned power plants, LCRA would require the responsible party to conduct water audits at least every five years. Providing and implementing the results and recommendations that are a product of these audits would also be required. Additionally, LCRA may consider adopting a “reasonable use” standard to ensure water requests do not exceed actual water need, LCRA would define an amount of water use considered “reasonable” for those power plants requesting water. Due to continuing advances in technology, this estimate of reasonable use must be updated with some frequency.

State Legislation to require that All New Toilets Sold in Texas must be HET: While LCRA would consider modifying plumbing codes to require HETs in all new and remodeled homes and buildings, LCRA does not have a plumbing code and many LCRA wholesale municipal customers do not have the ability to develop a plumbing code. An associated requirement could be added to all new customer agreements but would be difficult to enforce. Therefore, the Task Force recommended that LCRA to actively and affirmatively support state legislation to require HETs (1.28 gallons or less per flush) as the only available option for purchase throughout the state of Texas after a certain date.

Study of Potential Water Savings Related to Separate Irrigation Meters. Separate irrigation meters for new large landscapes enable a user to determine outdoor versus indoor water use. Knowing the amount of water used for outdoor landscaping can support a reduction in that use, inform a user if and when a leak occurs, and provide a realistic estimate of total water savings possible. Requiring all customers to have separate irrigation meters may be expensive, and the Task Force did not have enough information to estimate the amount of water this measure can save. Thus, during the next two years, they would like LCRA to obtain factual information regarding estimated and actual savings resulting in separate landscape meters to develop this estimate. If LCRA determines this measure can provide savings that justify implementation, they should then amend their rules accordingly.

Wastewater Reuse: Wastewater reuse encompasses the beneficial use of wastewater treatment plant effluent. Effluent is domestic or municipal wastewater that has been treated to a quality suitable for a particular beneficial use. Beneficial uses of effluent include golf course irrigation, industrial cooling and process water, and, employing a strict level of treatment, drinking water. Reuse is the only source of water that increases by volume with increased growth and economic activity *and* helps conserve traditional surface and groundwater resources. Additionally, wastewater is a consistent, reliable supply that does not vary in quantity due to weather conditions.

Water Conservation Certification Program: The purpose of a water conservation certification program is to recognize year-round conservation efforts performed by specific entities and provide an incentive to initiate or continue these efforts. Typically, the programs are industry specific, e.g. separate certification programs can exist for golf courses, schools, new homes, etc. In addition to the water saved, LCRA would benefit from the positive public relations of a public/private partnership program. The incentive for the organization would be positive promotional signage, which can be placed at the business and/or on marketing materials, to show participation in the program. These programs would be voluntary; the facility owner would request certification from and be recognized by LCRA with regard to water conservation.

Water Use Survey of ICI Entities to Determine More Precise Magnitude of Potential Savings: While residential customers typically use water in similar ways, ICI customers use water for vastly different purposes, e.g. manufacturing facilities, hospitals or health care facilities, schools and restaurants. Conservation measures that produce results in one facility may have a minimal impact in others. A survey would provide a realistic estimate of maximum water savings potential among ICI customers, as well as an estimate of the level to which these customers would conserve, i.e. for a given facility, whether conservation would solely be monetarily driven or if societal and environmental impacts would affect their efforts.

Public Information/Education

Hill Country Landscapes: The Hill Country Landscape Option is a tool to help homeowners create a well designed, water efficient landscape. The intent is that, by following these guidelines, one can have a successful landscape that saves time, energy and water. Information available includes ideal soil conditions, suggested native and dry-weather tolerant vegetation, design options, and efficient irrigation techniques.

Landscape Demonstrations: Created for public education, a living landscape demonstration would feature native, heat- and drought-tolerant plants, trees and shrubs. These exhibit(s) would showcase different design possibilities for water-wise landscaping, as well as demonstrate water conservation techniques, to include irrigation methods.

LCRA Nature Parks: LCRA's nature parks and natural science centers offer a diverse array of outdoor education and recreation programs. Most programs must be scheduled by schools, groups and organizations in advance; however, some classes are offered at specific

times and dates for individuals, families and groups. Students can learn about water quality, wildlife, geology, and other science and natural history topics in the TEKS-aligned programs. Additionally, LCRA nature parks offer boating, rafting and kayaking adventures on the Highland Lakes, Colorado River and Matagorda Bay. Locations include Canyon of the Eagles Nature Park, Matagorda Bay Nature Park, and McKinney Roughs Nature Park.

Rain Barrels, Bulk Purchase and Distribution: Due to rapid urbanization, infiltration of rain water into the soil has decreased drastically and recharging of groundwater has diminished. A homeowner can install a rain barrel which to capture rainwater from his/her roof and use the water for irrigation and other purposes, using the water more efficiently than had it become runoff in an urban watershed. The barrels hold 75 gallons of rainwater and include a debris screen, hose, and overflow tube. LCRA could purchase a relatively large number of barrels and make them, as well as instructions on how to install and most efficiently use them, available to residents within the basin. Small rain barrels do not save a large volume of water, but tend to increase awareness of water used for landscaping.

Regional Councils to Communicate Conservation Messages Consistent with the LCRA Conservation Programs: LCRA Regional Councils were created to provide a two-way communication link between LCRA and the communities it serves. Thus, conservation information could be disseminated to the members of the councils, who would then share this information with the communities they serve. Additionally, conservation-related concerns expressed by the communities could be communicated back to LCRA.

Water IQ Water Awareness Campaign: The “Water IQ: Know your Water” is the statewide public awareness water conservation program designed to educate Texans about water conservation. Through Water IQ, the Texas Water Development Board (TWDB) provides general information on water efficient practices, raises awareness about the importance of water conservation and helps Texans use less water. Water IQ is designed to complement and support existing local and regional water conservation efforts. Thus, LCRA can promote and support this campaign in partnership with customers to increase education efforts.

Web-Based Self Home Audit: A web-based self-assessment tool could be made available on the LCRA water conservation web site. A guide, a form, and, potentially, frequently asked questions (and responses) could be provided. The intent is to help people understand how much water they use in and around the home, how they compare to the average residential water use, and which areas they could improve on.