City of Santa Fe

Agenda

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**SANTA FE WATER CONSERVATION COMMITTEE MEETING**
**CITY HALL - 200 LINCOLN AVE.**
**CITY COUNCILORS' CONFERENCE ROOM**
TUESDAY, FEBRUARY 11, 2014
4:00 PM TO 6:00 PM

1. CALL TO ORDER
2. ROLL CALL
3. APPROVAL OF AGENDA
4. APPROVAL OF CONSENT AGENDA
5. APPROVAL OF MINUTES JANUARY 14, 2014 WATER CONSERVATION COMMITTEE MEETING
6. CONSENT AGENDA
   A. DROUGHT, MONSOON AND WATER RESOURCE MANAGEMENT UPDATE (Rick Carpenter)

**DISCUSSION ITEMS:**

**INFORMATIONAL ITEMS:**

7. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITATIVES: (Councilor Ives 75 minutes)
   A. GROUP #1 – WATER CONSERVATION & DROUGHT MANAGEMENT PLAN UPDATE (15 minutes)
   B. GROUP #2- WATER CONSERVATION EDUCATION/OUTREACH (15 minutes)
   C. GROUP #3- WATER CONSERVATION CODES, ORDINANCES & REGULATIONS (15 minutes)
   D. GROUP #4- REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS (15 minutes)
   E. GROUP #5- DOMESTIC WELLS WITHIN THE CITY LIMITS (15 minutes)
8. REBATE ANALYSIS (Doug Pushard 45 minutes)

**MATTERS FROM STAFF:**

**MATTERS FROM COMMITTEE:**

**NEXT MEETING – TUESDAY, MARCH 11, 2014:**

CAPTIONS: FEBRUARY 26, 2014 @3 pm PACKET MATERIAL: FEBRUARY 28, 2014 @3 pm

**ADJOURN.**

**Persons with disabilities in need of accommodations, contact the City Clerk's office at 955-6520, five (5) working days prior to meeting date.**

WATER CONSERVATION COMMITTEE
INDEX
JANUARY 14, 2014

CITY OF SANTA FE

# SANTA FE WATER CONSERVATION COMMITTEE

## MINUTES – January 14, 2014

**Frances Lucero, Stenographer**

**1/14/2014**

DRAFT UNTIL APPROVED

**SANTA FE WATER CONSERVATION COMMITTEE MEETING**
TUESDAY, JANUARY 14, 2014
4:00 PM TO 5:45 PM

MINUTES

1. CALL TO ORDER
   The meeting was called to order by Acting Chair, Melissa McDonald at 4:00 pm in the City Councilor's Conference Room, Santa Fe, New Mexico.

2. ROLL CALL
   Present
   Melissa McDonald, Acting Chair
   Nancy Avedisian
   Doug Pushard
   Tim Michael
   Grace Perez, Telephonically
   Giselle Piburn
   Stephen Wiman
   Bill Roth

   Not Present
   Councilor Peter Ives, Chair, Excused
   Karyn Schmitt, Excused
   Lisa Randall, Excused

   Others Present
   Laurie Trevizo, Water Conservation Manager
   Caryn Grosse, Water Conservation Specialist
   Anna Serrano for Fran Lucero, Stenographer

3. APPROVAL OF AGENDA

   Amended to move item 6A to Discussion.

   ***Mr. Wiman moved to approve the agenda as amended, second by Mr. Piburn, motion carried by unanimous voice vote.***

4. APPROVAL OF CONSENT AGENDA

   ***Mr. Pushard moved to approve the consent agenda, second by Mr. Michael, motion carried by unanimous voice vote.***

5. APPROVAL OF MINUTES DECEMBER 10, 2013 WATER CONSERVATION COMMITTEE MEETING

   Note to Stenographer to list those members who are excused under not present category. Let the record reflect that Grace Perez was not present and excused by the Chair.

   ***Ms. Piburn moved to approve the minutes of December 10, 2013 as amended, second by Mr. Michael, motion carried by unanimous voice vote.***

6. CONSENT AGENDA

*A. DROUGHT, MONSOON AND WATER RESOURCE MANAGEMENT UPDATE (Rick Carpenter)*

Ms. Trevizo reported that item 6A has been approved, therefore there will be no discussion based on the approval. It was noted that Mr. Carpenter has been ill; the committee can provide Ms. Trevizo with any questions and Mr. Carpenter will respond in writing.

Questions:

1. I would like to know the impact of the annexation which occurs in mid January on the water system and the possible additional demand for water.
2. Does anyone know the private well count for the area about to be annexed?
3. Do we have any knowledge so far of the 2013 water production figures and how they compared to 2012? I know the GPCD comes later.
4. Grace Perez: Referred to the bottom of the 1st page and wanted to know what specific action has been taken or considered.

Ms. Trevizo responded that as far as the annexation we gained customers but we also gave away a lot of customers as well. Ms. Trevizo has asked billing to provide her with calculations. For example we had a lot of customers in Las Campanas who are now Santa Fe County customers.

Ms. Trevizo stated that she does not know the private well count is; if they are in the Santa Fe Watershed they will be covered in Amy Lewis report.

Ms. Trevizo stated that the production numbers are lower than they were in 2012.

Ms. Trevizo informed Ms. Perez and the committee members that Mr. Carpenter would respond to this particular question as talks are going on right now.

Ms. Perez stated that there is a meeting taking place tomorrow on the San Juan Chama resources and she looks forward to an update.

STATUS UPDATE ON WATER CONSERVATION EDUCATION & OUTREACH (Laurie Trevizo)

**DISCUSSION ITEMS:**

7. 2014 LEGISLATIVE PROPOSAL ON WATER CONSERVATION

Mr. Pushard informed the committee that he would leave the meeting early this evening to attend the round table discussion on rebate credit.

Ms. Trevizo asked the question in reference to last meeting minutes, last page; Senator Wirth's visit – there is interest from the committee to write a letter to State Senators and Representatives on what we would like them to do. It shows this as a follow up for the next agenda. Ms. Trevizo requested to the Acting Chair that she would like to be involved in that process next meeting.

The legislature starts on January 21st and asked if there was further discussion on this item. No additional information from the Acting Chair or the committee members.

**INFORMATIONAL ITEMS:**

8. GROUP REPORTS FROM WATER CONSERVATION COMMITTEE INITATIVES:

A. GROUP #5 – DOMESTIC WELLS WITHIN THE CITY LIMITS – STEPHEN WIMAN

Included in the meeting packet is a summary of findings for the committee review. The two issues the sub-committee wanted to address most urgently were the effect of private wells in the city upon the aquifer and whether or not they affected the Santa Fe River. In both cases the effects are really quite minimal. One thing worth saying is that the city ordinance which requires any new wells to be permitted by the city and there have only been replacement wells permitted. That number is something like 18 or 20 wells and reporting from the wells is less than desired; won't use the word non-existent because we don't know that. We made a requirement but we did not follow up on it. It is know that there are no new wells being drilled in the city and that is a favorable outcome. The usage of the private wells in the city is expected at 260 ac. ft. per year and draw down the aquifer 3 ft. over 40 years. As the water is being used much of it is actually being returned to the aquifer and some case the Water Treatment Plant. The other issue is if these wells weren't there the city would be providing water for that. They are not completely bad for the overall water regiment/cycle. Again there is some return to the aquifer and the Water Treatment Plant. The records that we have are less than perfect but to go back and find out where all those wells are would be difficult. A recommendation moving forward is probably the first one which is widely accepted is some type of public information campaign that would include private well owners. Maybe there is a way to offer them some of the benefits that people on the water system benefit from such as rebates. Incorporating them as being part of the big picture and also reminding them that they need to adhere to regulations that apply to all water users within the city; I believe this is well established by law. The next specific step for the organization as the work group; we would like to arrange a meeting with the legal team at the city and find out if they are in agreement of what we have put in writing and if this is agreed upon, we will set up the appointment with someone from the City Attorney office.

Mr. Marcos Martinez, City Attorney Office
I have looked at this status report and I am impressed with what has been done. I have no problem meeting with members or I can talk about it now if you would like, to a certain extent. In general I would say I am not in disagreement there is a question of degree that some of the time conclusions in maybe one of them and the same in the recommendation. The city ordinance on domestic wells was passed in 1999, ordinance # 1999-3. Again, I was impressed with the reasonable approach. The only thing I would caution on was the conclusions that the city was to regulate all wells. I think that the State Engineer might disagree with that; the city does have some broad regulatory authority on domestic wells in the city. I think you are correct in finding that authority through domestic well statute as

passed by the legislature in 2001. Basically it analyzes the city's domestic well ordinance. The court will say that as long as the city ordinance is not in conflict with state law the city has some authority to regulate in that arena. I think when it goes beyond domestic wells, other private wells, non-domestic wells that the city has more difficulty regulating those and that is simply because one of the elements that the State Engineer determines and administers is the purpose and place and use of the wells since there is a purpose for the use. There is some statutory authority for the regulation of wells and I believe you found those in your research. There are two ordinances that directly speak to our ability to regulate wells aside from the ordinance – Santa Fe City Code 25-321includes water waste and all private wells located within the city limits; Santa Fe City Code 25-5.5 – Water Emergency Management Plan also states that if the Water Emergency Management Plan applies to all water customers and to all private well users located in the city limits. I believe the city has made strides to regulating all wells when it comes to waste and Water Emergency Management Plans, you may want to consider more specific ordinances that also address use to make it clear that the water emergency restrictions apply to all customers also might apply to other users. Those are my observations on the conclusions.

The adjudication of the Santa Fe River, which has been on-going since 1971 with private owners against PNM. A hydrographic survey was to be done and completed and was re-initiated in 1977. Basically the State Engineer deals with adjudications, prioritizing in general, I would say, those adjudications that have Indian water right claims. Basically the State Engineers is not putting a lot of resources in to adjudication. Every year they file a report that obligates under Supreme Court rule, to describe all adjudications that are on-going and describing the allocations and resources they have. I have received a copy of the 2013 report from the State Engineers office; they indicate they have allocated $1/10^{th}$ of a contract attorney's time to address the Santa Fe River adjudication. The State Engineers office use to put out an annual report and in that annual report they would give summaries and status of adjudications in the state and the last one they did was 2009 – 2011. Mr. Martinez read from the 2009-2011 report (pg. 69). They will not be doing anything on the adjudication of the Santa Fe River; the city doesn't need to intervene in this case because we have been involved since the beginning. The State Engineers is not going to do anything about domestic well users because they don't have the resources to do so. The process of the adjudication is the State looks at everyone in the hydrographic survey. That is a survey that the state does for every water user on the surface, surface water users mostly acequias and some community ditches and the ground water users and after they have made that survey they send you the results and ask you to sign off on a consent order. There is a time s third party can disagree but this is only after everyone has had a word at the state. This is an inter-state proceeding order when the state has done an initial order on everyone else's water rights. Until that happens the city won't have an opportunity by way of the structure of the adjudication process to object a third party claim; this would be the city objecting to domestic well owners. There is an opportunity for the city to basically object to other claimant's on the Santa Fe River.

Questions: Will the city have an opportunity to provide an objection to that position?

Mr. Martinez: That might help; you alluded to the fact that the city's position has not been great; there are other items that affect this; reporting being submitted and not submitted, and the state note having people to check those reports.

Q: (Melissa McDonald) it seems that it encourages people to waste water; it says you haven't been using it even though you are allowed to use it or we are going to take it away. That is what we don't want, we don't want them to take it away, we want them to conserve. I don't know if there is an answer to that, but that is certainly the problem. People feel that they have to use water to keep their water. It is the nature of the problem; people feel if they don't use the water it will get taken away. I also worry a bit, if you have a slow producing well and you are told it is going to be assessed or metered, you may replace it and produce more than you actually produce. Most of the wells I know are slow producing and will never get to 3 ac. ft., so when you tell people you are allowed up to 3 ac. ft. and we are going to make you put a meter on, they may say ok I am going to try to make my well work better.

Mr. Martinez reiterated that mostly all adjudications are long running.

Ms. McDonald made a clarification; if you need a replacement well, can't make the distinction between irrigation well or domestic well, I don't know how it is determined. Is it automatically dropped in half if you go to a lower level?

Mr. Martinez said that he believes the State Engineers Regulations commit them to regarding replacement/supplemental well; one set of the regulations says that the State Engineer can limit someone through their historical use basically. What I have seen from the State Engineers office is that seems like they are cutting back. I can't really explain the rationale.

Melissa McDonald: For those people who have replaced wells since 1999, even though they aren't reporting them and if you go back and tell them you need to see the historical use, they know they are required to keep records, is that correct?

Mr. Martinez: There are two record keeping requirements, meter work report (either monthly or annually) and well log report. That same requirement reports pertains to the city.

Mr. Pushard: The ordinance you are referring to is 2004-7 and it specifically says; "the wells shall be metered to city specifications and monthly usage shall be reported."

Mr. Martinez: That is in the ordinance, whether people are doing it, I don't know.

Mr. Wiman: Has the city made a conscious effort not to be more involved with private wells within the city. Are they asking people to come forward and register their wells? It could be a very invasive process.

Mr. Martinez: I think the city made it first stand by having the first ordinance on domestic wells. More research needs to be done and possibly through the State Engineer's office.

Mr. Pushard continued on regulation #1, well owners are not qualified for rebates and one of the ideas that came up was to broaden our rebate program to well owners and in doing that we would make them aware that they would fall under certain regulations. Mr. Pushard was asking the committee if they would support the working group drafting a document in support with Ms. Trevizo's assistance.

Ms. Trevizo: This would be an ordinance change so we are talking about going through the full committee process so it depends on how the language would be considered. People do not pay in to the levy fund which is the $4 fee – twice a year that all of the other customers pay in to which funds all of our rebate programs. For example we would offer them a reduce rebate. We don't cut checks; we don't have a policy to cut checks and will not ever cut checks. They would need to have sewer or refuse to be eligible as well.

Tim Michael: If there is only a small fraction I would like to know.

Ms. Trevizo said that an IT query is not an easy search.

Mr. Roth noted that he is a well user and didn't have a water bill for 8 years.

Mr. Pushard said that there is no register when a property sells if they are well owners. One idea would be an ordinance to make the city aware, and I will include in the draft that we bring back and work with Ms. Trevizo, to make sure that they understand that they fall under the emergency water regulations. It is as much an awareness program and it also puts care out there for those who want to conserve water.

Ms. McDonald made a recommendation that this topic of discussion be brought back to the next meeting for feedback from those who are not in attendance. Also, I believe if you have a replacement well you register with the city. Anybody who decides to improve their well, I believe this is the way the city is getting information.

Mr. Pushard, point of clarification; the well ordinance is for repair. If you are deepening your existing well there is no registration with the city.

Nancy Avedisian: At the time of closing on a property, if the well needs repairs, a permit is required.

Mr. Pushard said this is only for moving a well from an existing location not completion, it is a small fraction. All the well drillers know this regulation extremely well.

Ms. Trevizo stated for this working group, that she has made it very clear as far as domestic wells are concerned; we muddle the lines between water conservation and water resources. Part of the discussion that came out of recommendation #1 as rebates are concerned is that it brings it back into the

water conservation realm and we as a group and as a committee will have some say. Once it goes out into the water resource realm and in to where legal and all those other places it will be out of our control and it is not something we will be able to manage. In your research and recommendations please keep that in mind and tie it back to water conservation otherwise as the Water Conservation office we cannot support you in some of this information.

Mr. Pushard expressed his thanks for this reminder. As a follow up we will bring discussion back on this regulation and work through Ms. Trevizo.

B. GROUP #1 – WATER CONSERVATION & DROUGHT MANAGEMENT PLAN UPDATE
Grace Perez. (Nothing to report)

Ms. Trevizo stated that this group as listed above; she and Caryn Grosse have been performing edits based on the meetings held this last year and those are in progress.

C. GROUP #2 –WATER CONSERVATION EDUCATION/OUTREACH
Stephen Wiman (handout distributed to the committee)
First presentation was given to the Santa Fe Chapter of American Institute of Architects in which there were an estimated 60 attendees. (Exhibit A attached) Slide show presentation took about 24 minutes. A follow up presentation will be a brown bag lunch to the Realtors. It was noted that they did conduct a dry run and Mr. Wiman would like to know who was comfortable doing the presentation in the future. Tim would want to do a dry run beforehand. Melissa and Ms. Trevizo are completely comfortable. Ms. Avedisian would like to work with it a little more. Bob would also like to do a dry run beforehand. Ms. Trevizo said that the next dry run would be nice having the committee as an audience and ask questions. It was also recommended to identify a Moderator. Ms. Trevizo offered Ms. Grace Perez as her expertise in that area is exceptional.

Mr. Wiman said that in the feedback it was asked to have the power point as a PDF on the website. Ms. Trevizo will check with Legal to assure that this can be done. Mr. Wiman also asked about the legality of collecting e-mail addresses. Ms. Trevizo said that she is not prepared to provide this service right now. Ms. Trevizo said that she is also working with Legal to research if we can get a Facebook page.

Compliments to Mr. Wiman for a successful presentation.

D. GROUP #3 –WATER CONSERVATION CODES, ORDINANCES & REGULATIONS

Mr. Pushard reported that the committee is working on water rating for building and have met with Amanda Evans at the Community College. The committee is hopeful that there will be resources available from the Santa Fe Community College for the project. The project is three-fold, 1) is to create a spreadsheet that is similar to the energy rating system and we pulled together the city building code, the state building code and a couple of other examples and some questions; 2) is more difficult and that is creating a rating for any of the things that can go in

to building; 3) the outcome is not an ordinance, it is not a building code change it is much more of a tool that a builder can use.

Mr. Roth said he has spoken to Kathryn Mortimer and Ms. Amanda Evans at the SFCC who are ready to help. Ms. Mortimer would like to sit with Mr. Roth, Councilor Ives, Mr. Pushard and Ms. Trevizo to discuss the code. Ms. Avedisian would like to be part of this working group.

Mr. Pushard asked if grey water falls in the Water Conservation Department.

Ms. Trevizo said they don't permit it if that is the question.

E. GROUP #4 – REESTABLISH TREND OF NET ANNUAL REDUCTIONS IN PER CAPITA WATER USAGE AND IDENTIFYING LARGE WATER USERS

Melissa McDonald: (provided a written report)
The Santa Fe Basin study refers more to climate change. Group has met with the Parks division, nothing to report at this time but working closely with them. Karyn Schmitt will provide a report at next meeting. Mr. Michaels has met with Gary Varela regarding water use in the parks.

**MATTERS FROM STAFF:**

Ms. Trevizo stated for tomorrow Public Utilities Committee Meeting, there are two action items on green building code by Kathryn Mortimer. (Read language and informed the committee that there will also be a resolution for discussion). It will go to Finance Committee on January 21st. Ms. Trevizo informed the committee that Caryn is the only LEAD certified individual in the city and is a valuable resource.

Ms. Trevizo noted that the City of Santa Fe updated their website and we should check to see if any links we have places for water conservation are working.

9. INTRODUCTION OF ROBERT WOOD, WATER CONSERVATION SPECIALIST SENIOR (Laurie Trevizo)

Mr. Wood started with the Water Conservation Office on December 23, 2013. His official title is Water Conservation Specialist Sr.

It was noted if anyone sees any water violations to bring them to Mr. Wood's attention.

The Water Conservation Committee is very excited about working with Bob Wood, past and future.

10. 11TH ANNUAL CHILDREN'S POSTER CONTEST (Laurie Trevizo)

An e-mail was included in the packet. Judging will take place on January 24th and the committee was asked to RSVP to assure that a quorum is not existent. This will be for the 2015 calendar.

Sustainable Santa Fe Awards is now taking applicants. If anyone from the committee would like to nominate please do so.

**MATTERS FROM COMMITTEE:**

Mr. Pushard referred to an e-mail from Ms. Trevizo on EPA grants that were awarded to the sustainable cities and asked Ms. Trevizo if a list of projects exists that they would like to have grant money allocated to. Would the committee be interested in brain storming on other projects that we might want grant money for.

Ms. Trevizo said that they do maintain a "big picture" item list. There are items in the "parking lot" and the feasibility of those projects and timing are looked at and reviewed against projects that are in process and completed.

**NEXT MEETING – TUESDAY, FEBRUARY 11, 2014:**

CAPTIONS: JANUARY 30, 2014 @3 pm PACKET MATERIAL: FEBRUARY 3, 2014 @3 pm

**ADJOURN**

There being no further business to come before the Water Conservation Committee, the meeting was adjourned at 5:45 pm.

**SIGNATURE SHEET**

Melissa McDonald, Acting Chair

Fran Lucero Stenographer

# MEMORANDUM

**TO:** City of Santa Fe Public Utilities Committee
City of Santa Fe Water Conservation Committee
Buckman Direct Diversion Board

**FROM:** Rick Carpenter, Water Resources and Conservation Manager RC

**VIA:** Nick Schiavo, Acting Public Utilities Department and Water Division Director NSA

**DATE:** January 06, 2014

**SUBJECT:** Update on Drought, Monsoon, and Water Resource Management

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## CURRENT UPDATE – GENERAL WATER RESOURCE MANGEMENT

As the Committee/Board is aware, our region is still suffering through a severe drought. Our region has gone through three consecutive years of record drought and heat. It is now apparent that we are probably heading into a fourth consecutive year of severe drought and abnormal heat which will present significant challenges to all water purveyors, utilities, and irrigators going forward into next year. Even though much of the State and our region have received moderate monsoonal rains overall in July and August, and with much of the state receiving record high monsoonal rains in September, most of the state of New Mexico remains in "severe to extreme" drought conditions. New Mexico appears to be the epicenter of the western U.S. drought. Weather prediction models indicate that, at least through the early part of this winter, if not longer, drought conditions in the southwest (especially Arizona and New Mexico) should be neutral to below average precipitation (snow) and above average temperatures, therefore, overall drought conditions will likely still persist at least through the early part of next year. Runoff into regional river basins and reservoirs is expected to be normal to below normal.

This current drought is extreme, but what sets it apart from previous extreme droughts is that, absent significant winter snow the rest of this year, the region will enter into next spring and summer without very much carry-over water in regional reservoirs – they are at low levels (except for the local McClure reservoir in Santa Fe). For example, Heron reservoir (San Juan-Chama Project water) is currently at 35% of capacity. This condition could make this year much more challenging than the last year has been. However, the City of Santa Fe has invested in a robust and diverse portfolio of four distinct water supply sources that allows for flexibility in meeting demand: Buckman well field, City well field, Canyon Road Water Treatment Plant on the Upper Santa Fe River, and the Buckman Direct Diversion on the Rio Grande.

## LOCAL CONDITIONS

### Source of Supply Utilization Summary

November 2013

| | | |
|---|---|---|
| City Wells | 7.47mg | 22.91af |
| Buckman Wells | 39.94mg | 122.57af |
| CRWTP | 50.30mg | 154.36af |
| BRWTP | 91.12mg | 279.64af |
| *Other Wells(Osage, MRC, etc)* | *0.00mg* | *0.00af* |

### Upper Santa Fe River/CRWTP

| | Total Combined Reservoir Level | Santa Fe Snow Gage | Reservoir Inflow |
|---|---|---|---|
| January 04, 2014 | 64.3% | 25.0 inches | 1.74 MGD |
| 5-Year Average This Date (2009 – 2013) | 47.9% | 22.3 inches | 0.44 MGD |

Heading into September, water resource managers for the City were expecting the Canyon Road Water Treatment Plant to experience significant supply shortfalls later this year and into next year – due in part to severely reduced inflows resulting from the drought, but also due to the planned construction projects inside of the reservoir footprints. However, as of January 4th, and due to the recent heavy rains in mid-September and some early snow storms, total combined storage in Nichols and McClure reservoirs is up to 64.3% (or about 2,572 acre-feet of storage). Flows into Nichols are being by-passed due to construction on the new intake facility. Inflows are expected to continue for the near future and so McClure has been releasing a small about of water to approximate inflows.

### Buckman Regional Water Treatment Plant

Flows in the Rio Grande are relatively low but the BDD Project is able to divert water. Turbidity and suspended solids are very low and raw water quality is good. Demand in the system has been low, requiring only 3 to 4 mgd from the BDD Project.

## REGIONAL CONDITIONS

### Rio Grande Basin

Surface flows in the Rio Grande and its tributaries have been well below normal, storage levels in regional reservoirs are very low currently. The recent rains have helped river flows (at least norm, temporarily) and regional reservoirs are receiving needed inflow, but normal to above normal to above normal snow pack is still needed this coming winter or reservoir levels will still

be critically low heading into next irrigation season. Recent weather forecast models seem to be suggesting that snow pack for the rest of this winter may be disappointing. Native flows in the Rio Grande will likely be low to very low.

**San Juan Basin**

It should be stressed that, conditions could significantly worsen for San Juan Chama Project deliveries next year if the drought persists (i.e., low snow pack this coming winter in the San Juan Basin), due to a lack of carry-over storage in Heron Reservoir and other reservoirs in the system. Heron Reservoir is currently at a historic low level of 35% of capacity for this time of year. Deliveries to SJCP contractors could be significantly curtailed next year. It is still too early in the year to say with much confidence, but the Bureau of Reclamation has called a meeting of San Juan-Chama contractors for January 15th wherein early forecasts for runoff and SJCP water deliveries are expected.

Dear WCC Working Groups,

Working Group #1 is charged with updating the Water Conservation & Drought Management that the City must submit periodically to the Office of the State Engineer. The document contains a section in which we describe our future conservation plans. In the past, this section has gotten short shrift. Our goal is to enhance it by including possible new programs that we deem to be high priority.

We previously requested comments from the full WCC on a draft set of Guiding Principles for water conservation programs. Now we would like your working group to identify what you consider your 5 highest priority programs for the short (1-3 years) or longer (3-5 years) term. These can be entirely new projects or new enhancements to current ones. Please limit these to the general focus of your working group. We would like your input by Friday, February 21. Please send it by email to me, copying working group members Lisa R., Bill R. Doug as well as Laurie & Caryn. We will review where we are at the March WCC meeting.

While this may seem like a tight deadline, the list will by no means be final. It is a first pass. You and the full committee will have ample opportunity to make revisions during the document review process.

Please use the following format:

| 5 programs, order not important | DESCRIPTIVE TITLE | TIMEFRAME (Short/Longer) | BRIEF DESCRIPTION (3 sentence max) |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | | | |

Thanks very much for your help.

Lisa Randall, Doug Pushard, Bill Roth, Grace Perez

Dear City Candidate:

Water is a critical issue here in Santa Fe as you're well aware. Almost every poll taken recently has it on the list of top concerns of our citizens. Water affects everything about Santa Fe…our landscapes, tourism, our economy and our quality of life.

The city has a robust and diverse water source portfolio that provides us with water security for the near-term. Water conservation has been one of the strong pillars of our water portfolio over the past decade and it remains one of our least expensive sources of future water.

The City of Santa Fe created the Water Conservation Committee in 2002 (Resolution 2002-25) with the following duties and responsibilities:

1. The SFWCC is charged with promoting water conservation, developing water conservation proposals and advising city government on water conservation activities;
2. Identifying ways to reach out to groups of all ages to educate them on additional ways to conserve water, discussing water conservation programs, their costs and benefits and methods of administration;
3. Examining building code provisions, construction practices and land use policies and their effect on water use;
4. Propose changes in code, practice and policy that will promote further water conservation; and
5. When time permits, the SFWCC shall be given the opportunity to discuss and make recommendations on water conservation programs being undertaken by the City, so long as that consideration does not delay implementation of any program.

This committee as such has an outreach working group that helps educate citizens on our current water situation. We invite you to schedule a meeting with a member of the SFWCC to review the presentation "Water Conservation in Santa Fe". It was prepared by the Water Conservation Committee with assistance from the City of Santa Fe Water Conservation Office. This overview covers the diverse sources of supply which make up our water portfolio, how we use our water (detailed both city-wide and by single-family residences), the concept of GPCD (gallons per capita per day), how Santa Fe's usage compares to that of other cities, our ability to meet future demand, and reasons, rebates and incentives to encourage residents to conserve water.

Please contact Stephen Wiman and Grace Perez, Santa Fe WCC members serving as co-chairs of the WCC's Education/Outreach Working Group, to receive a copy of this presentation. skwiman@earthlink.net giperez@earthlink.net

**Working Group 4**
**Issue: Promoting Conservation Strategies of Large Water Users**

| | |
|---|---|
| **Strategic Goal** | Contribute to reducing water use by optimizing water use by large water users |
| **Objectives** | Optimize water use by large users |
| **Tasks** | • Identify large water users<br>• Promote the installation of electronic transmitting water meters<br>• Estimate contribution to total demand<br>• Engage large water users in the discussion of how to optimize water use<br>• Identify ways to optimize the water consumption of large users, and encourage water conservation by large users, especially parks<br>• Engage in discussion Research on Smart Controllers for rebates/park installations<br>• Explore and suggest potential rebate programs and potential savings for large users<br>• Explore behavioral modification models as a means to reduction of use<br>• Research commercial water budgets |
| **Members** | Karyn Schmitt, Melissa McDonald, Tim Michael |
| **Notes** | • Research on Smart Controllers for rebates/park installations<br>• Exploring with WCC on ways to localizing —adding passive water harvesting info to the curriculum perhaps through the QWEL program<br>• Liaison with Parks and Open Space (POSAC--Melissa McDonald)<br>• Support AMI efforts for better meter reading and better software packages that help consumers track individual daily water use as a tool for increased efficiency and conservation<br>• Explore gray water rebate options with Kim Kelly Sustainable Santa Fe Commission |
| **Reference Material** | • Water Use in Santa Fe, Borchert et al., July 2009<br>• QWEL Guide and website/WaterSense<br>• City of Tucson, City of Flagstaff, Salt Lake City, Boulder website & others (engage in discussions with other water conservation programs)<br>• Upper Rio Grande Impact Assessment, a report developed by Reclamation's West Wide Climate Risk Assessment, a WaterSMART Program, http://www.usbr.gov/WaterSMART/wcra/reports/urgia.html<br>• Santa Fe Basin Study Preliminary Assessment Report, http://www.santafenm.gov/index.aspx?nid=2577<br>• 2001 City of Santa Fe Parks Mater Plan |
| **Fiscal Impact** | To be determined |

Update:
Legislative --Our committee has been following Senate Bill 16, Tax Credits for Rainwater Harvesting sponsored by Senator Peter Wirth. This bill will give a rebate up to $5,000 or 20% per system. It unanimously passed the senate conservation committee and is heading to the corporations committee. The Office of the State Engineer has concerns surrounding the Gila Wilderness watershed and possible legal challenges with regard to return flow credits. The OSE is also concerned about vouching for the "effectiveness" of these systems. In the bill, the OSE would be required to consult with the State Regulation and Licensing Bureau, and this would create more work for the already burdened office. Supporters of the bill will be looking at City of Austin's guidelines. Discussion of requiring site drawings, cistern-system drawings, backflow inspections, and meeting local codes will likely ensue at the Corporations Committee, which is the bills next stop in the legislature. People who support this legislation should contact Senator Phil Griego to voice your support at senatorgriego@yahoo.com , 505-469-6470 or P.O. Box 10 , San Jose, NM 87565

Parks -- We are continuing to compile water usage numbers

Gray Water – Kim Kelly, of Sustainable Santa Fe Commission, contacted us about potential gray water rebates. We plan to meet and discuss this and will report back.

SENATE BILL 16

**51ST LEGISLATURE - STATE OF NEW MEXICO - SECOND SESSION, 2014**

INTRODUCED BY

Peter Wirth

AN ACT

RELATING TO TAXATION; CREATING THE WATER HARVESTING INCOME TAX CREDIT; AUTHORIZING THE TAXATION AND REVENUE DEPARTMENT TO REVEAL AGGREGATE TAX CREDIT OR DEDUCTION INFORMATION TO FACILITATE A REPORT TO LEGISLATIVE COMMITTEES.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF NEW MEXICO:

**SECTION 1.** Section 7-1-8.8 NMSA 1978 (being Laws 2009, Chapter 243, Section 10) is amended to read:

"7-1-8.8. INFORMATION THAT MAY BE REVEALED TO OTHER STATE AGENCIES AND LEGISLATIVE COMMITTEES.--An employee of the department may reveal to:

A. a committee of the legislature for a valid legislative purpose, return information concerning any tax or fee imposed pursuant to the Cigarette Tax Act;

B. the revenue stabilization and tax policy

underscored material = new
[bracketed material] = delete

committee and the legislative finance committee, return information necessary to facilitate the compilation of a report to those committees on the effectiveness of a tax credit or deduction that is required pursuant to law; provided that the return information shall not include a taxpayer's name, address or government-issued identification number;

[~~B.~~] C. the attorney general, return information acquired pursuant to the Cigarette Tax Act for purposes of Section 6-4-13 NMSA 1978 and the master settlement agreement defined in Section 6-4-12 NMSA 1978;

[~~C.~~] D. the commissioner of public lands, return information for use in auditing that pertains to rentals, royalties, fees and other payments due the state under land sale, land lease or other land use contracts;

[~~D.~~] E. the secretary of human services or the secretary's delegate, under a written agreement with the department, the last known address with date of all names certified to the department as being absent parents of children receiving public financial assistance, but only for the purpose of enforcing the support liability of the absent parents by the child support enforcement division or any successor organizational unit;

[~~E.~~] F. the department of information technology, by electronic media, a database updated quarterly that contains the names, addresses, county of address and taxpayer

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[~~bracketed material~~] = delete

identification numbers of New Mexico personal income tax filers, but only for the purpose of producing the random jury list for the selection of petit or grand jurors for the state courts pursuant to Section 38-5-3 NMSA 1978;

[~~F.~~] G. the state courts, the random jury lists produced by the department of information technology under Subsection [~~E~~] F of this section;

[~~G.~~] H. the director of the New Mexico department of agriculture or the director's authorized representative, upon request of the director or representative, the names and addresses of all gasoline or special fuel distributors, wholesalers and retailers;

[~~H.~~] I. the public regulation commission, return information with respect to the Corporate Income and Franchise Tax Act required to enable the commission to carry out its duties;

[~~I.~~] J. the state racing commission, return information with respect to the state, municipal and county gross receipts taxes paid by racetracks;

[~~J.~~] K. the gaming control board, tax returns of license applicants and their affiliates as provided in Subsection E of Section 60-2E-14 NMSA 1978;

[~~K.~~] L. the director of the workers' compensation administration or to the director's representatives authorized for this purpose, return information to facilitate the

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identification of taxpayers that are delinquent or noncompliant in payment of fees required by Section 52-1-9.1 or 52-5-19 NMSA 1978; and

[~~L.~~] M. the secretary of workforce solutions or the secretary's delegate, return information for use in enforcement of unemployment insurance collections pursuant to the terms of a written reciprocal agreement entered into by the department with the secretary of workforce solutions for exchange of information."

**SECTION 2.** A new section of the Income Tax Act is enacted to read:

"[NEW MATERIAL] WATER HARVESTING INCOME TAX CREDIT.--

A. A taxpayer who is not a dependent of another individual and who purchases and installs a certified water harvesting system after January 1, 2014 and before December 31, 2024 in a residence or business in New Mexico owned by that taxpayer may apply for a tax credit against the taxpayer's tax liability imposed pursuant to the Income Tax Act in an amount up to twenty percent of the purchase and installation costs of the system. The tax credit provided by this section may be referred to as the "water harvesting income tax credit".

B. The purpose of the water harvesting income tax credit is to provide an incentive for homeowners and businesses to use harvested water for future use.

C. The water harvesting income tax credit shall not

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exceed five thousand dollars ($5,000). The department shall allow a water harvesting income tax credit only for a water harvesting system certified by the regulation and licensing department.

D. The department may allow a maximum annual aggregate of two million dollars ($2,000,000) in water harvesting income tax credits per year. Applications for the credit shall be considered in the order received by the department.

E. A taxpayer may claim a water harvesting income tax credit in the taxable year in which the taxpayer purchases and installs a water harvesting system. To receive a water harvesting income tax credit, a taxpayer shall apply to the department on forms and in the manner prescribed by the department. The application shall include a certification made pursuant to Subsection I of this section.

F. A portion of the water harvesting income tax credit that remains unused in a taxable year may be carried forward for a maximum of ten consecutive taxable years following the taxable year in which the credit originates until fully expended.

G. A husband and wife filing separate returns for a taxable year for which they could have filed a joint return may each claim only one-half of the water harvesting income tax credit that would have been claimed on a joint return.

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H. A taxpayer may be allocated the right to claim a water harvesting income tax credit in proportion to the taxpayer's ownership interest if the taxpayer owns an interest in a business entity that is taxed for federal income tax purposes as a partnership and that business entity has met all of the requirements to be eligible for the credit. The total credit claimed by all members of the partnership or limited liability company shall not exceed the allowable credit pursuant to Subsection C of this section.

I. Prior to July 1, 2014, the regulation and licensing department, in consultation with the state engineer, shall adopt rules establishing procedures to provide certification of water harvesting systems for purposes of obtaining a water harvesting income tax credit. The rules shall address technical specifications and requirements relating to safety, code and standards compliance, minimum and maximum system sizes, system applications and lists of eligible components. The regulation and licensing department may modify the specifications and requirements as necessary to maintain a high level of system quality and performance.

J. A taxpayer allowed a water harvesting income tax credit pursuant to this section shall report the amount of the credit to the department in a manner required by the department.

K. The department shall compile an annual report on

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the water harvesting income tax credit pursuant to this section that shall include the number of taxpayers approved by the department to receive the credit, the aggregate amount of credits approved and any other information necessary to evaluate the effectiveness of the credit. Beginning in 2019 and five years thereafter that the credit is in effect, the department shall compile and present the annual reports to the revenue stabilization and tax policy committee and the legislative finance committee with an analysis of the effectiveness and cost of the credit and whether the credit is performing the purpose for which it was created.

L. As used in this section, "water harvesting system" is a system that is designed to provide for the collection of rainwater or snowmelt from the rooftop of a building and is capable of storing the rainwater or snowmelt for future use."

**SECTION 3.** APPLICABILITY.--The provisions of this act apply to taxable years beginning on or after January 1, 2014.



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**A Review of the City of Santa Fe Water Conservation Rebate Program**

**Executive Summary and Recommendations:**

Water conservation rebates are one of the conservation strategies adopted by the City of Santa Fe[1] under the Comprehensive Water Conservation Requirements Ordinance (Ord. #1997-17, §2)[2], and have been a part of the City's water conservation program since 2003 (Ord. #2003-29, §2)[3]. The stated purpose of the Water Conservation Ordinance is to provide the City the means to reduce per capita water demands by requiring its citizens and businesses to comply with prescribed water conservation regulations and by establishing financial incentives for water conservation. The ordinance also states that reduction in water use reduces peak summer demands thereby reducing short and long-term system costs.

One of the purposes of this review is to present conclusions regarding the effectiveness of Santa Fe's rebate program in reducing water demand. The review does not attempt to evaluate the relative effectiveness of the rebate program compared to other City water conservation programs that include education and promotion, tiered water rates, regulations, water use restrictions, and building codes. This review also does not consider other cultural, social, economic, and climatic factors that complicate any analysis of conservation programs.

The City maintains records on the number and type of rebates, the amount of money distributed, and the estimated water savings resulting from rebates. City records were the primary source of data to develop a consolidated history of the rebate programs. This history was used to investigate how effectively the rebate programs have met the needs of both the City and the customer and to develop recommendations that might be used in future rebate programs. Each of these is discussed below.

Through 2013, the City has awarded more than 8,500 rebates for water saving devices, with a total estimated lifetime water savings of about 1,280 acre-feet. Over the projected 10-ten year useful lifetime of the devices, the savings amounts to 128 acre-feet per year. This can be compared to Santa Fe's annual water demand of about 10,000 acre-feet per year, indicating a reduction in total annual and per capita consumption of about 1.3% as a result of rebates.

Rebate expenditures total almost $1.7 million. Dividing total expenditures by the the total estimated water savings of 1,280 acre-feet results in cost of $1,300 per acre foot of water saved by rebates, which is more than three-quarters of the City's $1,700 per acre-foot cost of water production.

The City has modified the list of devices eligible for rebates and adjusted rebate amounts over the course of the program. With some notable exceptions, the City has historically set rebate amounts based on its own economic considerations – generally the estimated lifetime water savings of the device in acre-feet times the City cost of water in dollars per acre-foot. For the customer, the economic interests associated with water-saving devices are different from those of the City. The economic interests of customers have not been a factor in the City's approach to determining rebate amounts.

A large number (80%) of all rebates have been awarded to single-family residential accounts. No rebates have been awarded to multi-family accounts. Although commercial connections are about 30% of total connections, commercial water savings from rebates total less than 15%. Although outdoor water use is a significant portion of the annual water use, outdoor rebates account for about 2.5% of the water saved through the rebate program.

Simple payback is a useful way to evaluate the economics associated with the installation of a water-saving device. Payback is different for the City than for the customer. City payback depends on the rebate, the water savings rate and the cost of water production. Customer payback depends on the net device cost (price minus rebate), the water savings rate and the value of water and sewer savings.

[1] Hereafter referred to as the City or Santa Fe
[2] SFCC 1987 25-2.1
[3] SFCC 1987 25-2.11

As the rebate program has changed, or because of outside factors, the level of promotion of various devices has changed. The most notable example is the 2010 clothes washer rebate, which benefited from a combination of both City and State promotion and rebates.

Residential and commercial customers are motivated by economic and non-economic factors to conserve. Economic factors include the cost of the device, the amount of the rebate, and the value of the water saved by the device. Non-economic factors include the amount of effort required to install the device and the level and duration of City promotional activities.

For commercial customers, it appears that a combination of low net cost and short payback period encourages rebate acceptance. For residential customers, a combination of active promotion, low net cost and short payback encourages rebate acceptance. As an example, the highly promoted 2010 clothes washer rebate with a low net cost and short payback resulted in a large number of rebates (782 in 2010). In comparison, from 2004 to 2009, clothes washer rebates were less heavily promoted, had a higher net cost and longer payback, and rebates were awarded at a rate of about 400 per year.

**Recommendations:**

- Rebate programs combined with education and promotion should be a significant component of an overall water conservation effort.
- Rebates should be available and promoted to include all customer groups and water uses.
- Rebate programs need a constant, predictable funding source.
- Rebate programs should be ongoing; rebate amounts, water savings rates, and education programs should be evaluated and adjusted on an ongoing basis.
- Mechanisms for modifying the program, particularly rebate amounts, should not be excessively difficult.
- Payback periods for both the City and the customer should be considered in determining rebate amounts. Excessively long payback periods for either should be avoided.
- Rebate amounts should be large enough to provide an economic incentive to the customer.
- Heavy promotion of specific device rebates, coupled with rebates sufficient to provide an economic incentive, generates more rebates.
- Promotion efforts to commercial accounts should be focused on lifetime cost of water savings, whereas promotion to residents should be focused on both economic and non-economic factors.

This analysis is a starting point for further investigations. A list of suggestions for further investigations is included in the Conclusions section of this report.

**Overview**

The City of Santa Fe has provided water conservation rebate programs in one form or another beginning in 2003. Since that time, the City has awarded thousands of rebates to water utility customers, and the water use rate (gallons per capita per day), the total annual water consumption (acre-feet), and peak daily water consumption (gallons per day) have all declined. Although rising water prices, extended drought, increased public awareness, poor economic conditions and other factors may be partially responsible for these declines, the rebates and related activities have helped to reduce water consumption. This review is an attempt to compile information about the rebate programs and investigate how well the programs have worked.

The purposes of this paper are to:

1. Compile a historical record of Santa Fe's water conservation rebate programs,

2. Investigate how effective the rebate programs have been in meeting the needs of both the City and the customer, and

3. Provide recommendations that might be used in the development of future rebate programs.

This paper is primarily based on information from the City of Santa Fe Annual Water Reports for the years of 2009 through 2012[4], with some of the historical information taken from portions of the Water Conservation and Drought Management Plan[5]. The annual reports include data back to 2004, and this data is the primary basis for this paper. Data from these reports and other sources has been assembled into spreadsheets. A portion of the data in the spreadsheets is included in tables in the body of the report and in the Appendix.

This paper is organized as follows:

**Part 1: Program History, Distribution by Population and Sector, Current Rebates, Summary Details, and Seasonal Use and Outdoor Rebates.** This part includes a history and description of the rebate programs and a table of current rebate amounts. It also includes details on the number of rebates awarded and the distribution among the residential and commercial sectors, the amount of the rebates as the rebate programs have changed through time, a table of the water savings factors that indicate the projected water savings for each device, and a discussion of seasonal use.

**Part 2. City Economic Factors.** This part addresses economic factors relating to the rebate program as it relates to the City. It provides information on the total amounts that the City has awarded to customers, based on the number of rebates and the amount provided for each rebate as indicated in Part 1. It includes a table that provides an estimate of the potential water savings as a result of the rebate programs, which results in economic savings to the City because this water will not have to be produced. Based on these savings, this section provides an estimate of the time in years that will be required for the City to recoup its investment in the rebates. It also includes an estimate of the payback period to the City by device type.

**Part 3. Customer Economic Factors**. Beginning with a tabulation of the price of the devices, this part investigates potential water savings and economic benefits from the perspective of the customer. It discusses the net cost of devices, the value of water and sewer savings, and the customer payback periods.

[4] https://nm-santafe.civicplus.com/index.aspx?NID=2300
[5] http://savewatersantafe.com/wp-content/uploads/2013/05/CitySF-Water-Conservation-and-Drought-Mangement-Plan-2010.pdf

**Part 4. Balanced Rebates.** This part evaluates the equilibrium between payback periods for the City and the customer. This balanced rebate approach could be used as a tool to evaluate rebate amounts in the future.

**Part 5. Non-economic Factors**. This part provides information on the degree of difficulty for the customer to install water saving devices, and on the level of promotion of the rebates, described as the duration of the rebate program and the number of promotional activities.

**Part 6. Relationship of the Number of Rebates to Customer Factors.** Presuming that rebate program success can be measured in part by the number of rebates awarded, this part relates the number of rebates to the customer factors described in the previous parts.

**Part 7. Conclusions and Further Investigations.** The intent for Part 1-4 is to present the data and information with a minimum of conclusions. General conclusions and suggestions for further investigations are contained in Part 7.

**Part 1: Program History, Distribution by Population and Sector, Current Rebates, Summary Details, and Seasonal Use and Outdoor Rebates**

The purpose of Part 1 is to provide a review of historical rebate programs and a summary of the current program. This part includes:

- a brief history of the rebate programs,
- a discussion relating the number of rebates to population and to the number of utility connections, and indicating the distribution of rebates by commercial or residential sector[6],
- a table of current rebates, and
- details and tables showing the year-by-year number of rebates and history of rebate amounts.

***Program History***

This section is a summary of more specific details of the rebate programs found in the last section of this part. A list of relevant resolutions can be found in Appendix I.

In September 2003 Santa Fe provided a rain barrel rebate to single-family residential City water customers, and in November initiated residential rebates for high-efficiency washing machines and hot water recirculators.

From 2004 through 2009, the City provided rebates for rain barrels, clothes washing machines, hot water recirculators, and a small number of commercial devices. In 2009, the City added rebates for outdoor devices such as rain and moisture sensors, evapotranspiration irrigation controllers, and pressure reducing valves, although no rebates were awarded for these devices. During this period (2004 through 2009), almost 4,500 rebates were awarded.

The rebate program was modified in 2010. The City provided commercial rebates for high-efficiency toilets, water-free urinals, high efficiency clothes washers, and commercial process efficiency improvements. The City initiated rebates for residential high-efficiency toilets, and discontinued rebates for hot water recirculators. Rebates were made available for rain barrels and cisterns. The City provided a rebate for high-efficiency clothes washing machines that was augmented by a State rebate. Almost 2,000 rebates were awarded during 2010.

The current rebate program began in May 2011, with money for rebates being supplied by an eight dollar-a-year fee (four dollars, two times a year) that is added to the water bill of City water utility accounts. With approximately 55,000 accounts, this amounts to $440,000 available each year to pay for rebates[7].

The current program provides rebates for the same devices as in 2010, but at slightly different amounts. To the end of 2013, this program has awarded more than 2,400 rebates. The total includes rebates for commercial high-efficiency toilets and water-free urinals, high efficiency clothes washers and toilets, rain barrels, cisterns and rain sensors.

[6] Accounts are considered to be in either the commercial or the residential sector. “Commercial” refers to commercial, industrial and institutional accounts. The majority of commercial rebates have been awarded to lodging facilities (hotels/motels). “Residential” refers to single or multi-family residential accounts, mixed-use communities, home offices and businesses operated out of the home. No rebates have been awarded to multi-family residential accounts.

[7] A description of source of funding of the City rebate program is included in the Appendix.

### *Number of Rebates Relative to Population and Connections, and Distribution by Sector*

This section is included to provide an indication of the overall distribution of rebate awards.

One measure of rebate distribution which may be useful for comparison to rebate programs of other cities, is the number of rebates awarded relative to the population. Another potentially useful measure is the number of rebates relative to the number of connections.

Table 1 provides information on the number of rebates relative to both population and connections. It also separates the rebates by commercial and residential sector and separates single-family residential connections from multi-family residential and other connections. The information regarding distribution of rebates by sector may be useful in directing future rebate amounts or promotional efforts to specific customer or sector groups.

According to U.S. Census data for the City of Santa Fe, as of July 1, 2012, Santa Fe had a population of approximately 69,200. For the purposes of this paper, population is estimated to be 69,500 at the end of 2012, and 70,000 at the end 2013.

At the end of 2012, there had been a total of 7,959 rebates, and at the close of 2013, the total had reached 8,864. There were approximately 55,000 water utility connections in 2012, distributed among commercial, single-family residential, and multi-family and other accounts. Relative to the number of connections, the City has achieved over 20% penetration in the residential sector and less than 10% penetration in the commercial.

**Table 1**
**Rebate Distribution**

| | 2012 | 2013 |
|---|---|---|
| Population | 69,500 | 70,000 est[a] |
| Total Rebates | 7,959 | 8,864 |
| • Commercial Rebates to end of year | 1,371 | 1,733 |
| • Residential Rebates to end of year | 6,588 | 7,131 |
| Total Connections | 54,900[b] | 55,300[c] |
| • Commercial (approximate) | 16,470[d] | 16,560[d] |
| • Single-family Residential (approximate) | 30,200[d] | 30,360[d] |
| • Multi-family Residential and Other (approximate) | 8,230[d] | 8,280[d] |
| Total Rebates as percent of Population | 11.5% | 12.7% |
| Total Rebates as percent of Total Connections | 14.5% | 15.4% |
| • Commercial Rebates, percent of Commercial Connections | 8.3% | 9.9% |
| • Residential Rebates, percent of Single-family Residential Connections | 21.8%[e] | 22.6%[e] |

[a]Population from U.S. Census Bureau, Population Division. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2012. Found at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml. End of year (2012 and 2013) population estimated 2013 population at approximately 0.8% annual growth rate.
[b]From City Water Division data.
[c]Connections estimated at 0.79 times population from City Water Division data.
[d]Commercial, single-family residential and multi-family residential approximations are from City Water Division records indicating that connections are distributed at 30%, 55% and 15% respectively among the categories.
[e]No rebates have been awarded to multi-family residential accounts.

***Current Rebates***

Table 2 shows current rebates amounts. Rebate applicants must be water customers of the City of Santa Fe Water Division. Rebates are for the exchange of existing devices to efficient technologies, and do not apply to purchases for new homes or new construction and development.

**Table 2**
**Current Rebates**

| | Rebate for (Device or Technology) | C, R, Or Both[a] | Rebate Amount $ |
|---|---|---|---|
| Indoor | High-Efficiency Clothes Washer | | |
| | • Top-Load Machine[b] | Both | 350 |
| | • Front-Load Machine[c] | Both | 150 |
| | High-Efficiency Toilet (HET) | | |
| | • Residential | R | 175 |
| | • Commercial Hotel/Motel | C | 125 |
| | • Commercial Tank-Type | C | 250 |
| | • Commercial Flushometer | C | 500 |
| | Water-Free Urinal | Both | 500 |
| | Commercial Process Efficiency | C | Site-specific |
| Outdoor | Rainwater Harvesting | | |
| | • Rain Barrel 50-99 gallon | Both | 12 |
| | • Rain Barrel 100-199 gallon | Both | 25 |
| | • Rain Barrel 200-299 gallon | Both | 50 |
| | • Cistern | Both | 0.25 per gallon |

[a]Rebates available to commercial accounts (C), residential accounts (R), or both.
[b]Replacement of top loading washer with a higher-efficiency washer
[c] Replacement of a front loading washer with a higher-efficiency washer

***History of Number of Rebates Awarded and Rebate Amounts***

This section provides additional details on the rebate programs, with emphasis on the annual distribution of rebates and on the changes in rebate amounts. Table 3 summarizes the discussion, and Figure 1 shows the number of rebates by year. A table of number of rebates by device is included in Appendix II.

The first City of Santa Fe Water Conservation rebates went into effect in September 2003. A single-family residential water customer was eligible for one $30 rebate for the purchase of a rain barrel. In November 2003, the City made rebates available for high-efficiency washing machines and hot water recirculators. A residential water customer was eligible for one $100 rebate for the purchase of either a hot water recirculator or a clothes washer. From 2004 to 2009, 2,461 high-efficiency clothes washer, 1,736 rain barrel and 270 hot water recirculator rebates were awarded. During this same time, the City awarded commercial rebates for six air cooled ice machines and one commercial dishwasher. In 2009, the City initiated outdoor rebates for rain and moisture sensors, evapotranspiration irrigation controllers, pressure reducing valves, and other outdoor devices, although no outdoor rebates were awarded.

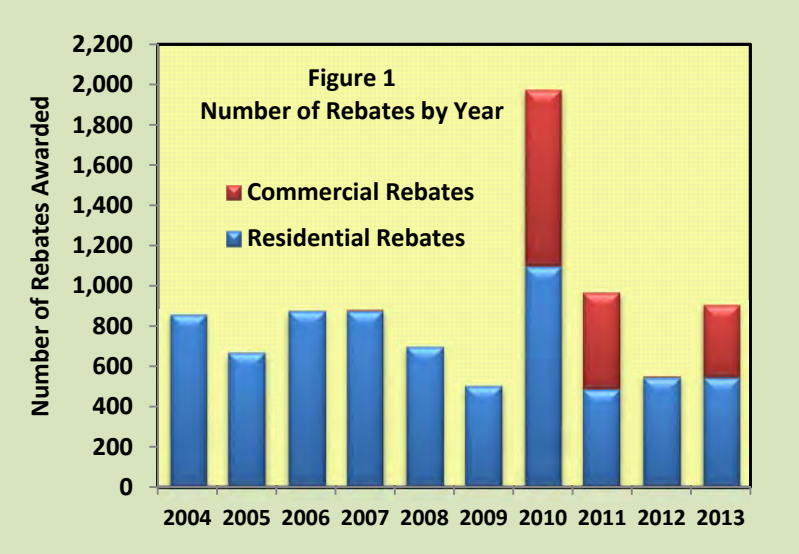
The rebate program was updated in 2010. The City provided rebates for commercial high-efficiency toilets of three types: flushometer valve, tank-type installed in locations other than lodging facilities, and tank-type installed in lodging facilities (hotels/motels). Some 848 rebates were awarded for commercial high-efficiency toilets. Commercial rebates were also awarded for water-free urinals (24), the exchange of front-loader or the replacement of top-loader clothes washing machines (4), and for commercial process efficiency improvements (1).

In 2010, the City rebate for the replacement of a top loading washing machine with a high-efficiency front-loading machine was $480. For a portion of the year, the State of New Mexico, using funding from the American Recovery and Reinvestment Act, provided an additional $200 clothes washing machine rebate[8]. A total of 817 residential clothes washing machine rebates were awarded, an all-time high. The City also awarded rebates for residential high-efficiency (1.28 gallons-per-flush) toilets (236) and discontinued rebates for residential hot water recirculators. Rebates were awarded for rain barrels (39), and cisterns (2). The State clothes washing machine rebate program was discontinued before the end of the year, and the City rebate program ran out of funds in August.

**Table 3**
**Summary of Number of Rebates**

| Rebate | 2004-2009 | 2010 | 2011-2013 | Total |
|---|---|---|---|---|
| Commercial HET, Flushomteter | NA | 197 | 2 | 199 |
| Commercial HET, Tank not Hotel/Motel | NA | 192 | 20 | 212 |
| Commercial HET, Hotel/Motel | NA | 459 | 822 | 1,281 |
| Water-Free Urinal | NA | 24 | 5 | 29 |
| Commercial HE Clothes Washer | NA | 4 | 0 | 4 |
| Air-Cooled Ice Machine | 6 | NA | NA | 6 |
| Commercial Dishwasher | 1 | NA | NA | 1 |
| Commercial Process Efficiency | NA | 1 | 0 | 1 |
| Hot Water Recirculator | 270 | NA | NA | 270 |
| Residential HE Toilet | NA | 236 | 695 | 931 |
| Residential Clothes Washer | 2,461 | NA | NA | 2,461 |
| Residential HE Clothes Washer | NA | 817 | 772 | 1,589 |
| Rain Barrel, Unspecified | 1,736 | NA | NA | 1,736 |
| Rain Barrel, 50-299 gallon | NA | 39 | 95 | 134 |
| Cistern | NA | 2 | 6 | 8 |
| Rain Sensor | 0 | 0 | 2 | 2 |
| Other Outdoor Devices | 0 | 0 | 0 | 0 |
| Total | 4,474 | 1,971 | 2,419 | 8,864 |
| Commercial Total | 7 | 877 | 849 | 1,733 |
| Residential Total | 4,467 | 1,094 | 1,570 | 7,131 |

The current rebate program, which began on May 1, 2011, reinstated rebates for the same devices as in 2010, but at slightly different amounts. Under this program (2011 to the end of 2013), 844 rebates have been awarded for commercial high-efficiency toilets and 5 for water-free urinals. Residential rebates have been awarded for high-efficiency toilets (695), high efficiency clothes washers (772), rain barrels (95), cisterns (6) and rain sensors (2). The City is currently accepting rebate applications for rain barrels and cisterns, but not for the other outdoor devices that had been available for rebate under the previous program.




The most recent year, 2013 had more rebates (361) than 2012 due to installations of commercial high-efficiency hotel/motel toilet rebates by two or three lodging facilities; 361 in 2013 compared to no hotel/motel toilet rebates in 2012.

By the end of 2013, a total of 1,733 commercial rebates had been awarded. Almost all were for high-efficiency toilets, and three-quarters were at hotels and motels. Almost all have been awarded since the beginning of 2010.

[8] http://www.emnrd.State.nm.us/ecmd/documents/ProgramDescription.pdf

Although “residential” refers to both single and multi-family residential accounts, no rebates have been awarded to multi-family residential accounts. By the close of 2013, a total of 7,131 residential rebates had been awarded; almost three-quarters were for indoor devices. Outdoor rebates have been almost almost all rain barrel rebates.

Clothes washer rebates accounted for more than half of the total residential rebates. The greatest number of rebates was in 2010 largely due to the number of top loader clothes washer replacements, presumably encouraged by the $200 State of New Mexico rebate in addition to the City rebate.

Rebate amounts are proposed by the Water Conservation Office and adopted by City Ordinance, and rebate amounts have changed as the rebate programs have changed. Table 4 lists the changes over time for both commercial and residential rebates. The information may be useful in comparing rebate amounts to the number of rebates awarded.

**Table 4**
**Historical Rebate Amounts**
**(Dollars)**

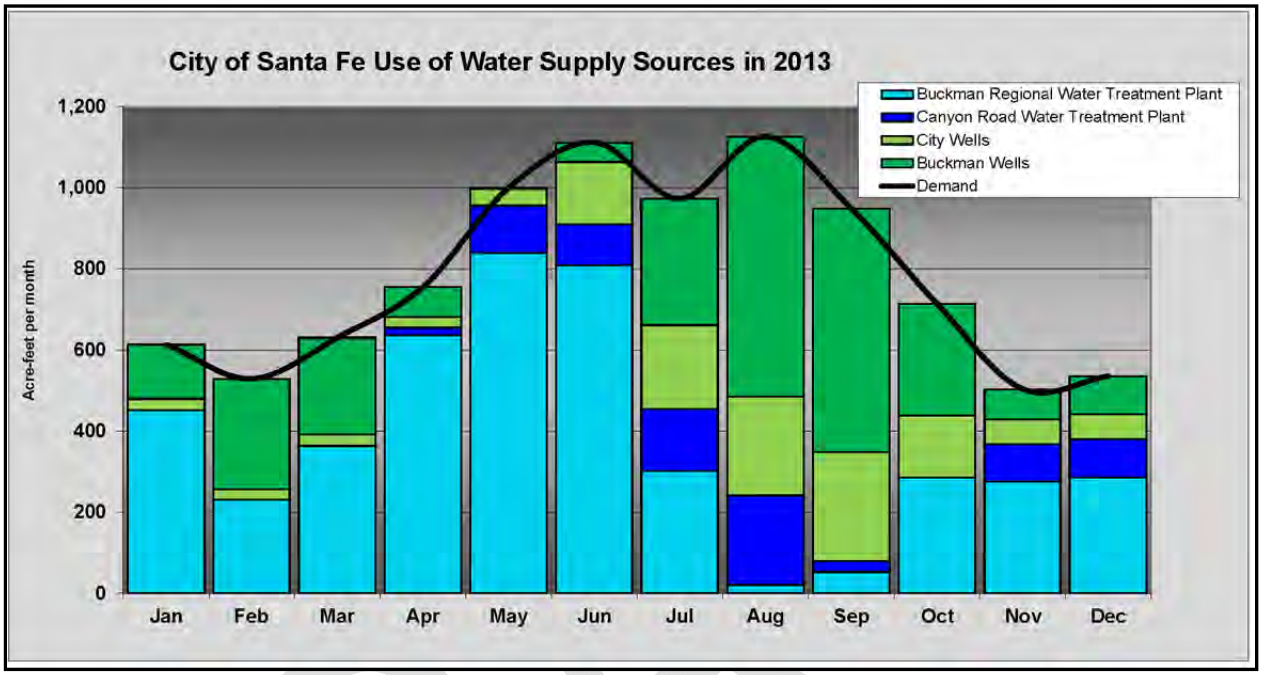
| Rebate | 2004-2009 | 2010 | 2011-2013 |
|---|---|---|---|
| Commercial HE Toilet, Flushometer | NA | 504 | 500 |
| Commercial HE Toilet, Tank Type not in Hotel/Motel | NA | 504 | 250 |
| Commercial HE Toilet, Tank Type in Hotel/Motel | NA | 504 | 125 |
| Water-Free Urinal | NA | 630 | 500 |
| Commercial HE Clothes Washer, Top Loader replacement | NA | 480 | 350 |
| Commercial HE Clothes Washer, Front Loader exchange | NA | 180 | 150 |
| Air-Cooled Ice Machine | 200 | NA | NA |
| Commercial Dishwasher | 400 | NA | NA |
| Commercial Process Efficiency | NA | 874 | b |
| Hot Water Recirculator | 100 | NA | NA |
| Residential HE Toilet | NA | 175 | 175 |
| Residential Clothes Washer, Unspecified | 100 | NA | NA |
| Residential HE Clothes Washer, Top Loader replacement | NA | 480[c] | 350 |
| Residential HE Clothes Washer, Front Loader exchange | NA | 180 | 150 |
| Rain Barrel, Unspecified | 30 | NA | NA |
| Rain Barrel, 50-99 gallon | NA | 12 | 12 |
| Rain Barrel, 100-199 gallon | NA | 25 | 25 |
| Rain Barrel, 200-299 gallon | NA | 50 | 50 |
| Water Harvesting (Cistern), per gallon | 0 | 0.25 | 0.25 |
| Rain Sensor | 0 | 40 | 40[d] |
| Moisture Sensor | 0 | 75 | 75[d] |
| Evapotranspiration Controller | 0 | 300-750 | 300-750[d] |
| Press Reducing Valve | 0 | 120-525 | 120-525[d] |
| Other Outdoor Devices | 0 | 2-5 | 2-5[d] |

[a]NA indicates that rebates were not available
[b]Installation-specific amount
[c]Does not includes the $200 rebate from the State of New Mexico
[d]Rebates for these devices were not available in 2013

***Seasonal Use and Outdoor Rebates***

According to the City (Where Does Our Drinking Water Come From)[9], water use varies through the year as indicated in Figure 2 for the year 2013.

**Figure 2**




A 2010 article[10] in Choices magazine contains the following paragraph:

> Irrigating the urban residential landscape usually accounts for 40-70% of household water use. Additionally, residential landscapes receive 30 to 40% more water than typically required by the common types of plants and grass. Estimates of potential water savings range from 35% to 75% of current per capita water use based on a typical home with a traditional bluegrass type landscape. Improvements in the efficiency of landscape irrigation could yield significant water savings and is properly the focus of municipal water conservation programs.

The figure indicates that in 2013, City water demand ranged from less than 600 acre-feet in some of the winter months, to more than 1,000 acre-feet in summer months. The pattern of water use is also documented in the Long-Range Water Supply Plan Appendix F-6.[11] High demand occurs when renewable surface water resources are limited, and in order to meet the demand, the water utility may need to use non-renewable groundwater sources.

Because high summer demand is partly due to summer landscape irrigation, outdoor water conservation programs, in addition to recuing overall water consumption, might also reduce peak demand and help to conserve groundwater resources.

[9] http://www.santafenm.gov/where_does_our_drinking_water_come_from

[10] *Water-Conserving Attitudes and Landscape Choices in New Mexico*, Hurd, Brian H., in Choices, Volume 25, Issue 3, 3rd Quareter 2010. Found January2014 at http://www.choicesmagazine.org/magazine/article.php?article=146 and at http://ageconsearch.umn.edu/bitstream/95759/2/Water-Conserving.pdf.

[11] http://www.santafenm.gov/document_center/document/781

**Part 2: City Economic Factors**

The purpose of Part 2 is to consider, from the perspective of the City, factors relating to the economics and water savings of rebates. Regarding the source of funds for the rebate programs, as indicated in Part 1, funds for rebates are supplied by a fee that is added to City water bills.

This part includes:

- information on the total City rebate expenditures, based on the number of rebates and the amount provided for each rebate as indicated in Part 1,
- a discussion and table of water savings rates, and a table that relates the amount of the rebate to the amount of water saved for the life of the device,
- a table that provides an estimate of the potential savings as a result of the rebate, programs,
- a calculation of the City payback for overall rebate program, and
- a calculation of the City payback by device.

***City Rebate Expenditures***

Table 5 lists the total amounts that the City has rebated to customers, based on the number of rebates and the amount provided for each rebate.

**Table 5**
**Rebate Program Expenditures**
**(Dollars)**

| Year | Commercial Rebates | Residential Rebates | Total |
|---|---|---|---|
| 2004 | 0 | 46,230 | 46,230 |
| 2005 | 0 | 46,530 | 46,530 |
| 2006 | 600 | 59,090 | 59,690 |
| 2007 | 1,000 | 61,540 | 62,540 |
| 2008 | 0 | 61,490 | 61,490 |
| 2009 | 0 | 50,300 | 50,300 |
| 2010 | 444,706 | 428,015 | 872,721 |
| 2011 | 64,375 | 130,498 | 194,873 |
| 2012 | 1,500 | 130,965 | 132,465 |
| 2013 | 45,375 | 113,139 | 158,514 |
| Total | 557,556 | 1,127,797 | 1,685,353 |

The table indicates that total City expenditures for rebates from 2004-2013 are almost $1,700,000, approximately two-thirds for residential and one-third for commercial rebates. Most of the expenditures have been from 2010 to the present, with more than half in 2010. The 2010 spike was in part the result of the previously mentioned State rebate program. The table does not include State rebate expenditures.

### *Water Savings Rates*

For the devices or technologies that are available for a rebate, the City has calculated the annual water savings rate WSR) as indicated in the 2012 Annual Report.[12] These numbers are used by the City to estimate how much water will be saved each year as a result of a rebate.

As an example, for a high efficiency (1.28 gallons per flush) toilet, the City estimates that the toilet uses 0.4 gallons of water per flush less than a low-flow toilet. Using typical household data – 5.1 flushes per day per person and 2.3 persons per household (11.7 flushes per household per day) – the water saving resulting from changing a low-flow toilet to a high efficiency toilet is 1,713 gallons per year, or 0.0053 acre-feet per year. The water savings rate is 0.0053 acre-feet per year (afy).

The water savings rate is the amount of water that the City estimates that a water saving device will save in a year. The City generally expresses the WSR in acre-feet per year (afy). The value of the WSR depends on the savings of each device and on the frequency of its use. In part, rebate amounts have changed as the WSR has been adjusted.

As another example, the water savings rate for a high-efficiency toilet in a hotel/motel is only 0.0022 acre-feet per year, which is less than the rate for a residential toilet because of the lower frequency of use (4.8 flushes per day) compared to 11.7 per day for a household toilet. Water savings rates are shown in Table 6.

If the useful life of a device can be estimated, the WSR and the useful life can be used to estimate the lifetime water savings from the device. Most devices are assumed to have a useful life of 10 years, although a 5-year life is assumed for air-cooled ice machines and commercial dishwashers.[13] Although the projected water savings of a device depends on the estimated useful life, the actual savings may differ.

The cost of the rebate to save an acre foot of water can be calculated by dividing the rebate amount by the lifetime water savings. For the current rebates, costs to save an acre-foot of water are shown in Table 7. Costs range from almost $5,700 for a high-efficiency toilet in a hotel/motel to about $1,200 for a water-free urinal.

**Table 6**
**Water Savings Rates**

| Device | Water Savings Rate (acre-feet per year) |
|---|---|
| Commercial HE Toilet, Flushometer | 0.0336 |
| Commercial HE Toilet, Tank Type not in Hotel/Motel | 0.0168 |
| Commercial HE Toilet, Tank Type in Hotel/Motel | 0.0022 |
| Water-Free Urinal | 0.0420 |
| HE Clothes Washer, Top Loader replacement | 0.0233[a] |
| HE Clothes Washer, Front Loader exchange | 0.0088[b] |
| Air-Cooled Ice Machine | 0.67 |
| Commercial Dishwasher | 1.15 |
| Commercial Process Efficiency | 0.45 |
| Hot Water Recirculator | 0.0215 |
| Residential HE Toilet | 0.0053 |
| Residential Clothes Washer, Unspecified | 0.0250 |
| Rain Barrel, Unspecified | 0.0015 |
| Rain Barrel, 50-99 gallon | 0.0008 |
| Rain Barrel, 100-199 gallon | 0.0015 |
| Rain Barrel, 200-299 gallon | 0.0031 |
| Cistern (per gallon capacity) | 0.000015 |
| Other Outdoor Devices | Not Calculated |

[a]Both commercial and residential
[b]Both commercial and residential

[12] http://www.santafenm.gov/document_center/document/767
[13] Appendix A City document 11/1/2007. (From Amy Vickers?)

**Table 7**
**Rebate Cost per acre-foot of Water Saved per Device**

| Device | Water Savings Rate acre-feet per year | Useful Life yrs | Lifetime Water Savings acre-feet | Rebate $ | Cost $ per acre-foot |
|---|---|---|---|---|---|
| Commercial HE Toilet, Flushometer | 0.0336 | 10 | 0.336 | 500 | 1,488 |
| Commercial HE Toilet, Tank Type not in Hotel/Motel | 0.0168 | 10 | 0.168 | 250 | 1,488 |
| Commercial HE Toilet, Tank Type in Hotel/Motel | 0.0022 | 10 | 0.022 | 125 | 5,682 |
| Water-Free Urinal | 0.0420 | 10 | 0.42 | 500 | 1,190 |
| HE Clothes Washer, Top Loader replacement | 0.0233 | 10 | 0.233 | 350 | 1,502 |
| HE Clothes Washer, Front Loader exchange | 0.0088 | 10 | 0.088 | 150 | 1,705 |
| Residential HE Toilet | 0.0053 | 10 | 0.053 | 175 | 3,302 |
| Rain Barrel, 50-99 gallon | 0.0008 | 10 | 0.008 | 12 | 1,500 |
| Rain Barrel, 100-199 gallon | 0.0015 | 10 | 0.015 | 25 | 1,667 |
| Rain Barrel, 200-299 gallon | 0.0031 | 10 | 0.031 | 50 | 1,613 |
| Cistern | 0.000015 per gallon | 10 | 0.00015 per gallon | 0.25 per gallon | 1,667 |

***Potential Water Savings***

The preceding information can be used to evaluate the water savings per device and potential rebate program water savings if the rebated devices are installed and are operated for the estimated useful life. This information is summarized in Table 8.

The first column lists the devices; the first nine rows for commercial devices and the remainder residential devices. Column 2 is the estimated useful life.

The values in the columns for the years 2004 – 2013 are, for each device, the product of the number of rebates times the water savings rates from Table 6. The units are acre-feet per year.

The column labeled “Sum, 2004-2012” is the sum of the entries to the left, with units of acre-feet per year. If all devices had 10-year useful lives, total savings would be a little more than 130 acre-feet

The column labeled “Potential Savings, af” is the product of the estimated annual water savings times the useful life. This value is the total potential water savings in acre-feet for the life of the device.

The table indicates that for the estimated useful life of the devices, almost 174 acre-feet of water (sum of Commercial Potential Water Savings) will be saved by commercial devices, and almost 1,104 acre-feet (sum of Residential Potential Water Savings) by residential devices already installed. This amounts to a total of almost 1,280 acre-feet of total potential water savings. This results in economic savings to the City because this amount of water will not have to be produced. Dividing the direct cost of this savings from Table 5 ($1,685,000) by the total of 1,280 acre feet equates to a cost of about $1,320 per acre-foot of water saved.

**Table 8**
**Estimated Water Savings of Installed Devices**

| Device | Useful Life, Years | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | Total | Potential Savings, af |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flushometer Valve High Efficiency Toilet | 10 | | | | | | | 6.62 | 0.07 | | | 6.69 | 66.86 |
| Tank Type High Efficiency Toilet | 10 | | | | | | | 3.23 | 0.22 | 0.10 | 0.02 | 3.56 | 35.62 |
| Hotel/Motel High Efficiency Toilet | 10 | | | | | | | 1.01 | 1.01 | | 0.79 | 2.82 | 28.18 |
| Water Free Urinal | 10 | | | | | | | 1.01 | 0.21 | | | 1.22 | 12.18 |
| HE Clothes Washer replacement for top loader | 10 | | | | | | | 0.05 | | | | 0.05 | 0.47 |
| HE Clothes Washer exchange for front loader | 10 | | | | | | | 0.02 | | | | 0.02 | 0.18 |
| Commercial Process Efficiency | 10 | | | | | | | 0.45 | | | | 0.45 | 4.50 |
| Air Cooled Ice Machine | 5 | | | 0.67 | 3.35 | | | | | | | 4.02 | 20.10 |
| Commercial Dishwasher | 5 | | | 1.15 | | | | | | | | 1.15 | 5.75 |
| Hot Water Recirculator | 10 | 1.33 | 0.99 | 0.77 | 1.05 | 0.73 | 0.92 | | | | | 5.805 | 58.05 |
| Residential High Efficiency Toilet | 10 | | | | | | | 1.25 | 0.92 | 1.35 | 1.42 | 4.934 | 49.34 |
| Residential Clothes Washer | 10 | 5.80 | 8.30 | 10.85 | 11.40 | 13.68 | 11.50 | | | | | 61.525 | 615.25 |
| HE Clothes Washer replacement for top loader | 10 | | | | | | | 18.22 | 6.20 | 5.31 | 4.01 | 33.738 | 337.38 |
| HE Clothes Washer exchange for front loader | 10 | | | | | | | 0.31 | 0.31 | 0.36 | 0.26 | 1.241 | 12.41 |
| Rain Barrel | 10 | 0.84 | 0.44 | 0.60 | 0.55 | 0.17 | | | | | | 2.604 | 26.04 |
| Rain Barrel 50-99 g | 10 | | | | | | | 0.01 | 0.003 | 0.01 | 0.05 | 0.078 | 0.78 |
| Rain Barrel 100-199 g | 10 | | | | | | | 0.01 | 0.003 | 0.005 | 0.003 | 0.018 | 0.18 |
| Rain Barrel 200-299 g | 10 | | | | | | | 0.06 | 0.01 | 0.003 | 0.01 | 0.074 | 0.74 |
| Water Harvesting (number) | 10 | | | | | | | | | | | | |
| • Water Harvesting | 10 | | | | | | | 0.23 | 0.09 | 0.01 | 0.05 | 0.377 | 3.77 |
| Rain Sensor | 10 | | | | | | | | | | | | |
| Moisture Sensor | 10 | | | | | | | | | | | | |
| Evapotranspiration Controller | 10 | | | | | | | | | | | | |
| Pressure Reducing Valve | 10 | | | | | | | | | | | | |
| Other Outdoor Devices | 10 | | | | | | | | | | | | |
| Commercial | | 0.00 | 0.00 | 1.82 | 3.35 | 0.00 | 0.00 | 12.38 | 1.51 | 0.10 | 0.81 | | 173.83 |
| Residential | | 7.97 | 9.73 | 12.23 | 13.01 | 14.58 | 12.42 | 20.09 | 7.53 | 7.05 | 5.80 | | 1,103.95 |
| Total | | 7.97 | 9.73 | 14.05 | 16.36 | 14.58 | 12.42 | 32.46 | 9.04 | 7.15 | 6.61 | | 1,277.78 |

### *Rebate Program Payback*

The City of Santa Fe Long-Range Water Supply Plan[14] Appendix Table I - 1 provides an estimate of capital and operating and maintenance (O&M) costs for water production. The sum of costs for 2013 (O&M existing sources, capital cost, and O&M new sources) is about $16,300,000. Overall water demand for 2012 is reported in *Santa Fe Trends 2013*[15] to be 9,777 acre-feet. Dividing the cost by the water demand results in an average cost for water production of $1,670 per acre-foot.

Simple payback can be calculated by dividing the amount of the expenditure ($1,685,000) by the annual return (dollars per year). The annual return is the overall savings rate (128 af per year) times the water production cost ($1,670 per acre-foot).

$$\boldsymbol{City\ Payback\ Period, yrs} = \frac{\boldsymbol{Total\ Expenditures\ for\ Rebates, \$}}{(\boldsymbol{Water\ Savings\ Rate\ , af\ per\ yr})(\boldsymbol{City\ Water\ Production\ Cost, \$\ per\ af})}$$

$$\boldsymbol{City\ Payback\ Period, yrs} = \frac{\boldsymbol{\$1,685,000}}{(\boldsymbol{128\ af\ per\ year})(\boldsymbol{\$1,670\ per\ af})} = \boldsymbol{7.9\ years}$$

An alternative method of estimating the payback period is to divide the overall value of $1,320 per acre foot saved (indicated in the previous section) by the cost of water production ($1,670 per acre-foot) and multiply the result by the useful life of the devices. A useful life of ten years can be used since that is the life of the majority of the devices.

$$\frac{\boldsymbol{\$1,320\ per\ acre\ foot\ saved}}{\boldsymbol{\$1,670\ per\ acre\ foot\ produced}} \times \boldsymbol{10\ years} = \boldsymbol{7.9\ years}$$

The overall payback period is almost eight years.



[14] http://www.santafenm.gov/document_center/document/772
[15] http://www.santafenm.gov/community_profile

***City Payback by Device***

Although a saving for the customer, rebates are an expense for the City. Similar to the first method used above to calculate the overall payback period for the rebate program, simple payback periods for the City for each device can be calculated. City payback periods are indicated in Table 9.

$$\boldsymbol{City\ Payback\ Period, yrs} = \frac{\boldsymbol{Rebate\ Amount, \$}}{(\boldsymbol{Water\ Savings\ Rate\ , af\ per\ yr})(\boldsymbol{City\ Water\ Production\ Cost, \$\ per\ af})}$$

**Table 9**
**City Payback Periods by Device**

| Device | Rebate $ | Water Savings Rate afy | Payback Period Years |
|---|---|---|---|
| Flushometer Valve HE Toilet | 500 | 0.0336 | 8.9 |
| Tank Type HE Toilet | 250 | 0.0168 | 8.9 |
| Hotel/Motel HE Toilet | 125 | 0.0022 | 34.0 |
| Water Free Urinal | 500 | 0.0420 | 7.1 |
| Commercial Process Efficiency | 874 | 0.4500 | 1.2 |
| Air Cooled Ice Machine | 200 | 0.6700 | 0.2 |
| Dishwasher | 400 | 1.1500 | 0.2 |
| Hot Water Recirculator | 100 | 0.215 | 2.8 |
| HE Toilet | 175 | 0.0053 | 19.8 |
| Washing Machine | 100 | 0.0250 | 2.4 |
| HE Clothes Washer replacement for top loader | 350 | 0.0233 | 9.0 |
| HE Clothes Washer exchange for front loader | 150 | 0.0088 | 10.2 |
| Rain Barrel | 30 | 0.0015 | 12.0 |
| Rain Barrel 50-99 gal | 12 | 0.0008 | 9.0 |
| Rain Barrel 100-199 gal | 25 | 0.0015 | 10.0 |
| Rain Barrel 200-299 gal | 50 | 0.0031 | 9.7 |
| Cistern | 0.25 per gallon | 0.000015 per gallon | 10.0 |

City payback period is directly related to the City Rebate cost per acre-foot for each device indicated in Table 7. Dividing Payback [R / (WSR)*(City Water Cost)] by Rebate Cost [R / (WSR)*(Useful Life)] reduces to [Useful Life /City Water Cost].

That is, Payback = Rebate Cost per acre-foot for the specific device (from Table 7) * (Useful Life of the specific device ) / City Water Cost ).

For devices with a 10-year useful life, the factor ( Useful Life for the specific device ) / City Water Cost) equals 0.006. In that case, payback is simply Rebate Cost per acre-foot (which incorporates water savings rate and rebate amount) from Table 7 times 0.006.

Longer payback periods mean that it takes longer for the City to recoup its rebate investment through water savings. Shorter rebate periods are better for the City as they equate to faster recovery of rebate expenditures. The payback period can be adjusted based on the rebate amount. For example, the 34 year payback period for a hotel/motel high-efficiency toilet could be reduced to 17 years by reducing the rebate amount by one half.

**Part 3: Customer Economic Factors**

Rebate acceptance may be affected by both economic and non-economic factors. The purpose of this part is to consider economic factors relating to rebates from the perspective of the customer. Non-economic factors are considered in another section. Beginning with a tabulation of the price of the devices, this part investigates potential water savings and economic benefits. It discusses the net cost of devices, the value of water and sewer savings, and the customer payback periods.

This part includes:

- information on the purchase price of devices available for rebates,
- an estimate of the value to the customer of water and sewer savings, and
- A calculation of the customer payback by device.

***Customer Purchase Price***

To calculate customer payback, it is necessary to estimate the net cost of the device (purchase price minus rebate), the water savings factor, and the value of water and sewer savings. The following sections discuss these factors, beginning with this section on purchase price. The rebate amounts shown in earlier tables can be subtracted from the purchase price to estimate the net cost.

Table 10 provides information on estimated purchase price. Prices were generated through Internet searches for the specific devices, finding a range of prices and then calculating the low, high and median price. This results in a device price for 2013 that may not reflect past price but is used for consistent comparison. Prices vary widely, and an aggressive shopper might find lower prices than the ones indicated. Also, the prices are not sale prices, which could also lower the cost of the device. There is no requirement in the City program that the device be purchased locally, and the local taxes of 8.1875% are not included in the prices shown in the table.

**Table 10**
**Estimated Purchase Price of Appliance or Device**
**(Dollars)**

| Device | Low | High | Median |
|---|---|---|---|
| HE Toilet - Flushometer Valve | 279 | 487 | 383 |
| HE Toilet - Tank Type | 135 | 1,500 | 300 |
| Water-Free Urinal | 300 | 1,200 | 600 |
| Commercial Clothes Washer - top loader | 750 | 1,085 | 765 |
| Commercial Clothes Washer - front loader | 1,375 | 1,700 | 1,485 |
| Air Cooled Ice Machine | 1,800 | 4,700 | 2,150 |
| Commercial Dishwasher | 2,800 | 24,000 | 5,700 |
| Hot Water Recirculator | 80 | 210 | 170 |
| High-Efficiency Toilet | 100 | 1,500 | 190[a] |
| Clothes Washing Machine | 630 | 1,400 | 760 |
| HE Clothes Washer - top loader | 700 | 810 | 720 |
| HE Clothes Washer - front loader | 630 | 1,400 | 760 |
| Rain Barrel 50-99 gal | 120 | 385 | 175 |
| Rain Barrel 100-199 gal | 300 | 510 | 405 |
| Rain Barrel 200-299 gal | 500 | 750 | 700 |
| Cistern ($ per gallon) | 0.55 | 2.62 | 1.22 |
| Rain Sensor | 15 | 60 | 20 |
| Moisture Sensor | 30 | 400 | 200 |
| ET Controllers | 320 | 1,500 | 500 |
| Irrigation Pressure Reducing Spray Head | 5 | 25 | 10 |
| Irrigation Pressure Reducing Valve | 50 | 70 | 50 |

[a] Median price adjusted from $250 to $190 as this is the price most often seen in the City awards based on conversations with City personnel.

### *Value of Water and Sewer Savings*

To calculate customer payback period, it is necessary to estimate the value of water and sewer savings. This section discusses water and sewer savings.

Beginning March 2009, City water rates have increased 8.2% per year for the last five years The current base volume charge (marginal rate) is $6.06 per 1000 gallons. During the May – August irrigation season, the rate is $6.06 per 1000 gallons for the first 10,000 gallons, and $21.72 per 1,000 gallons thereafter. For the remainder of the year, the base rate is $6.06 per 1,000 gallons for the first 7,000 gallons, and $21.72 per 1000 gallons thereafter.

The marginal rate of $6.06 per 1000 gallons is consistent with the City's cost of water production. That is, $6.06 per 1000 gallons is $1,975 per acre-foot, which is slightly more than the City's average cost of water production of $1,670 per acre foot.

However, the $6.06 per 1,000 gallons marginal cost of water of is not the total cost to the customer. The residential sewer charge is also based on water consumption, at $3.58 per 1,000 gallons.[16] Both of these are taxed at 5%. Therefore, the total cost to the customer, based on water consumption, is $10.12 per 1,000 gallons of water.

This equates to a cost of $3,300 per acre foot of water, making the economics of water saving different for the customer than for the City. The economics are also different if water consumption is greater than the base levels of 7,000 (May through August) or 10,000 gallons (remainder of the year). For consumption greater than base levels, total marginal cost to the customer comes to $26.57 per 1,000 gallons of water, or almost $8,700 per acre foot of water.

### *Customer Payback Period*

Customer payback period can be calculated with the information presented in the previous sections on purchase price and rebate amounts, water savings rates and water and sewer savings value.

For the customer, the payback period for each rebate can be calculated as

$$\boldsymbol{Customer\ Payback\ Period, yrs} = \frac{(\boldsymbol{Price - Rebate}), \$}{(\boldsymbol{Water\ Savings\ Rate\ , af\ per\ yr})(\boldsymbol{Value\ of\ Water\ and\ Sewer\ Savings, \$\ per\ af})}$$

The net cost (price minus rebate) and water savings rate are device-specific, and the value of water and savings is either $3,300 or $8,700 per acre-foot, depending on whether the customer is paying the base or the high water rate.

Customer payback periods by device art listed in Table 11.

[16] http://www.santafenm.gov/sewer_rates_and_application

**Table 11**
**Customer Payback Periods by Device**

| Device | Median Price $ | Rebate $ | Water Factor, afy | Payback years @ $3,300 per af | Payback years @ $8,700 per af |
|---|---|---|---|---|---|
| HE Toilet, Flushometer Valve | 383 | 500 | 0.0336 | -1.1 | -0.4 |
| HE Toilet, Tank Type | 300 | 250 | 0.0168 | 0.9 | 0.3 |
| HE Toilet, Tank Type, Hotel/Motel | 300 | 125 | 0.0022 | 24.1 | 9.1 |
| Water-Free Urinal | 600 | 500 | 0.0420 | 0.7 | 0.3 |
| Commercial HE Clothes Washer, top loader replacement | 765 | 350 | 0.0233 | 5.4 | 2.0 |
| Commercial HE Clothes Washer, front loader exchange | 1,485 | 150 | 0.0088 | 46.0 | 17.4 |
| Air-Cooled Ice Machine | 2,150 | 200 | 0.6700 | 0.9 | 0.3 |
| Commercial Dishwasher | 5,700 | 400 | 1.1500 | 1.4 | 0.5 |
| Hot Water Recirculator | 170 | 100 | 0.0125 | 1.0 | 0.4 |
| Residential HE Toilet, Tank Type | 190 | 175 | 0.0053 | 0.9 | 0.3 |
| Residential Clothes Washer | 760 | 100 | 0.0250 | 8.0 | 3.0 |
| Residential HE Clothes Washer, top loader replacement | 720 | 350[a] | 0.0233 | 4.8[a] | 1.8[a] |
| Residential HE Clothes Washer, front loader exchange | 760 | 150 | 0.0088 | 21.0 | 8.0 |
| Rain Barrel | 325 | 30 | 0.0015 | 59.6 | 22.6 |
| Rain Barrel 50-99 gal | 175 | 12 | 0.0008 | 61.7 | 23.4 |
| Rain Barrel 100-199 gal | 405 | 25 | 0.0015 | 76.8 | 29.1 |
| Rain Barrel 200-299 gal | 700 | 50 | 0.0031 | 63.5 | 24.1 |
| Cistern | 1.22 per gallon | 0.25 per gallon | 0.000015 | 19.6 | 7.4 |

[a]In 2010, combined rebate (City and state) was $680, and payback was less than one year.

Customer paybacks range from less than one year to more than 76 years. Payback periods at the base water rate are 2.6 times longer than payback periods at the higher water and sewer rate. As indicated in the table, larger rebates relative to device cost result in shorter customer payback periods.

**Part 4: Balanced Rebates**

This part introduces the concept of a balanced rebate; that is, a rebate that has the same payback period for both the City and the customer. The balanced rebate might be useful as a tool for setting rebate amounts.

As shown in the sections on City and Customer Payback, the rebate paybacks for the City are different than for the customer. That is, larger rebates result in longer paybacks for the City and shorter paybacks for the customer. At some rebate amount, the City and customer paybacks are the same. The rebate that results in this payback is referred to in this document as the "balanced rebate". The balanced rebate can be calculated as indicated below.

Using the following equations for payback periods:

$$City\ Payback\ Period, yrs = \frac{Rebate\ Amount, \$}{(Water\ Savings\ Rate\ , af\ per\ yr)(City\ Water\ Production\ Cost, \$\ per\ af)}$$

$$Customer\ Payback\ Period, yrs = \frac{Price - Rebate, \$}{(Water\ Savings\ Rate\ , af\ per\ yr)(Water\ \&\ Sewer\ Savings, \$\ per\ af)}$$

And the following definitions:

*R = balanced rebate*
*P = device purchase price*
*WSR = water savings rate*
*Ci = City water production cost*
*Cu = customer value of water and sewer savings*
*F = Cu / Ci, the ratio of Customer Value to City Cost*

Setting the paybacks equal, canceling WSR and rearranging:

$$\frac{R}{WSR\ x\ Ci} = \frac{P - R}{(WSR\ x\ Cu)}$$

$$RCu = (P - R)Ci$$
$$RCu = PCi - RCi$$
$$RCi + RCu = PCi$$
$$R(Ci + Cu) = PCi$$

$$R = P\left(\frac{Ci}{Ci + Cu}\right)$$

that is:

Defining F to be the ratio of Customer Value to City cost

$F = Cu / Ci$ then $Cu = FCi$ and

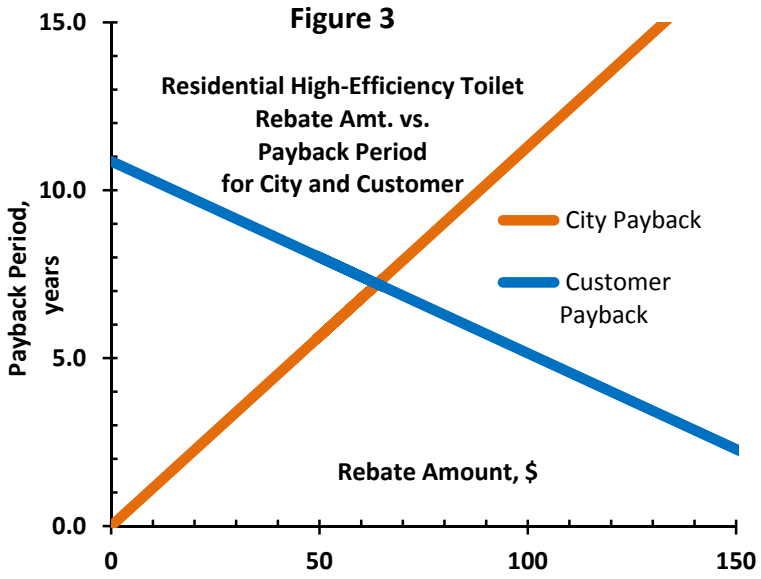
$$R = \frac{PCi}{Ci + Cu} \quad , \quad R = \frac{PCi}{Ci + FCi}$$

$$R = \frac{PCi}{Ci(1 + F)} \qquad R = P\left(\frac{1}{1 + F}\right)$$

The balanced rebate depends on the price and on the ratio of Customer Value to City Cost.

$$\boldsymbol{Balanced\ Rebate = Price\left(\frac{City\ Cost}{City\ Cost + Cutomer\ Value}\right)}$$

With F defined as the ratio of Customer Value to City Cost, and expecting that the City does not want to sell water below production cost, Cu = Ci. This results in an upper limit of F of one, and an upper limit of (1/F+1) of one-half. Therefore, the largest rebate is one-half of the prices of the device. At the values of $3,300 Customer Value and $1,670 City Cost, F = 1.98 and, the value of [1 / (F+1)] is 0.336. That is, the balanced rebate is about one-third of the price. At the values of $8,700 Customer Value and $1,670 City Cost, F= 5.21 and the value of [1 / (F+1)] is 0.161, making the balanced rebate about one-sixth of the price.




As illustrated in Figure 3, at a median price for a high-efficiency residential toilet of $190, the balanced rebate is $64. Payout periods for both the City and the customer are 7.2 years.

Table 12 provides the rebate amount in dollars and payback period in years of the balanced rebate (columns 4 and 5), compared to the current rebate and City and customer payback periods.

Column 2 shows Water Savings Factor. It is included as an indication of the effectiveness of the device in saving water, and is used in the payback calculations. The data suggest that devices with low water savings factors (perhaps less than 0.0015 acre-feet per year) may not be good expenditures for either the City or the customer.

Column 3 is the price of the device, which is used in calculation of the Balanced Rebate. As indicated above, at the values of $1,670 City Cost and $3,300 Customer Value, the Balanced Rebate is 0.336 times Price, with a payback that is the same for both the City and the customer. The last two columns (6 and 7) show the current rebate amount and the Payback to the City and to the customer at the current rebate.

**Table 12**
**Balanced Rebates**

| Device | Water Savings Factor, afy | Price $ | Balanced Rebate (.336 x Price) $ | Payback at Balanced Rebate yrs | Current Rebate $ | City Payback at Current Rebate yrs | Customer Payback at Current Rebate yrs |
|---|---|---|---|---|---|---|---|
| Commercial | | | | | | | |
| HE Toilet - Flushometer Valve | 0.0336 | 383 | 129 | 2.3 | 500 | 8.9 | -1.1 |
| HE Toilet -Tank Type | 0.0168 | 300 | 101 | 3.6 | 250 | 8.9 | 0.9 |
| HE Toilet -Tank Type, Hotel/Motel | 0.0022 | 300 | 101 | 27.4 | 125 | 34.0 | 24.1 |
| Water-Free Urinal | 0.0420 | 600 | 202 | 2.9 | 500 | 7.1 | 0.7 |
| Commercial Clothes Washer - top loader replacement | 0.0233 | 765 | 257 | 6.6 | 350 | 9.0 | 5.4 |
| Commercial Clothes Washer - front loader exchange | 0.0088 | 1,485 | 499 | 34.0 | 150 | 10.2 | 46.0 |
| Air Cooled Ice Machine | 0.6700 | 2,150 | 722 | 0.6 | 200 | 0.2 | 0.9 |
| Dishwashers | 1.1500 | 5,700 | 1,915 | 1.0 | 400 | 0.2 | 1.4 |
| Residential | | | | | | | |
| Hot Water Recirculator | 0.0215 | 170 | 57 | 1.6 | 100 | 4.8 | 1.7 |
| HE Toilet | 0.0053 | 190 | 64 | 7.2 | 175 | 19.8 | 0.9 |
| Washing Machine | 0.0250 | 760 | 255 | 6.1 | 100 | 2.4 | 8.0 |
| HE Clothes Washer replacement for top loader | 0.0233 | 720 | 242 | 6.2 | 350 | 9.0 | 4.8 |
| HE Clothes Washer exchange for front loader | 0.0088 | 760 | 255 | 17.4 | 150 | 10.2 | 21.0 |
| Rain Barrel | 0.0015 | 325 | 109 | 43.6 | 30 | 12.0 | 59.6 |
| Rain Barrel 50-99 gal | 0.0008 | 175 | 59 | 44.0 | 12 | 9.0 | 61.7 |
| Rain Barrel 100-199 gal | 0.0015 | 405 | 136 | 54.3 | 25 | 10.0 | 76.8 |
| Rain Barrel 200-299 gal | 0.0031 | 700 | 235 | 45.4 | 50 | 9.7 | 63.5 |
| Cistern | 0.000015 per gal | 1.22 per gal | 0.41 per gal | 16.4 | 0.25 per gal | 10 | 19.6 |

The table indicates that the only current residential balanced rebate with a payback period less than five years is the one for hot water recirculators. The water savings factor that was attributed to “washing machines” was unusually high (0.0250 acre-feet per year) and even with that factor the balanced rebate had a payback period of 6.1 years. Rain barrels have balanced payback periods greater than 40 years due to low water savings factors.

Using the hot water recirculator as an example, the balanced rebate of $57 provides an acceptable payback of 2.7 years to both the city and there customer. However, the actual rebate was $100, which provides a 4.8 year payback to the City and a 1.7 year payback to the customer.

Besides balanced rebates, payback periods may also be useful as guidelines when setting rebate amounts. This is because rebates (whatever the amount) with excessive payback periods may not be in the economic interest of either the City or the customer. Rebates with long payback periods might be considered, but perhaps based on non-economic factors. For example, rebates for hotel/motel high-efficiency toilets, with a payback approaching 30 years, are not a good economic decision for either the City or the customer; however, but may be desirable for other reasons.

**Part 5. Non-economic Factors**

Non-economic factors may affect the customer acceptance of a specific rebate. One of these factors may be the installation effort. This part provides information on the degree of difficulty for the customer to install water saving devices, and on the level of promotion of the rebates, described as the duration of the rebate program and the number of promotional activities.

***Installation Effort***

For example, for a hot water recirculator, installation may require the services of a plumber; whereas for a clothes washer, the vendor may not only deliver and install the washer, but may also take away the old unit. Table 13 below ranks the installation effort from low to high for both commercial and residential devices, with low being easy to do.[17] This table will be used in subsequent section to relate this variable to rebate acceptance.

**Table 13**
**Estimated Installation Effort of Rebated Devices**

| Commercial Devices | Ranking* |
|---|---|
| HE Toilet - Flushometer Valve | 4 |
| HE Toilet - Tank Type | 3 |
| Water-Free Urinal | 4 |
| Clothes Washer - Replacement for top loader | 2-4 |
| Clothes Washer - Exchange for front loading washer | 2-4 |
| Air Cooled Ice Machine | 3-5 |
| Dishwasher | 4-5 |
| Residential Devices | |
| Hot Water Recirculator | 4-5 |
| High-Efficiency Toilet | 2 |
| Clothes Washing Machine | 1 |
| HE Clothes Washer replacement for top loader | 1 |
| HE Clothes Washer exchange for front loading washer | 1 |
| Rain Barrel 50-99 gal | 2 |
| Rain Barrel 100-199 gal | 2 |
| Rain Barrel 200-299 gal | 2 |
| Cistern (Water Harvesting) | 5 |
| Rain Sensor | 2 |
| Moisture Sensor | 1-2 |
| ET Controllers | 4 |
| Irrigation Pressure Reducing Spray Head | 3-4 |
| Irrigation Pressure Reducing Valve | 3 |

1 – Requires little to no effort
2 – Some effort required, but typically doable by an someone with mechanical skills
3 – Requires expertise and potentially specialized tools
4 - Requires contractor or licensed professional, no permit or building modifications
5 – Contractor required and may require building modification and/or permit

[17] These rankings assume purchaser is a normal homeowner or business and not a contractor/installer. Rankings for this analysis are from meetings with City of Santa Fe Water Division personnel.

***Duration and Extent of Rebate Promotion by Device***

Two other factors may affect the success of a rebate program. One is the length of time the rebate was available and the other factor is the number of ways the rebate was promoted, such as advertising and word of mouth.

The marketing avenues used by the City include: websites, brochures (single or multiple, displayed in city display stands and stores), newspapers (Santa Fe New Mexican, other papers), theater, TV, water bill inserts, radio shows, press releases, bus ads, published articles and vendor-purchased advertisements. The number of years and number of ways promoted are listed in Table 14 for use in subsequent sections.

**Table 14**
**Promotion of Rebate Devices**

| Commercial Devices | Years of Program | How Promoted* |
|---|---|---|
| HE Toilet - Flushometer Valve | 2010 – Present | 1,2,3,4,5,6,9,10,11,12,13,14 |
| HE Toilet - Tank Type | 2010 – Present | 1,2,3,4,5,6,9,10,11,13,14 |
| Water-Free Urinal | 2010 – Present | 1,2,3,4,5,6,9,10,11,12,13,14 |
| Clothes Washer - Replacement for top loader | 2010 – Present | 1,2,3,4,5,6,9,10,11,12,13,14 |
| Clothes Washer - Exchange for front loading washer | 2010 – Present | 1,2,3,4,5,6,9,10,11,12,13,14 |
| Air Cooled Ice Machine | 2006 and 2007? | None |
| Dishwashers | 2006 and 2007? | None |
| Residential Devices | | |
| Hot Water Recirculators | 2004 – 2009 | |
| High-Efficiency Toilets | 2010 – Present | 1,2,3,4,5,6,9,10,11,13,14 |
| Clothes Washing Machines | 2004 – 2009 | 1,3,4,5,6,9,10,11,12,13,14 |
| HE Clothes Washer replacement for top loader | 2010 – Present | 1,2,3,4,5,6,9,10,11,13,14 |
| HE Clothes Washer exchange for front loading washer | 2010 – Present | 1,2,3,4,5,6,9,10,11,13,14 |
| Rain Barrel 50-99 gal | 2010 – Present | 1,3,4,5,9,10,11 |
| Rain Barrel 100-199 gal | 2010 – Present | 1,3,4,5,9,10,11 |
| Rain Barrel 200-299 gal | 2010 – Present | 1,3,4,5,9,10,11 |
| Cisterns | 2010 – Present | 1,3,4,5,9,10,11 |
| Rain Sensor | Aug 2009 – Sept 2012 | 1,3,4,5,9,10 |
| Moisture Sensor | Aug 2009 – Sept 2012 | 1,3,4,5,9,10 |
| ET Controllers | Aug 2009 – Sept 2012 | 1,3,4,5,9,10 |
| Irrigation Pressure Reducing Spray Head | Aug 2009 – Sept 2012 | 1,3,4,5,9,10 |
| Irrigation Pressure Reducing Valve | Aug 2009 – Sept 2012 | 1,3,4,5,9,10 |

The table above was based on meetings with City personnel. Promotional vehicles included:

1. Water Conservation Website
2. City Website
3. Brochures
4. City Display Stands
5. Vendor Display Stands
6. Print Media
7. Theater Advertising
8. Television Advertising
9. Water Bill Inserts
10. Radio Advertising
11. Press Releases
12. Vendor-purchased Advertising
13. Byline Article
14. Media Coverage

Table 15 lists the total number of months a rebate was available (the duration) and the total number of ways it was promoted. In simply providing a sum of the number of the ways promoted, the implicit assumption is that each type of promotion is equally effective, which may not be the case.

In 2013, the City launched a new website which may make it easier to find rebates and the related rebate forms. This may affect future rebates but is not considered in this analysis.

**Table 15**
**Rebate Duration and Number of Ways Promoted**

| Commercial Devices | Months of Rebate | Total Number of Ways Promoted |
|---|---|---|
| HE Toilet - Flushometer Valve | 48 | 12 |
| HE Toilet - Tank Type | 48 | 11 |
| Water-Free Urinal | 48 | 12 |
| Clothes Washer - Replacement for top loader | 48 | 12 |
| Clothes Washer - Exchange for front loading washer | 48 | 12 |
| Air Cooled Ice Machine | 12 | 0[a] |
| Dishwashers | 12 | 0[a] |
| Residential Devices | | |
| Hot Water Recirculators | 72 | 0[a] |
| High-Efficiency Toilets | 48 | 11 |
| Clothes Washing Machines | 72 | 11 |
| HE Clothes Washer replacement for top loader | 48 | 12 |
| HE Clothes Washer exchange for front loading washer | 48 | 12 |
| Rain Barrel 50-99 gal | 48 | 7 |
| Rain Barrel 100-199 gal | 48 | 7 |
| Rain Barrel 200-299 gal | 48 | 7 |
| Cisterns | 48 | 7 |
| Rain Sensor | 38 | 6 |
| Moisture Sensor | 38 | 6 |
| ET Controllers | 38 | 6 |
| Irrigation Pressure Reducing Spray Head | 38 | 6 |
| Irrigation Pressure Reducing Valve | 38 | 6 |

[a]No record of promotional activities

**Part 6. Relationship between the Number of Rebates and Customer Factors**

This section relates the number of rebates to the customer factors described in the previous sections.

***Number of Rebates Related to Price of Device and Rebate Amount***

Table 16 summarizes the number of rebates awarded, the rebate amount and the median price of a device.

**Table 16**
**Relationship of Device Price and Rebate Amount**
**To Number of Rebates Awarded**

| Device | Median Price $ | Rebate Amount[a] $ | Net Cost $ | No. of Rebates Awarded |
|---|---|---|---|---|
| HE Toilet - Flushometer Valve | 383 | 500 (504, 2004-2009) | (117) | 199 |
| HE Toilet - Tank Type | 300 | 250 (504, 2004-2009) | 50 | 212 |
| HE Toilet - Tank Type (Hotel/Motel) | 300 | 125 (504, 2004-2009) | 175 | 1281 |
| Water-Free Urinal | 600 | 500 (630, 2004-2009) | 100 | 29 |
| Clothes Washer - Replacement for top loader | 765 | 350 (480, 2004-2009) | 415 | 2 |
| Clothes Washer - Exchange for front loader | 1,485 | 150 (180, 2004-2009) | 1335 | 2 |
| Air Cooled Ice Machine | 2,150 | 200 (2004 to 2009) | 1950 | 6 |
| Dishwashers | 5,700 | 400 (2004 to 2009) | 5300 | 1 |
| Hot Water Recirculators | 170 | 100 (2004 to 2009) | 70 | 270 |
| High-Efficiency Toilets | 190 | 175 | 15 | 931 |
| Clothes Washing Machines | 760 | 100 (2004 to 2009) | 660 | 2,461 |
| HE Clothes Washer replacement for top loader | 720 | 350 (480[b] in 2010) | 370 (+240) | 1,448 |
| HE Clothes Washer exchange for front loader | 760 | 150 (180 in 2010) | 610 | 141 |
| Rain Barrel | 325 | 30 | 295 | 1,736 |
| Rain Barrel 50-99 gal | 175 | 12 | 163 | 98 |
| Rain Barrel 100-199 gal | 405 | 25 | 380 | 12 |
| Rain Barrel 200-299 gal | 700 | 50 | 650 | 24 |
| Cisterns | 1.22/gallon | 0.25/gallon | 0.97/gallon | 8 |
| Rain Sensor | 20 | 40 | (20) | 2 |
| Moisture Sensor | 200 | 75 | 125 | 0 |
| ET Controllers | 500 | 300-750 | 200 (250) | 0 |
| Irrigation Pressure Reducing Valve[c] | 50 | 120 | (70) | 0 |
| Irrigation Pressure Reducing Spray Head | 10 | 5 | 5 | 0 |

[a] 2013 rebate amount unless Stated otherwise
[b] In 2010, the State of New Mexico rebate program added $200 to this rebate amount.
[c] 3/4"

In the commercial device category, 1,721 rebates were awarded for high-efficiency toilets (flushometer valve and tank-type) and water free urinals. Rebates for these devices covered more than 40% of the cost of the device. For clothes washers, dishwashers, and air cooled ice machines, only 11 commercial rebates were awarded. For these devices, the rebate covered only 10-50% of the cost of the device.

Therefore, the relationship between price and rebate may affect the success of the commercial rebate program, at least to some degree. For most commercial devices, there appears to be a correlation

between price of the device, the rebate amount and the number of rebates granted. However, this correlation does not explain number of rebates awarded to Hotels/Motels for HETs, for which the rebate covered only 42% of the price. Here the large number of rebates may be attributed to the water saved and the resulting operating cost savings to the commercial customer.

In the residential rebate category, rebates for hot water recirculators and high-efficiency toilets were more than one-half of the cost of the devices and more than 1,200 rebates were awarded. Rebates for top loader replacements ranged from 45% to more than 90% (in 2010, with the additional $200 State rebate) of the cost, and more than 1,400 rebates were awarded. In the case of clothes washer rebates, over 51% of these rebates were awarded in 2010. Rebates for front loader exchanges were about 20% of the cost, and only 141 rebates were awarded. Rebates for rain barrels (50-299) were about 10% or less of the cost of the rain barrel and 134 were awarded.

From 2004-2009, the rebate for clothes washing machines was less than 15% of the price of the machine and yet almost 2,500 rebates were awarded. Here, the price/rebate relationship does not account for the number of rebates granted. The high number of these rebates awarded during this period may not be due to the cost/rebate relationship, but other factors such as advertising efforts or promotion by vendors.

In looking at the number of rebates granted for all outdoor devices other than rain barrels in 2009-2011, only two rebates were granted. This occurred despite the rebate amount being greater than the median cost of the device.

As shown in 2010 with the addition of the $200 State rebate, increasing rebates relative to the cost of the appliance does drive residential behavior. However, as shown in other rebates there must be other factors at play because price alone is not a sole predictor of rebate success. Tentatively, it might be concluded that the most successful rebates for residential customers are at least one-half the cost of the device.

***Number of Rebates Related to Payback Periods***

Table 17 below relates the payback period data to the number of rebates awarded.

**Table 17**
**Relationship of Customer Payback Period**
**To Number of Rebates Awarded**

| Device | Payback years @ $3,300 af | Payback years @ $8,700 af | Number of Rebates |
|---|---|---|---|
| Commercial | | | |
| HE Toilet, Flushometer Valve | -1.1 | -0.4 | 199 |
| HE Toilet, Tank Type | 0.9 | 0.3 | 212 |
| HE Toilet, Tank Type, Hotel/Motel | 24.1 | 9.1 | 1,281 |
| Water-Free Urinal | 0.7 | 0.3 | 29 |
| Commercial HE Clothes Washer, top loader replacement | 5.4 | 2.0 | 2 |
| Commercial HE Clothes Washer, front loader exchange | 46.0 | 17.4 | 2 |
| Air-Cooled Ice Machine | 0.9 | 0.3 | 6 |
| Commercial Dishwasher | 1.4 | 0.5 | 1 |
| Residential | | | |
| Hot Water Recirculator | 1.0 | 0.4 | 270 |
| Residential HE Toilet, Tank Type | 0.9 | 0.3 | 931 |
| Residential Clothes Washer | 8.0 | 3.0 | 2,461 |
| Residential HE Clothes Washer, top loader replacement | 4.8 | 1.8 | 1,448 |
| Residential HE Clothes Washer, front loader exchange | 21.0 | 8.0 | 141 |
| Rain Barrel | 59.6 | 22.6 | 1,736 |
| Rain Barrel 50-99 gal | 61.7 | 23.4 | 98 |
| Rain Barrel 100-199 gal | 76.8 | 29.1 | 12 |
| Rain Barrel 200-299 gal | 63.5 | 24.1 | 24 |
| Cistern | 19.6 | 7.4 | 8 |

For commercial rebates, the high-efficiency Flushometer has a short payback period for the customer and received the largest number of rebates. Commercial tank type toilets had a large number of rebates and a short payback period. Hotel/Motel tank-types had a significant number of rebates awarded despite the payback period being much longer than other payback periods. Interestingly, the air-cooled ice-machines, commercial dishwaters, and waterless urinals had short customer payback periods but only a few rebates were awarded.

Excluding hotel/motel rebate awards, there seems to be a relationship between customer payback periods and the number of rebates granted.

For residential rebates, there is a correlation between short customer payback periods and greater number of rebates, with the exception of clothes washer (on the first rebate program in 2004). Rain barrels programs with long payback periods for the customer have not been as successful as the other current programs.

***Number of Rebates Related to Degree of Difficulty***

Table 18 below relates the installation effort for the device with the number of rebates awarded..

**Table 18**
**Relationship of Installation Effort**
**To Number of Rebates Awarded**

| Commercial Devices | Ranking | No. of Rebates Awarded |
|---|---|---|
| HE Toilet - Flushometer Valve | 4 | 199 |
| HE Toilet - Tank Type | 3 | 212 |
| HE Toilet - Tank Type Hotel/Motel | 3-4 | 1,281 |
| Water-Free Urinal | 4 | 29 |
| Clothes Washer - Replacement for top loader | 2-4 | 2 |
| Clothes Washer - Exchange for front loading washer | 2-4 | 2 |
| Air Cooled Ice Machine | 3-5 | 6 |
| Dishwashers | 4-5 | 1 |
| Residential Devices | | |
| Hot Water Recirculators | 4-5 | 270 |
| High-Efficiency Toilets | 2 | 931 |
| Clothes Washing Machines | 1 | 2,461 |
| HE Clothes Washer replacement for top loader | 1 | 1,448 |
| HE Clothes Washer exchange for front loading washer | 1 | 141 |
| Rain Barrel | 2 | 1,736 |
| Rain Barrel 50-99 gal | 2 | 98 |
| Rain Barrel 100-199 gal | 2 | 12 |
| Rain Barrel 200-299 gal | 2 | 24 |
| Cistern | 5 | 8 |
| Rain Sensor | 2 | 2 |
| Moisture Sensor | 1-2 | 0 |
| ET Controllers | 4 | 0 |
| Irrigation Pressure Reducing Spray Head | 3-4 | 0 |
| Irrigation Pressure Reducing Valve | 3 | 0 |

[a]These rankings assume purchaser was a normal homeowner or business and not a contractor. Rankings for this analysis came from meetings with City of Santa Fe Water Division personnel.

For commercial devices, there is no apparent correlation between effort and number of rebates awarded. For residential devices, with the exception of hot water recirculators, there is no apparent correlation between effort and number of rebates.

### *Number of Rebates Related to Promotional Efforts*

Promotion effectiveness is generally a combination of length of promotion and the number of ways a device is promoted. The Promotional Factor is determined by multiplying the duration of the rebate program in months with the total number of ways promoted. For this analysis, it is assumed that all promotional vehicles are equal.

Table 19 relates the duration of the rebate program and the number of ways promoted with the number of rebates awarded.

**Table 19**
**Relationship of Rebate Duration and Ways Promoted**
**To Number of Rebates Awarded**

| Commercial Devices | Months of Rebate | Total Number of Ways Promoted | Promotional Factor | Number of Rebates Awarded |
|---|---|---|---|---|
| HE Toilet - Flushometer Valve | 48 | 12 | 576 | 199 |
| HE Toilet - Tank Type | 48 | 11 | 528 | 212 |
| HE Toilet - Tank Type Hotel/Motel | | | | 1,281 |
| Water-Free Urinal | 48 | 12 | 576 | 29 |
| Clothes Washer - Replacement for top loader | 48 | 12 | 576 | 2 |
| Clothes Washer - Exchange for front loading washer | 48 | 12 | 576 | 2 |
| Air Cooled Ice Machine | 12 | 0[a] | 0 | 6 |
| Dishwashers | 12 | 0[a] | 0 | 1 |
| Residential Devices | | | | |
| Hot Water Recirculators | 72 | 0[a] | 0 | 270 |
| High-Efficiency Toilets | 48 | 11 | 528 | 931 |
| Clothes Washing Machines | 72 | 11 | 792 | 2,461 |
| HE Clothes Washer replacement for top loader | 48 | 12 | 576 | 1,488 |
| HE Clothes Washer exchange for front loading washer | 48 | 12 | 336 | 141 |
| Rain Barrel 50-99 gal | 48 | 7 | 336 | 98 |
| Rain Barrel 100-199 gal | 48 | 7 | 336 | 12 |
| Rain Barrel 200-299 gal | 48 | 7 | 336 | 24 |
| Cisterns | 48 | 7 | 336 | 8 |
| Rain Sensor | 38 | 6 | 228 | 2 |
| Moisture Sensor | 38 | 6 | 228 | 0 |
| ET Controllers | 38 | 6 | 228 | 0 |
| Irrigation Pressure Reducing Spray Head | 38 | 6 | 228 | 0 |
| Irrigation Pressure Reducing Valve | 38 | 6 | 228 | 0 |

[a] No record of promotional activities

The clothes washing machines had the highest promotional factor at 792 and the highest number of rebates awarded.

Rain Sensor, Moisture Sensor, ET Controllers, Irrigation Pressure Reducing Spray Head, Irrigation Pressure Reducing Valve were all part of the same Outdoor Irrigation Rebate program. The low number of rebates was related to lack of general awareness, per City personnel.[18]

[18] Discussion with Daniel Ransom, the City Water Conservation manager at the time of this program.

**Part 7. Conclusions and Further Investigations**

The purposes of this paper are to investigate Santa Fe's water conservation rebate programs in order to:

1. Compile a historical record of Santa Fe's water conservation rebate programs,

2. Investigate how effective the rebate programs have been in meeting the needs of both the City and the customer, and

3. Provide recommendations that might be used in the development of future rebate programs.

Below is a section relating to each of the above purposes..

**1. Historical record**

The historical record of the rebate programs is provided throughout this document and summarized in multiple tables. The baseline data is provided in spreadsheets that have been provided to the City of Santa Fe.

Highlights of the historical record of the rebate program:

- Santa Fe rebate program began in 2003, with indoor and outdoor rebates available to both residential and commercial customers, and continues through 2013.
- Total rebates awarded through 2013 are more than 8,500 at total City cost of almost $1,700,000.
- The total amount of water that is estimated will be saved for the useful life of the rebated devices is more than 1,280 acre-feet.
- Total rebates to date as a percentage of population is more than 12%, with commercial rebates as a percentage of connections being almost 10%, and residential as a percentage of connections being over 22%.
- The number of rebates awarded per year has ranged from a low of about 500 to more than 2,000.
- For commercial customers, the highest number of rebates has been for high-efficiency toilets.
- For residential customers, the highest number of rebates has been for clothes washing machines.
- For outdoors, the highest number of rebates has been for the 2004-2009 rain barrel rebate program.
- Rebate amounts have changed over the period, and have ranged from a low of $2 to a high of $900.
- To the end of 2013, total rebate expenditures are almost $1,700,000, divided between commercial rebates of almost $600,00, and residential rebates of about $1,100,000.
- In 2010, the state of New Mexico provided a $200 rebate for high-efficiency washing machines in addition to the city rebate; consequently 2010 was the largest rebate year by far, which provides evidence that rebate amounts influence number of rebates.
- Water savings rates and the City cost of water are used as a basis for rebate amounts. .
- Determining an accurate cost of water is critical to determining rebate amounts.
- Rebate amounts for commercial high efficiency toilets (not hotel/motel) and residential high efficiency toilets are about two to three times the City water cost.
- Water savings in 2010 (32.46 acre-feet) was the largest of any year, representing almost 25% of total potential water savings. This was the result of the combined state and City rebates for clothes washers. The combined rebates also encouraged other both commercial and residential rebates.
- Although commercial connections are about 30% of total connections, commercial water savings from rebate have totaled less than 15%.
- Outdoor rebates have only been 2.5% of the overall water saved through the rebate program.

Table 20 summarizes key aspects of Santa Fe's rebate program.

**Table 20**
**Historical Rebate Summary**

| | Water Factor | Median Cost $ | Total No. Rebates | 2004 - 2009 Rebate $ | 2010 Rebate $ | 2011 - 2013 Rebate $ | Install Effort | Market Awareness (No of ways promoted) | Approx. Promotion Period yrs |
|---|---|---|---|---|---|---|---|---|---|
| HE Toilet, Flushometer Valve | afy | 383 | 199 | | 504 | 500 | 4 | 12 | 4 |
| HE Toilet, Tank Type | 0.0336 | 300 | 211 | | 504 | 250 | 3 | 11 | 4 |
| HE Toilet, Tank Type Hotel/Motel | 0.0168 | 300 | 1181 | | 504 | 125 | ? | 11 | 4 |
| Water-Free Urinal | 0.0022 | 600 | 29 | | 630 | 500 | 4 | 12 | 4 |
| Commercial HE Clothes Washer, top loader replacement | 0.0420 | 765 | 2 | | 480 | 350 | 3 | 12 | 4 |
| Commercial HE Clothes Washer, front loader exchange | 0.0233 | 1,485 | 2 | | 180 | 150 | 3 | 12 | 4 |
| Air-Cooled Ice Machine | 0.0088 | 2,150 | 6 | 200 | | | 4 | 0* | |
| Commercial Dishwasher | 0.6700 | 5,700 | 1 | 400 | | | 4.5 | 0* | |
| Commercial Process Efficiency | 1.1500 | | 1 | | 874 | | ? | | |
| Hot Water Recirculator | 0.4500 | 170 | 270 | 100 | | | 4.5 | | |
| Residential HE Toilet | 0.0215 | 190 | 811 | | 175 | 175 | 2 | | |
| Residential Clothes Washer | 0.0053 | 760 | 2461 | 100 | | | 1 | | |
| Residential HE Clothes Washer, top loader replacement | 0.0250 | 720 | 1388 | | 480 (730) | 350 | 1 | | |
| Residential HE Clothes Washer, front loader exchange | 0.0233 | 760 | 125 | | 180 | 150 | 2 | | |
| Rain Barrel | 0.0088 | 325 | 1736 | 30 | | | 2 | | |
| Rain Barrel 50-99 g | 0/0015 | 175 | 38 | | 12 | 12 | 2 | | |
| Rain Barrel 100-199 g | 0.0008 | 405 | 10 | | 25 | 25 | 2 | | |
| Rain Barrel 200-299 g | 0.0015 | 700 | 23 | | 50 | 50 | 2 | | |
| Cistern (Water Harvesting) | 0.0031 | 1.22 / gal | 5 | | 0.25 / gal | 0.25 / gal | 5 | | |
| Rain Sensor | 0.000015 | 20 | 2 | | 40 | 40 | 2 | | |
| Moisture Sensor | NC | 200 | 0 | | 75 | 75 | 1.5 | | |
| ET Controller | NC | 500 | 0 | | 300 - 750 | 300 - 750 | 4 | | |
| Irrigation Pressure Reducing Valve | NC | 50 | 0 | | 120 - 525 | 120 - 525 | 3.5 | | |
| Irrigation Pressure Spray Head | NC | 10 | | | | | | | |

**2. The effectiveness of the rebate programs.**

- The overall City payback period is almost eight years, and for each device, ranges from less than one year to more than 34 years.
- The economic interests of the customer influence the acceptance of rebates.
- Reduced water consumption results in customer savings based on the cost of water, sewer, and taxes. At base water rates, customer cost is $10.12 per 1,000 gallons of water, and 2.6 times this at the high water rate.
- For each device, customer payback period depends on the net device cost (price minus rebate), the water savings rate and the value of water and sewer savings. Except for the water savings rate, these factors are different than for the City.
- Customer payback periods range from less than one year to more than 75 years at the base water rate. Paybacks are about one third of these values at the high water rate.
- Non-economic factors may affect acceptance of rebates.
- For commercial customers, the net cost does not explain the number of rebates.
- For commercial customers, it appears that a combination of low net cost and short payback period better explains the number of rebates.
- Tank-type toilets for hotels/motels are not explained by either low net or short payback. In discussions with the City, this seems to be explained by a large number of installations by a few establishments.
- For residential customers, the net cost may help explain the number of rebates. For example, for a high efficiency clothes washer the rebate indicates a correlation of net cost to number of awards 2010 (782 were awarded). From 2004 to 2009, more than 2,400, a rate of 400 per year, at a higher net cost.
- The net cost does not correlate with any of the outdoor rebates instituted in 2009 and this must be explained by other factors.
- For residential rebates, larger numbers of rebates are associated with low net cost and short paybacks.
- For residential customers, low numbers of rebates are associated with high net cost and low paybacks.
- For residential customers, very few rebates were awarded for devices that had paybacks over 20 years with the exception of rain barrels.
- Those that do not fit this pattern have had rebates available for longer periods of time.
- Hot water recirculators were in place only from 2004 to 2009 and were not highly promoted.
- For commercial establishments, there is no apparent correlation between installation effort and number of rebates.
- For residential, with the exception of hot water recirculators, there seem to be some positive relationship between rebates and low effort.
- For residential, low promotional factors result on low numbers of rebates.
- For residential, the rebates that had the higher promotional factors had the highest number of rebates.
- For commercial, there relation to promotional factors is less clear.
- Based on the City water demand pattern and the Brian Hurd study, and the number of outdoor rebates, outdoor water savings may be useful in reducing peak demand.
- Factors such as installation effort, duration and extent of promotion, and device price may influence customer acceptance of rebates.
- Excessively payback periods for either the City or the customer may not be the effective.

**3. Recommendations**

- The Santa Fe rebate program has been ongoing for over a decade with many changes to the list of devices, the customers available to be awarded a rebated and the dollar amounts of the rebates. The current mechanism for changing this is through City of Santa Fe City Council approval (i.e. city ordinance/resolution changes). This is a time consuming process and adds

delays to the programs. A better approach maybe annual review of prior year's results with approval of the overall program objectives, expenditures and targets for the coming year. With the program expenditures subject to the current review process.

- The longer the rebate program, a certain amount of rebates will even with diminished advertising or promotion.
- Residential rebates with a low net cost and short payback have a quick impact on water savings.
- For commercial rebates, ongoing long-term operating cost savings may be a better promotional message.
- It appears that current rebate amounts have been based largely on the value of City water savings. There is value in also considering the value to the customer. Both of the values are conveniently measured by the payback period. Rebates that balance the payback to both the City and the customer may be useful.
- A balanced rebate, one that balances payback periods for both the City and the customer may be a useful tool.

The cost of a rebate program includes administrative and staff expenses as well as costs for processing rebate applications and advertising. Rebate programs are form-based systems that require the customer to report work and the water conservation staff to verify. Verification can require a few minutes too many hours including a site visit in some cases. The barrier to customers and the work requirement for staff are not investigated in this analysis, but do potentially impact the success of a program. If they were taken into account, administrative costs would increase the cost of the rebate program and extend the payoff periods for the City.

Water conservation cannot be entirely evaluated independently of other factors. Other factors also will affect water usage. Some of these are water rates, droughts, regulations, increased public awareness and economic conditions. This analysis is a starting point for further investigations. The following would add significant data:

- Customer survey post installation to verify actual usage of the device rebated.
- Comparative analysis for the market penetration of specific devices by market sector.
- Tracking of hours to process rebates and inclusion of these costs in the overall costs to the City.
- Survey of sample market to better understand awareness versus promotional efforts.
- Better comparative data of the different types of promotion (e.g., city ads versus vendor ads).
- Investigation into the need for a constant source of rebate program funding.