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TAMPA BAY WATER
Supplying Water To The Region

Tampa Bay Water
Water Demand Management Plan Update 2018

Final Report
December 2018

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List of Acronyms

Abbreviation	**Definition**
AHS	American Housing Survey
AMJ	April, May, June
AWE	Alliance for Water Efficiency
BCR	Benefit Cost Ratio
CEE	Consortium for Energy Efficiency
COC	Cycles of Concentration
COT	City of Tampa
CW	Clothes Washers
DBPR	Florida Department of Business and Professional Regulation
DMP	Demand Management Plan
DOE	Department of Energy
DW	Dishwasher
EPA	U.S. Environmental Protection Agency
ES	Energy Star
ET	Evapotranspiration
ET / SMS	Evapotranspiration / Soil Moisture Sensor
FDOR	Florida Department of Revenue
FFL	Florida Friendly Landscape
FV	Future Value
FWS	Florida Water Star
GPF	Gallons Per Flush
GPUD	Gallons Per Unit Day
GPY	Gallons Per Year
HE	High Efficiency
HET	High Efficiency Toilet
HEU	High Efficiency Urinal
IFAS	Institute of Food and Agricultural Sciences
ISE	Irrigation System Evaluation
LTDF	Long-Term Demand Forecast
LTMWP	Long-term Master Water Plan
MF	Multifamily
MG	Million Gallons
MGD	Million Gallons Per Day
NA	Not Applicable
NPR	City of New Port Richey
NPV	Net Present Value

Abbreviation	**Definition**
NR	Nonresidential
NWH	North West Hillsborough County
PAS	Pasco
PIN	Pinellas
PRSV	Pre-Rinse Spray Valve
PV	Present Value
SCH	South Central Hillsborough County
SF	Single Family
SHARP	South Hillsborough Aquifer Recharge Project
SMS	Soil Moisture Sensor
STP	City of St. Petersburg
SWTP	Surface Water Treatment Plant
TBW	Tampa Bay Water
TDS	Total Dissolved Solids
UF EDIS	University of Florida Electronic Data Information Source
UF	University of Florida
WDPA	Water Demand Planning Area
WEPL	Water Efficiency Program Library

1. Executive Summary

ES.1 Background

Tampa Bay Water currently helps meet the water demands of more than 2.4 million people in the tri-county Tampa Bay region. Residential demands account for nearly 75 percent of billed water consumption, with the remainder associated with the needs of commercial businesses and industry. The agency has been actively involved in quantifying water demand and potential changes in demand through water use efficiency efforts, mainly through member government implementation, since adoption of its original demand management plan in 1997. Additionally, the agency developed tools to quantify ongoing member water use efficiency programs that helped to meet original Board of Directors adopted planning goals in 1998. Furthermore, the Tampa Bay Water Board of Directors adopted Board Resolution No. 2013-006 in February 2013. This resolution incorporates water use efficiency evaluation efforts into the Agency long-term water supply planning process consistent and in concert with the recommendations of this DMP. This resolution directs the Agency to:

- Develop and implement data collection, management and analysis protocols and procedures for the continued assessment of passive water use efficiency within Tampa Bay Water's service area.
- Integrate passive water-use efficiency into the Agency's Long-term Demand Forecast and Future Need Analysis.
- Include the Water Use Efficiency Evaluation as an element of the Long-term Water Supply Plan and include an updated evaluation of potential active measures for implementing efficient water-use products as part of future options for the next Long-term Water Supply

As a part of its diversified water supply portfolio, Tampa Bay Water relies on surface water supplies to meet some drinking water demands in the tri-county area. Approximately, one-half of the water supplies for Tampa Bay Water member governments are dependent on the timing and quantity of local and regional rainfall. To meet regional demands reliably, it is important to understand how variability and uncertainties affect the planning and development of water supplies as river flows upon which these supplies are dependent tend to fluctuate due to weather and seasonal variability. As Tampa Bay Water's reliance on surface water and other alternative water sources continues to increase, the value of increased water use efficiency in managing future long-term supply needs has become evident. As new supply development costs continue to increase, avoided cost of water supply through demand management has become a more critical element of the water supply planning process.

The 2018 Demand Management Plan (DMP) update, investigates the benefits and costs of water demand management as a quantifiable, alternative water supply source to projects being considered in the agency's 2018 Long-term Master Water Plan (LTMWP). The 2018 DMP update is considered one component of the agency's strategic goals to achieve reliability of its water supply and delivery system to our member governments. Tampa Bay Water is required to evaluate and update the Demand Management Plan every five years, consistent with the LTMWP update.

Demand side management efforts are intended to serve as a complementary component to traditional water supply planning processes in meeting current and future water demands. Demand-side management encompasses a set of activities designed to:

- Provide a better understanding of how and why water is used;
- Forecast human demands for water supplies;
- Develop prospective water-using efficiency (demand reduction) measures;
- Identify programmatic and project goals, evaluation criteria, performance measures, and monitoring mechanisms;
- Define and evaluate program effectiveness and goal achievement; and
- Evaluate the benefits and costs of efficiency measures as an alternative or complement to supply development.

Through efficient use of available supplies and use of targeted implementation strategies, water use efficiency can help manage peak and average day water demand in conjunction with reducing long-term future water supply requirements. Cost-effective alternatives to new supply development and other valuable benefits can be realized through demand side management including: optimization of existing facilities, deferred capital investment costs, improved public perception, potential reduction in greenhouse gas emissions vs. supply development., support of future supply projects, and environmental stewardship and protection.

ES.2 Components of Tampa Bay Water's DMP

The 2018 DMP reflect improvements in the state of water use efficiency occurring since 1995 when the first DMP goals were adopted as well as the completion of the 2013 DMP. The update includes an evaluation of potential demand management projects as a beneficial tool for long-term water supply planning. Results define how water efficiency activities may fit into Tampa Bay Water's long-term water supply planning process, which includes supply reliability and member government long range demand projections. The 2018 DMP report is organized into five sections:

- Section 1: Introduction
- Section 2: Determination of Market Potential for Active Demand Management Programs
- Section 3: Active Demand Management Program Development
- Section 4: Avoided Cost Analysis
- Section 5: Summary and Recommended Strategies

The demand management evaluation effort includes an analysis of water savings (past and future) and an analysis of avoided supply costs related to improved water use efficiency. The "avoided supply cost" analysis considers increments of conserved water versus (a) cost to operate existing water supply sources and (b) total cost (capital and operating costs) to develop new water supply. Consideration of cost savings and water supply benefits permits a consistent "apples to apples" comparison to other water supply alternatives.

ES.3 Remaining Market Potential for Active Demand Management

Estimates of water savings potential are based on assumptions concerning changes in the mix of water using technology and the rate (or intensity) at which water using technology is used. The U.S. Energy Policy Act (EPAct), effective in 1994, mandated flow standards for many fixtures (e.g., toilets, faucets and showerheads, among others). Since then, manufacturers have introduced and marketed fixtures and appliances, which far exceed EPAct standards, leading to programs such as the EPA WaterSense and Energy Star (ES) programs. These programs certify products performing at rates that are more efficient than the current national efficiency standards while meeting consumer expectations and influence the market by encouraging consumers to purchase ultra-water conserving, high-efficiency (HE) water products. WaterSense labeled products require independent third-party certification of performance and product durability, insuring product use is consistent with labeling over a defined life. As consumers decide to purchase and install HE water products, formally labeled EPA WaterSense and other products that well exceed minimum efficiency requirements required by law, water consumption efficiency increases.

Assessment of technology and program-based savings potential requires starting-point (or base-year) estimates of fixture or appliance age distribution and efficiency regionally by water use sector and water efficiency technology market penetration. The market potential for active water efficiency measures is estimated after the impact of passive water use efficiency measures is considered:

- *Passive* water efficiency is achieved through a natural process of replacing old fixtures with new, more efficient fixtures as they wear out or become effectively obsolete or installing efficient water-using fixtures in new construction due to either codes or driven by market changes. Passive water efficiency typically occurs indoors with the replacement of toilets, clothes washers, dishwashers, and urinals.

- *Active* water efficiency measures include programs designed to expedite the replacement process described above. Such programs are often sponsored by water utilities to ensure a target installation rate and associated water savings and can include outdoor efficiency technologies.

Water efficiency measures subject to natural replacement include the residential and nonresidential fixtures (toilets, urinals and clothes washers). Outdoor efficiency programs and nonresidential cooling towers are not subject to natural replacement assumptions for the purposes of estimating remaining market potential.

The assessment of remaining efficiency potential supports the screening and selection of technically applicable active programs. The 2013 DMP update identified 24 measures deemed viable for implementation, of which only 18 were judged to have sufficient information to estimate the presence of end uses and support a comprehensive assessment of efficiency potential and cost. The 2013 DMP Water Efficiency Program Library (WEPL) contains the complete listing of available indoor and outdoor measures for new homes, existing homes, and non-residential uses considered.

ES.4 Cost-Effective Active Demand Management

The 2013 DMP update screening process considered 18 programs / technologies, either applied through evaluation of existing programs (regionally and nationally) or developed based upon specific application of technologies in specific sectors or water end uses. The process utilized regional and national literature and other secondary sources, along with information gleaned from survey and analysis of regional water use characteristics.

As part of the 2018 update, savings rates, utility costs, benefit cost ratios and implementation strategies were reviewed and updated as deemed appropriate to ensure feasible targeting and implementation strategies. This assessment resulted in the selection of 11 programs for the 2018 update. Remaining market potential for water efficient technology (beyond what is likely accounted for by passive measures) was determined through the 2040 demand forecast planning horizon for the 11 programs selected for inclusion in the 2018 DMP update as described in Section 2. The portfolio of programs included in the 2018 update are shown in Table ES-1

Table ES-1
Programs Meeting Screening Criteria

Program	Sector	Utility Cost ($/unit)	Unit Savings (GPY)	Useful Life of Savings (yrs)	Gallons Saved over Useful Life	$/1000 gal	BCR
Cooling Towers	NR	$1,225	1,386,530	10	13,865,299	0.09	8.6
High Efficiency Toilet (Valve)	NR	$100	22,103	30	663,093	0.15	2.8
High Efficiency Urinal (1/2 Gallon)	NR	$100	18,928	30	567,840	0.18	4.5
Pre-Rinse Spray Valve	NR	$75	37,426	10	374,260	0.20	2.8
Alternative Irrigation Sources	SF	$575	94,034	25	2,350,850	0.24	3
High Efficiency Toilet (Tank)	NR	$100	13,020	30	390,587	0.26	2.4
Dishwashers (Conveyor)	NR	$425	59,951	20	1,199,027	0.35	2.1
High Efficiency Toilet	SF	$125	12,854	25	321,350	0.39	1.8
High Efficiency Toilet	MF	$100	9,679	25	241,977	0.41	1.2
ET/SMS Irrigation Controller[1]	SF	$300	56,645	10	566,449	0.53	1.4
FWS/FFL Incentive[2]	SF	$725	50,560	25	1,264,000	0.57	1.3

[1] Evapotranspiration / Soil Moisture Sensor Irrigation Controller

[2] Florida Water Star / Florida Friendly Landscaping

Of the 11 programs, 6 programs are applicable to the non-residential (NR) sector, 4 to the single-family (SF) sector and 1 to the multi-family (MF) sector. Indoor water efficiency still exists after passive efficiency in all sectors of water use, while outdoor opportunities exist primarily in the single-family sector. While the potential for outdoor efficiency is assumed to exist in the multifamily and nonresidential sectors, the potential savings rates for these programs are highly variable due to the diversity of nonresidential properties and establishment types.

Estimates of gallons saved reflect savings over the life of each measure, which vary depending on measure implementation assumptions, unit savings rates, and useful life of the technology. Estimated unit costs were compared with unit costs of supply alternatives to evaluate the viability of demand management programs and estimate the benefit cost ratio (BCR). As identified in Table ES-1, program cost effectiveness ranges from $0.09/1000 gallons for the cooling tower retrofit to $0.57/1000 gallons for FWS / FFL Incentives.

ES.5 Benefits of Avoided Costs

Accounting for prospective changes in efficiency standards, fixture life, and market penetration of high efficiency products allows adjustment of the baseline demand forecast to reflect market-based passive demand reductions. In addition to passive savings, water savings related to implementation of active demand management measures can result in additional demand reductions.

Passive water savings were estimated as part of Tampa Bay Water's Long-Term Demand Forecast (one possible range of savings identified), while active savings were estimated through the 2018 DMP update. Estimated impacts of passive water savings and potential active demand management on the region's long-term demands over the planning horizon are presented in Table ES-2 and Table ES-3. As shown, total baseline demands are projected to increase at an annualized average rate of 1 percent per year to about 285 MGD in 2040, based on the Agency's 2017 demand forecast. This represents a 59 MGD increase in total baseline demands from 2015. Given the 18 MGD water use reduction associated with the impact of passive efficiency (i.e., existing and new plumbing codes with projected lifetimes for existing products), the projected increase by 2040 is reduced to 268 MGD. By 2040, approximately 26 MGD of total passive and active savings potential was identified. Of this total, 17.9 MGD of water use reduction is associated with the impact of passive changes, while the estimated additional savings from active efficiency is 7.6 MGD (this number could be higher if replacement products are equally or more efficient or technologies installed lifetimes are extended). Figure ES-1 illustrates the magnitude of estimated water demand reductions from both passive and active savings relative to the updated 2018 baseline demand forecast and current sustainable system capacity.

Quantification of supply-side benefits are based on the accrual of avoided costs and demonstrates the benefits of proposed efficiency measures and deferral of source development. Avoided costs (or benefits) from water use efficiency generally result from:

- Capital deferral;
- Capital elimination; and
- Reduction in variable cost.

Savings and costs to utilities only were determined over a 60-year planning horizon (2014-2073) allowing savings rates in this analysis to mature over the life of the technology installed. Net avoided costs of viable demand management programs were evaluated over two separate timeframes; the total life of all savings and through the 2040 forecast horizon. When cost and benefits are evaluated though the forecast horizon only, the NPV of avoided costs remains positive but is reduced to $8.88 million, with PV costs remaining at $31.5 million, and PV benefits estimated at $40.38 million by 2040. Given these benefits and costs, the collective portfolio of demand management measures has a BCR of 1.3 When costs and benefits of the portfolio of viable demand management programs are evaluated over total life of the savings (through the end of 2073), a net present value (NPV) of more than $33.6 million in benefits was identified to Tampa Bay Water's customers (as shown in Table ES-4). Given the PV cost of the program at $31.5 million, the collective portfolio of demand management measures has a BCR of 2.1.

Table ES-2
Comparison of Demand Projections Scenarios with Passive and Active Savings

Demand Profile	Projected Water Demand (MGD)						2015-2030			2015-2040		
	2015	2020	2025	2030	2035	2040	Absolute Change	% Change	Avg. Annual % Change	Absolute Change	% Change	Avg. Annual % Change
Baseline	226.8	251.1	264.2	273.5	279.9	285.5	46.8	20.6%	0.8%	59	25.9%	1.0%
Baseline w/Passive Efficiency	226.8	246.3	255.1	260.7	264.2	267.5	34.0	15.0%	0.6%	41	18.0%	0.7%
Baseline w/Active Efficiency	226.8	245.8	249.0	249.3	254.8	259.9	22.6	9.9%	0.4%	33	14.6%	0.6%

Table ES-3
Projected Water Savings from Passive and Active Water Conservation

Water Savings	Projected Water Savings (MGD) / Percent Reduction (%)					
	2015	2020	2025	2030	2035	2040
Passive Savings	0.0 / 0	4.8 / 1.7	9.1 / 3.2	12.8 / 4.5	15.7 / 5.5	17.9 / 6.3
Active Savings	0.0 / 0	0.5 / 0.2	6.1 / 2.1	11.4 / 4.0	9.4 / 3.3	7.6 / 2.7
Total Savings	0.0 / 0	5.3 / 1.9	15.2 / 5.3	24.2 / 8.5	25.1 / 8.8	25.5 / 8.9

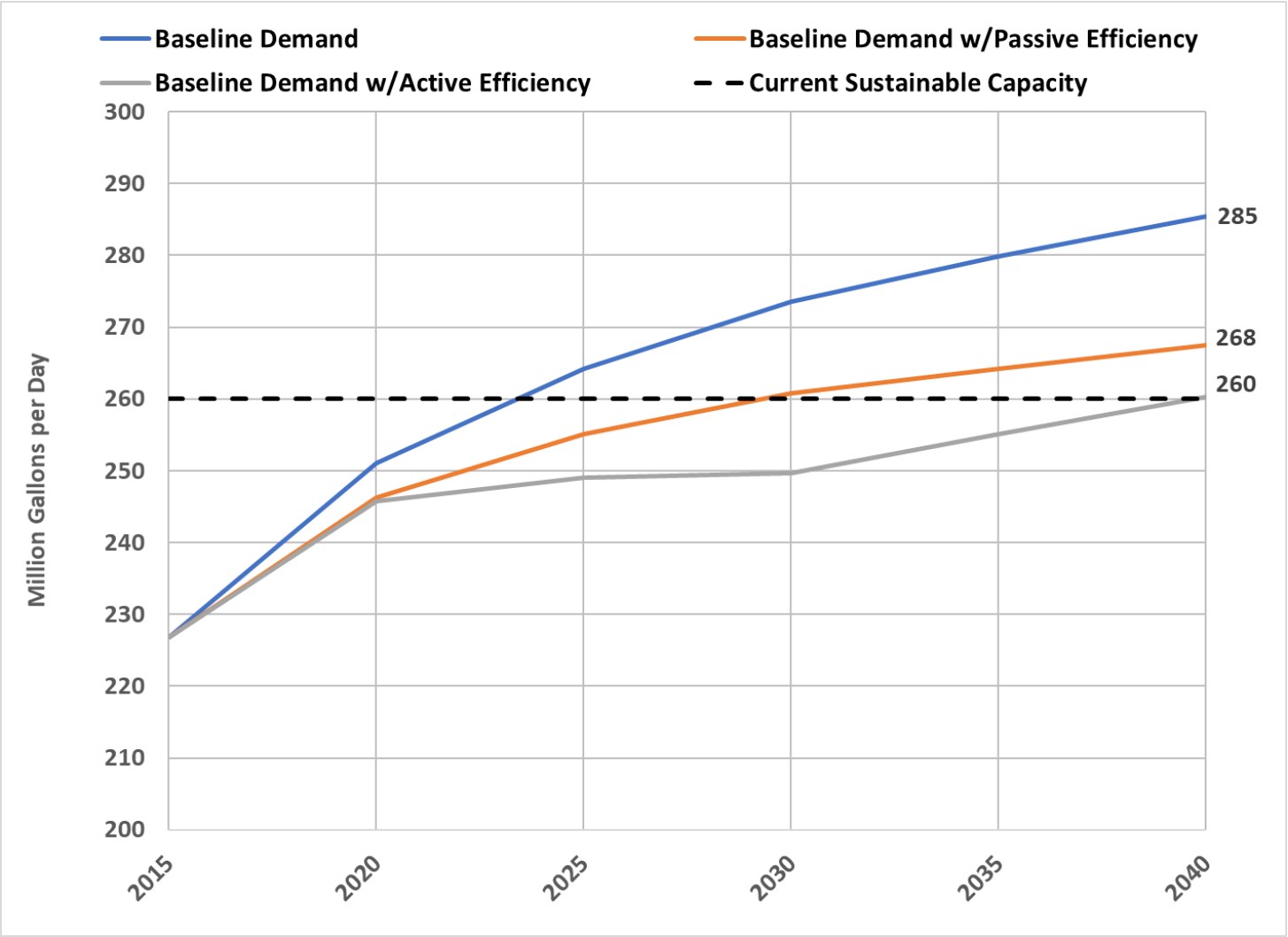

Figure ES-1
Baseline Demand Forecast with Estimated Passive and Active Savings

Table ES-4
Net Present Value (NPV) of Avoided Costs

	PV Cost ($M)	PV Benefit ($M)	NPV ($M)	BCR
Life of Savings to 2073	$31.50	$65.06	$33.57	2.1
Life of Savings to 2040	$31.50	$40.38	$8.88	1.3

The avoided supply cost analysis indicates investment in active water efficiency would result in reduced capital, operational and maintenance costs for Tampa Bay Water and its member governments. Should additional supply capacity be necessary prior to 2040, the net benefits associated with the selected portfolio of active measures would likely increase substantially, providing cost-effective opportunities for deferred or eliminated capital and operating costs of new water supply development.

ES.6 Summary of Recommendations

The DMP update results indicate demand management activities stemming from gains in water efficiency can effectively serve as a complementary component to traditional water supply planning processes in meeting current and future water demands. Through efficient use of available supplies and use of targeted implementation strategies, increases water use efficiency, whether they occur passively or are expedited by utility policies, can help manage peak and average day water demand in conjunction with reducing long-term future water supply requirements.

Regular monitoring and routine updates of the passive efficiency forecast should continue to reduce uncertainties over the water supply planning horizon, particularly with respect to Tampa Bay Water's long-term demand forecasting, future need analysis, and LTMWP updates.

It is recommended Tampa Bay Water continue to estimate and assess avoided operational and capital costs as a formal part of its water supply planning process. As part of this process, Tampa Bay Water should continue to refine and optimize the predicted schedule and need of additional water supply and/or the optimization of existing facilities, by estimating the level of demand reductions possible or necessary to eliminate or defer meaningful amounts of capital and operational investments.

Furthermore, it is recommended Tampa Bay Water:

- Work with member governments to develop implementation strategies that can be used to reduce potential supply development capital and operating costs consistent with the interlocal agreement requirements.
- Collaborate with local home builders, nonresidential organizations and IFAS (Institute of Food and Agricultural Sciences) to promote and design programs that will result in market uptake.
- Pursue cooperative funding and other grant opportunities such as Southwest Florida Water Management funds, Florida Department of Environmental Protection Safe Drinking Water Act State Revolving Funds to help support the program, and further increase the economic benefits identified in this plan.
- Identify program administration needs and qualifications.

Incorporation of the effects of increased water-use efficiency into the Agency's long-term planning process provides the Board of Directors with more supply policy options, affords Tampa Bay Water and its member governments a supply buffer (increased water use efficiency reduces demand) and allows the agency to prepare and plan for observed and anticipated changes in water use efficiency. These activities should continue to be supported by the types of analytical methods and strategies described in both the 2013 and 2018 DMP updates, and through deliberate integration of anticipated water savings into ongoing water demand forecasting and supply planning.

1. Introduction

Tampa Bay Water currently helps meet the water demands of more than 2.4 million people in the tri-county region. Residential demands accounted for nearly 75 percent of billed water consumption, with the remainder associated with the needs of commercial businesses and industry. The agency has been actively involved in quantifying water demand and potential changes in demand through water use efficiency efforts, mainly through member government implementation, since adoption of its original demand management plan the late-1990s. Additionally, the agency developed tools to quantify ongoing member water use efficiency programs that helped to meet original Board of Directors adopted planning goals in 1998. Furthermore, the Tampa Bay Water Board of Directors adopted Board Resolution No. 2013-006 in February 2013. This resolution incorporates water use efficiency evaluation efforts into the Agency long-term water supply planning process consistent and in concert with the recommendations of this DMP. This resolution directs the Agency to:

- Develop and implement data collection, management and analysis protocols and procedures for the continued assessment of passive water use efficiency within Tampa Bay Water's service area.
- Integrate passive water-use efficiency into the Agency's Long-term Demand Forecast and Future Need Analysis.
- Include the Water Use Efficiency Evaluation as an element of the Long-term Water Supply Plan and include an updated evaluation of potential active measures for implementing efficient water-use products as part of future options for the next Long-term Water Supply

As a part of its diversified water supply portfolio, Tampa Bay Water consistently relies on surface water supplies to meet the drinking water demands in the tri-county area. Approximately, one-half of the water supplies for Tampa Bay Water member governments are dependent on the timing and quantity of local and regional rainfall. To meet regional demands reliably, it is important to understand how variability and uncertainties affect the planning and development of water supplies as river flows upon which these supplies are dependent tend to fluctuate due to weather and seasonal variability. As Tampa Bay Water's reliance on surface water and other alternative water sources continues to increase, the value of increased water use efficiency in managing future long-term supply needs has become evident. As new supply development costs continue to increase, avoided cost of water supply through demand management has become a more critical element of the water supply planning process.

The 2018 Demand Management Plan (DMP) update, investigates the benefits and costs of water demand management as a quantifiable, alternative water supply source to projects being considered in the agency's 2018 Long-term Master Water Plan (LTMWP). The 2018 DMP update is considered one component of the agency's strategic goals to achieve reliability of its water supply and delivery system to our member governments. Tampa Bay Water is required to evaluate and update the Demand Management Plan every five years, consistent with the LTMWP update.

Demand side management efforts are intended to serve as a complementary component to traditional water supply planning processes in meeting current and future water demands. Demand-side management encompasses a set of activities designed to:

- Provide a better understanding of how and why water is used;
- Forecast human demands for water supplies;
- Develop prospective water-using efficiency (demand reduction) measures;
- Identify programmatic and project goals, evaluation criteria, performance measures, and monitoring mechanisms;
- Define and evaluate program effectiveness and goal achievement; and
- Evaluate the benefits and costs of efficiency measures as an alternative or complement to supply development.

Through efficient use of available supplies and use of targeted implementation strategies, water use efficiency can help manage peak and average day water demand in conjunction with reducing long-term future water supply requirements. Cost-effective alternatives to new supply development and other valuable benefits can be realized through demand side management including: optimization of existing facilities, deferred capital investment costs, improved public perception, potential reduction in greenhouse gas emissions vs. supply development., support of future supply projects, and environmental stewardship and protection.

As the cost of future Tampa Bay Water supply options increase, positive economic benefits may accrue regionally as a result of water saved from water use efficiency programs. Product technology information obtained from the 2013 DMP[1] update support development, screening, ranking and selection of active water efficiency measure for inclusion in the 2018 DMP update. Potentially applicable water efficiency measures considered for program development include technologies and best practices that target:

- Indoor and outdoor water end uses
- Nonresidential water uses

The Alliance for Water Efficiency Water Conservation Tracking Tool Version 3 (AWE Tool) was the primary instrument used to formulate and estimate cost-effectiveness of demand management program measures and to conduct an "avoided supply cost" analysis. Estimates of the ***cost-effectiveness*** and ***net benefits*** quantify the viability of active water efficiency measures in terms of reducing operational costs of existing supply and deferring or eliminating the cost (capital and operating) to develop new water supply.

- Cost-effectiveness, the unit costs of water saved ($/1000 gallons), is defined by total water savings and total implementation costs over the useful life of a measure.

- Net benefits, the total benefit (avoided cost of operational and capital costs of future supply needs) minus the total cost of any active measure, is measured in terms of benefit-cost ratios. Benefit-cost ratios are calculated by dividing the net present benefits of a measure by the net present costs associated with a measure (in 2017 dollars).

[1] Tampa Bay Water, (2013). Water Demand Management Plan Final Report.

Measures of cost-effectiveness and net benefits of fully formulated water efficiency programs are quantified in the AWE Tool and provide key criteria for screening, ranking and selection of water efficiency measures for potential program development. Remaining market potential (beyond what is likely to be accounted-for by passive activities) is used to define the applicability, timing and penetration rates for active (utility-sponsored) programs.

The demand management evaluation effort includes an analysis of water savings (past and future) and an analysis of avoided supply costs related to improved water use efficiency. The "avoided supply cost" analysis then considers increments of conserved water versus the operational and capital costs of future supply needs. Consideration of cost savings and water supply benefits permits a consistent "apples to apples" comparison to other water supply alternatives. The following sections describe the methods used to fully formulate potentially viable water efficiency measures through estimation of market potential and savings rates, quantification of net benefits and cost-effectiveness, screening of measures, and selection of demand management alternatives.

2. Determination of Market Potential for Active Demand Management Programs

Estimates of water savings potential are based on assumptions concerning changes in the mix of water using technology and the rate (or intensity) at which water using technology is used. The U.S. Energy Policy Act (EPAct), effective in 1994, mandated flow standards for many fixtures (e.g., toilets, faucets and showerheads, among others). Since then, manufacturers have introduced and marketed fixtures and appliances, which far exceed EPAct standards, leading to programs such as the EPA WaterSense and Energy Star (ES) programs. These programs certify products performing at rates that are more efficient than the current national efficiency standards while meeting consumer expectations and influence the market by encouraging consumers to purchase ultra-water conserving, high-efficiency (HE) water products. WaterSense labeled products require independent third-party certification of performance and product durability, insuring product use is consistent with labeling over a defined life. As consumers decide to purchase and install HE water products, formally labeled EPA WaterSense and other products that well exceed minimum efficiency requirements required by law, water consumption efficiency increases.

Mechanical efficiency refers to the effective flow rate (e.g. gallons per flush) of an end use device. Several levels of mechanical efficiency corresponding to different flow rates exist for each end use technology. End use technologies can generally be categorized according to three levels of mechanical efficiency defined as follows:

- Non-conserving (conventional)
- Conserving (standard)
- Ultra-conserving (high-efficiency)

Conventional technologies are the least water efficient and commonly found in older homes and businesses. With respect to domestic end use fixtures including toilets, faucets and showerheads, conventional technologies are most often associated with homes built prior to 1994. Standard and high-efficiency fixtures provide the same technology-based result as conventional fixtures but at lower water usage rates per event (i.e. with higher efficiency).

Assessment of technology and program-based savings potential requires starting-point (or base-year) estimates of fixture or appliance age distribution and efficiency regionally by water use sector and water efficiency technology market penetration. The market potential for active water efficiency measures is estimated after the impact of passive water use efficiency measures is considered:

- *Passive* water efficiency is achieved through a natural process of replacing old fixtures with new, more efficient fixtures as they wear out or become effectively obsolete or installing efficient water-using fixtures in new construction due to either codes or driven by market changes. Passive water efficiency typically occurs indoors with the replacement of toilets, clothes washers, dishwashers, and urinals.

- *Active* water efficiency measures include programs designed to expedite the replacement process described above. Such programs are often sponsored by water utilities to ensure a

target installation rate and associated water savings and can include outdoor efficiency technologies.

Water efficiency measures subject to natural replacement include the residential and nonresidential fixtures (toilets, urinals and clothes washers). Outdoor efficiency programs and nonresidential cooling towers are not subject to natural replacement assumptions for the purposes of estimating remaining market potential.

Evaluation of existing (or baseline) water efficiency utilizes parcel information obtained from the County Property Appraisers in Hillsborough, Pasco and Pinellas counties, in conjunction with assumptions of the useful life of water fixtures. All fixtures have an expected life which can be translated into an annual rate of decay or natural replacement rate (nrr). The nrr for each technology is calculated using Equation 2-1.

Equation 2-1:

$$nrr = \frac{1}{Expected\ Life\ in\ Years}$$

The 2014 property appraiser-based technology estimates of the number of existing fixture and appliance types for given mechanical efficiency levels in the region were extrapolated to the baseline water demand forecast base year of 2010 and each forecast year through 2035 according to equation 5-2.

Equation 2-2:

$$F_m^y = \left(FE_{y_1} - R \right) \times (1 - nrr)^{(y - y_1)}$$

Where*:*

F	=	Remaining fixtures in mechanical efficiency level m for year y
FE	=	Fixtures existing in mechanical efficiency level m for year y_1
R	=	Rebates provided by member governments through y_1
m	=	Mechanical efficiency level
y	=	Forecast year
y_1	=	Initial year of analysis (or product decay)
nrr	=	Natural replacement rate

The 2014 base-year used for the 2018 DMP analysis is consistent with the base year of the Long-Term Demand Forecast (LTDF). Using estimates of these main parameters for the base year, remaining water efficiency potential is evaluated over the agency's long-term water demand horizon (2040). Given the LTMWP identifies the need for additional supplies prior to 2030, generally acceptable market penetration rates for incentives were applied to remaining units in 2030 to determine the number of incentives that could be available from implementation of a comprehensive demand management plan capable of deferring or avoiding the next increment of supply.

The assessment of remaining efficiency potential supports the screening and selection of technically applicable active programs. The 2013 DMP update identified 24 measures deemed viable for implementation, of which only 18 were judged to have sufficient information to estimate the presence of

end uses and support a comprehensive assessment of efficiency potential and cost. The 2013 DMP Water Efficiency Program Library (WEPL) contains the complete listing of available indoor and outdoor measures for new homes, existing homes, and non-residential uses considered. The following sections describe the process of updating the remaining market potential available for incentive-based programs after natural replacement has occurred for the 18 programs previously evaluated for the 2018 DMP.

2.1 Residential Housing Units

Housing units support the estimation of remaining market potential for all residential programs considered for the 2018 DMP. While most programs rely on total single-family (SF) or multifamily (MF) units, estimation of occupied owner and renter units was required to support estimation of in-unit clothes washers for the multifamily sector. Occupied owner and renter multifamily units are projected by multiplying the total number multifamily units in each forecast year by the 2014 percent distribution of owner and renter multifamily units provided in Table 2-1 by WDPA (Water Demand Planning Area).

Table 2-1
SF and MF Owner, Rental, and Total Units for 2014

WDPA	MF Units (Owner)	MF Units (Renter)	Total MF	% Owner MF	% Renter MF
PAS	12,197	4,661	16,858	72.4%	27.6%
NPR	3,326	2,261	5,587	59.5%	40.5%
NWH	11,282	13,976	25,258	44.7%	55.3%
SCH	16,986	11,052	28,039	60.6%	39.4%
COT	26,030	52,974	79,004	32.9%	67.1%
PIN	67,852	25,283	93,134	72.9%	27.1%
STP	25,086	33,388	58,474	42.9%	57.1%
TBW	**162,760**	**143,594**	**306,354**	**53.1%**	**46.9%**

Table 2-2 provides the 2014-2040 single-family and multifamily (renter and owner) unit forecasts used to estimate change in the distribution of technology efficiency related to new development and natural replacement in existing development. As shown, single-family and multifamily housing units are projected to increase by 46 and 30 percent respectively over the forecast horizon, with Pasco County (PAS) and South Central Hillsborough (SCH) accounting for the highest total percent change and annual average growth rates in both sectors.

Table 2-2
SF and MF Unit Projections by WDPA (2014-2040)

	WDPA	Total Units						Percent of Total						Absolute Change	% Change	Annual Avg% Chang
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
SF Units	PAS	74,523	92,349	102,689	110,449	118,393	126,708	15.7%	17.4%	17.9%	18.0%	18.1%	18.3%	52,185	70.03%	2.06%
	NPR	6,097	6,498	6,641	6,624	6,649	6,726	1.3%	1.2%	1.2%	1.1%	1.0%	1.0%	629	10.31%	0.38%
	NWH	44,729	48,125	51,597	54,727	57,356	60,124	9.4%	9.1%	9.0%	8.9%	8.8%	8.7%	15,396	34.42%	1.14%
	SCH	87,260	104,362	118,632	132,300	144,814	157,675	18.4%	19.7%	20.6%	21.5%	22.2%	22.8%	70,415	80.70%	2.30%
	COT	100,918	112,592	125,578	137,816	148,779	160,040	21.2%	21.2%	21.8%	22.4%	22.8%	23.1%	59,122	58.58%	1.79%
	PIN	88,817	91,184	92,806	94,656	96,799	98,679	18.7%	17.2%	16.1%	15.4%	14.8%	14.3%	9,862	11.10%	0.41%
	STP	72,670	75,719	77,076	78,676	80,634	82,460	15.3%	14.3%	13.4%	12.8%	12.3%	11.9%	9,790	13.47%	0.49%
	TBW	**475,014**	**530,830**	**575,019**	**615,248**	**653,424**	**692,413**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**217,398**	**45.77%**	**1.46%**
Total MF Units	PAS	16,858	19,807	22,157	24,898	26,611	27,542	5.5%	6.0%	6.2%	6.7%	7.0%	7.2%	10,685	63.38%	1.91%
	NPR	5,587	5,753	5,924	6,147	6,101	5,905	1.8%	1.7%	1.7%	1.6%	1.6%	1.5%	318	5.70%	0.21%
	NWH	25,258	27,080	28,012	28,443	28,262	27,845	8.2%	8.2%	7.9%	7.6%	7.4%	7.2%	2,587	10.24%	0.38%
	SCH	28,039	33,526	36,698	39,091	40,466	41,302	9.2%	10.1%	10.3%	10.5%	10.6%	10.7%	13,263	47.30%	1.50%
	COT	79,004	87,574	95,659	101,824	105,450	107,774	25.8%	26.4%	26.9%	27.3%	27.6%	28.0%	28,770	36.42%	1.20%
	PIN	93,134	96,073	100,516	103,507	104,379	103,708	30.4%	28.9%	28.3%	27.8%	27.4%	27.0%	10,573	11.35%	0.41%
	STP	58,474	62,443	66,143	68,758	70,120	70,402	19.1%	18.8%	18.6%	18.5%	18.4%	18.3%	11,928	20.40%	0.72%
	TBW	**306,354**	**332,257**	**355,108**	**372,668**	**381,389**	**384,478**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**78,124**	**25.50%**	**0.88%**
Owner MF Units	PAS	12,197	14,331	16,031	18,014	19,254	19,927	72.4%	72.4%	72.4%	72.4%	72.4%	72.4%	7,730	63.38%	1.91%
	NPR	3,326	3,425	3,526	3,659	3,632	3,515	59.5%	59.5%	59.5%	59.5%	59.5%	59.5%	190	5.70%	0.21%
	NWH	11,282	12,096	12,512	12,705	12,624	12,438	44.7%	44.7%	44.7%	44.7%	44.7%	44.7%	1,155	10.24%	0.38%
	SCH	16,986	20,311	22,232	23,682	24,515	25,021	60.6%	60.6%	60.6%	60.6%	60.6%	60.6%	8,035	47.30%	1.50%
	COT	26,030	28,854	31,518	33,549	34,744	35,510	32.9%	32.9%	32.9%	32.9%	32.9%	32.9%	9,479	36.42%	1.20%
	PIN	67,852	69,993	73,230	75,408	76,043	75,555	72.9%	72.9%	72.9%	72.9%	72.9%	72.9%	7,703	11.35%	0.41%
	STP	25,086	26,789	28,376	29,498	30,083	30,203	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	5,117	20.40%	0.72%
	TBW	**162,760**	**175,798**	**187,426**	**196,516**	**200,895**	**202,170**	**53.1%**	**52.9%**	**52.8%**	**52.7%**	**52.7%**	**52.6%**	**39,410**	**24.21%**	**0.84%**
Rental MF Units	PAS	4,661	5,476	6,126	6,884	7,357	7,615	27.6%	27.6%	27.6%	27.6%	27.6%	27.6%	2,954	63.38%	1.91%
	NPR	2,261	2,328	2,398	2,488	2,469	2,390	40.5%	40.5%	40.5%	40.5%	40.5%	40.5%	129	5.70%	0.21%
	NWH	13,976	14,984	15,499	15,738	15,638	15,407	55.3%	55.3%	55.3%	55.3%	55.3%	55.3%	1,431	10.24%	0.38%
	SCH	11,052	13,215	14,465	15,409	15,951	16,280	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	5,228	47.30%	1.50%
	COT	52,974	58,720	64,141	68,275	70,706	72,265	67.1%	67.1%	67.1%	67.1%	67.1%	67.1%	19,291	36.42%	1.20%
	PIN	25,283	26,081	27,287	28,098	28,335	28,153	27.1%	27.1%	27.1%	27.1%	27.1%	27.1%	2,870	11.35%	0.41%
	STP	33,388	35,654	37,767	39,260	40,038	40,199	57.1%	57.1%	57.1%	57.1%	57.1%	57.1%	6,811	20.40%	0.72%
	TBW	**143,594**	**156,458**	**167,683**	**176,152**	**180,494**	**182,308**	**46.9%**	**47.1%**	**47.2%**	**47.3%**	**47.3%**	**47.4%**	**38,714**	**26.96%**	**0.92%**

2.2 Residential Toilet Market Potential

Residential HET retrofit programs provide financial incentives to water customers to encourage conversion of 5.0 and 3.5 gpf toilets to High Efficiency Toilets (HETs). End use fixture estimates provide a basis for measuring product saturation (market penetration) in existing residential (single-family/multifamily) homes according to varied levels of technological efficiency. The fixture estimation methodology employs a two-step process that includes:

- Estimation of existing fixtures and appliance stock by age and efficiency cohorts
- Conversion of non-conserving fixtures and appliances to standard or HE products

Parcel data provides the initial distributions of fixture efficiency by sector of water use based on the age of home. Prior to estimation of passive replacement, fixture stock is categorized according to various levels of technological efficiency (mechanical rates of use) v. year of construction according to a variety of efficiency mandates. Conversion then occurs according to assumptions related to the products life expectancy and the number of rebates previously issued through member government rebate programs.

Residential fixtures were generated in Tampa Bay Water's LTDFS to support development of a water efficiency factor to estimate passive savings as part of the econometric forecast model. The development of these factors followed a logic similar to that used in the 2013 DMP where parcel data provides the basis for estimation according to housing age distribution and facilitate the estimation of passive replacement over time. Relevant parcel information includes full-baths, half-baths and year of construction. While single-family data is generally complete in the local property appraiser data, considerable amounts of multifamily bathroom data is incomplete and as such, the American Housing Survey (AHS, 2013) estimates of the average number of bathrooms per unit are used to estimate full- and half baths in multifamily units by construction year. Annual conversion rates were obtained from literature are then calculated based on an expected product life of 25 years (4.0% nrr). A complete description of the methodology used to generate these estimates can be found in the 2018 LTDFS report

Table 2-3 provides the total number of single-family and multifamily toilet fixtures by WDPA mechanical efficiency class for base year 2014, while Table 2-4 and Table 2-5 provides the total number of single family and multifamily rebate-eligible toilets (5.0 and 3.5 gpf) estimated throughout the forecast horizon in five-year increments. As one would expect, the number of rebate eligible fixtures diminishes over the forecast horizon as the number of 5.0 and 3.5 gpf toilets remaining after passive replacement diminishes through time. In 2020, about 21 percent of total single-family toilets are considered rebate eligible, however, due to natural replacement activity only 3 percent of total single-family toilets are estimated to have flush volumes greater than 1.6 gpf by 2040.

Table 2-6 and Table 2-7 summarize the market potential available in each sector and the number of eligible rebates available given an 11-year program that reduces the estimated number of rebate eligible toilets in 2030 by 50 percent.

Table 2-3
Distribution of Residential Toilets by Residential Sector, Technological Efficiency Level, and WPDA (2014)

		Base Year Toilet Estimates								% of Total							
Sector	Flow Rate	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP
SF	5.0	94,168	20,579	3,653	-	-	29,718	19,971	20,247	7.8%	7.9%	19.2%	0.0%	0.0%	13.0%	9.5%	14.8%
	3.5	165,001	30,798	3,841	14,245	18,144	33,413	41,123	23,438	13.6%	11.8%	20.2%	11.9%	7.7%	14.7%	19.5%	17.1%
	1.6	780,962	180,242	9,336	80,448	180,309	134,974	121,823	73,830	64.4%	69.0%	49.2%	67.0%	76.1%	59.2%	57.8%	53.9%
	1.3	172,936	29,670	2,158	25,334	38,488	29,881	27,925	19,478	14.3%	11.4%	11.4%	21.1%	16.2%	13.1%	13.2%	14.2%
	Total	**1,213,067**	**261,289**	**18,988**	**120,026**	**236,941**	**227,986**	**210,843**	**136,994**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
MF	5.0	7,534	1,258	714	1,033	11,261	23,872	16,610	62,282	11.6%	17.6%	1.5%	1.5%	6.6%	12.9%	15.1%	9.5%
	3.5	13,342	1,677	6,251	6,252	27,404	37,890	20,304	113,119	20.6%	23.4%	13.5%	9.1%	16.0%	20.4%	18.4%	17.3%
	1.6	35,633	3,458	31,309	51,245	108,517	101,142	59,434	390,737	55.1%	48.3%	67.6%	74.5%	63.4%	54.5%	54.0%	59.7%
	1.3	8,203	763	8,031	10,291	23,983	22,827	13,797	87,894	12.7%	10.7%	17.3%	15.0%	14.0%	12.3%	12.5%	13.4%
	Total	**64,711**	**7,156**	**46,305**	**68,821**	**171,166**	**185,731**	**110,144**	**654,033**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-4
SF Toilets Eligible for Rebate Incentive by WPDA (2014-2014)

WDPA	Variable	Toilets						Percent of Total Toilets						Absolute Change	% Change	Annual Avg% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	3.5 GPF	30,798	23,959	19,417	15,713	12,693	10,231	11.8%	7.9%	5.7%	4.3%	3.2%	2.4%	-18,105	-66.8%	-4.2%
NPR	3.5 GPF	3,841	3,007	2,452	1,999	1,630	1,329	20.2%	15.3%	12.2%	9.9%	8.1%	6.5%	-2,211	-57.6%	-4.0%
NWH	3.5 GPF	14,245	9,152	5,765	3,003	2,125	1,673	11.9%	7.1%	4.2%	2.1%	1.4%	1.0%	-12,120	-85.1%	-7.9%
SCH	3.5 GPF	18,144	11,639	7,312	4,415	3,547	2,840	7.7%	4.1%	2.3%	1.2%	0.9%	0.7%	-14,597	-80.5%	-6.9%
COT	3.5 GPF	33,413	26,002	21,071	17,051	13,774	11,101	14.7%	10.2%	7.4%	5.4%	4.1%	3.1%	-19,639	-58.8%	-4.1%
PIN	3.5 GPF	41,123	31,435	24,990	19,735	15,450	11,491	19.5%	14.4%	11.3%	8.7%	6.7%	4.9%	-25,673	-62.4%	-4.8%
STP	3.5 GPF	23,438	18,282	14,852	12,056	9,776	7,891	17.1%	13.0%	10.3%	8.2%	6.5%	5.1%	-13,663	-58.3%	-4.1%
TBW	**3.5 GPF**	**165,001**	**123,476**	**95,859**	**73,971**	**58,994**	**46,555**	**13.6%**	**9.1%**	**6.5%**	**4.7%**	**3.5%**	**2.6%**	**-106,007**	**-64.2%**	**-4.8%**
PAS	5 GPF	20,579	15,902	12,801	10,272	8,210	6,529	7.9%	5.2%	3.8%	2.8%	2.1%	1.6%	-12,369	-60.1%	-4.3%
NPR	5 GPF	3,653	2,859	2,331	1,901	1,550	1,264	19.2%	14.5%	11.6%	9.4%	7.7%	6.2%	-2,103	-57.6%	-4.0%
NWH	5 GPF	-	-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%
SCH	5 GPF	-	-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%
COT	5 GPF	29,718	21,551	16,118	11,688	8,076	5,131	13.0%	8.4%	5.7%	3.7%	2.4%	1.4%	-21,642	-72.8%	-6.5%
PIN	5 GPF	19,971	12,480	7,496	3,433	120	-	9.5%	5.7%	3.4%	1.5%	0.1%	0.0%	-19,852	-99.4%	-100%
STP	5 GPF	20,247	13,195	8,505	4,680	1,562	-	14.8%	9.3%	5.9%	3.2%	1.0%	0.0%	-18,685	-92.3%	-100%
TBW	**5 GPF**	**94,168**	**65,987**	**47,251**	**31,974**	**19,517**	**12,923**	**7.8%**	**4.9%**	**3.2%**	**2.0%**	**1.2%**	**0.7%**	**-74,651**	**-79.3%**	**-7.4%**
PAS	Rebate Eligible	51,377	39,861	32,218	25,985	20,903	16,760	19.7%	13.1%	9.5%	7.1%	5.3%	4.0%	-30,474	-59.3%	-4.2%
NPR	Rebate Eligible	7,494	5,866	4,783	3,900	3,180	2,593	39.5%	29.8%	23.8%	19.4%	15.7%	12.7%	-4,314	-57.6%	-4.0%
NWH	Rebate Eligible	14,245	9,152	5,765	3,003	2,125	1,673	11.9%	7.1%	4.2%	2.1%	1.4%	1.0%	-12,120	-85.1%	-7.9%
SCH	Rebate Eligible	18,144	11,639	7,312	4,415	3,547	2,840	7.7%	4.1%	2.3%	1.2%	0.9%	0.7%	-14,597	-80.5%	-6.9%
COT	Rebate Eligible	63,131	47,553	37,189	28,739	21,850	16,232	27.7%	18.6%	13.0%	9.2%	6.5%	4.5%	-41,281	-65.4%	-5.1%
PIN	Rebate Eligible	61,094	43,915	32,486	23,168	15,570	11,491	29.0%	20.2%	14.7%	10.3%	6.7%	4.9%	-45,525	-74.5%	-6.2%
STP	Rebate Eligible	43,686	31,478	23,357	16,736	11,337	7,891	31.9%	22.3%	16.3%	11.4%	7.5%	5.1%	-32,348	-74.0%	-6.4%
TBW	**Rebate Eligible**	**259,170**	**189,464**	**143,110**	**105,945**	**78,511**	**59,478**	**21.4%**	**14.0%**	**9.7%**	**6.7%**	**4.7%**	**3.3%**	**-180,658**	**-69.7%**	**-5.5%**
PAS	Total Toilets	261,289	304,980	339,125	364,749	390,982	418,439	22%	23%	23%	23%	23%	24%	129,693	49.6%	1.8%
NPR	Total Toilets	18,988	19,693	20,121	20,150	20,241	20,471	2%	1%	1%	1%	1%	1%	1,253	6.6%	0.3%
NWH	Total Toilets	120,026	128,588	137,863	146,224	153,246	160,639	10%	10%	9%	9%	9%	9%	33,220	27.7%	1.1%
SCH	Total Toilets	236,941	283,512	322,275	359,404	393,396	428,333	20%	21%	22%	23%	23%	24%	156,455	66.0%	2.3%
COT	Total Toilets	227,986	255,616	285,098	312,878	337,765	363,328	19%	19%	19%	20%	20%	20%	109,779	48.2%	1.8%
PIN	Total Toilets	210,843	217,681	221,551	225,966	231,078	235,566	17%	16%	15%	14%	14%	13%	20,235	9.6%	0.4%
STP	Total Toilets	136,994	141,159	143,686	146,667	150,315	153,717	11%	10%	10%	9%	9%	9%	13,321	9.7%	0.4%
TBW	**Total Toilets**	**1,213,067**	**1,351,229**	**1,469,719**	**1,576,038**	**1,677,023**	**1,780,493**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**463,956**	**38.2%**	**1.5%**

Table 2-5
MF Toilets Eligible for Rebate Incentive by WPDA (2014-2014)

		Toilets						Percent of Total Toilets						Absolute Change	% Change	Annual Avg.% Change
WDPA	**Variable**	**2014**	**2020**	**2025**	**2030**	**2035**	**2040**	**2014**	**2020**	**2025**	**2030**	**2035**	**2040**			
PAS	3.5 GPF	13,342	10,386	8,420	6,817	5,511	4,445	20.6%	14.6%	10.6%	7.6%	5.8%	4.5%	-8,897	-66.7%	-4.1%
NPR	3.5 GPF	1,677	1,312	1,070	873	580	711	23.4%	17.9%	14.1%	11.1%	7.4%	9.0%	-1,097	-65.4%	-3.2%
NWH	3.5 GPF	6,251	4,370	3,064	533	1,212	2,044	13.5%	8.9%	6.0%	1.0%	2.3%	4.0%	-5,039	-80.6%	-4.2%
SCH	3.5 GPF	6,252	4,385	3,095	2,083	1,257	720	9.1%	5.5%	3.5%	2.2%	1.3%	0.7%	-4,995	-79.9%	-8.0%
COT	3.5 GPF	27,404	20,634	16,130	12,458	9,464	6,760	16.0%	10.6%	7.6%	5.5%	4.0%	2.8%	-17,941	-65.5%	-5.2%
PIN	3.5 GPF	37,890	29,118	23,282	18,524	11,481	14,644	20.4%	15.2%	11.6%	9.0%	5.5%	7.0%	-26,409	-69.7%	-3.6%
STP	3.5 GPF	20,304	15,805	12,814	10,375	8,386	6,764	18.4%	13.6%	10.4%	8.1%	6.4%	5.1%	-11,918	-58.7%	-4.1%
TBW	**3.5 GPF**	**113,119**	**86,010**	**67,876**	**51,662**	**37,890**	**36,089**	**17.3%**	**12.1%**	**8.9%**	**6.4%**	**4.6%**	**4.3%**	**-75,230**	**-66.5%**	**-4.3%**
PAS	5 GPF	7,534	5,840	4,713	3,795	3,046	2,435	11.6%	8.2%	5.9%	4.2%	3.2%	2.5%	-4,488	-59.6%	-4.3%
NPR	5 GPF	1,258	985	803	655	435	534	17.6%	13.4%	10.6%	8.3%	5.5%	6.8%	-823	-65.4%	-3.2%
NWH	5 GPF	714	253	-	-	-	-	1.5%	0.5%	0.0%	0.0%	0.0%	0.0%	-714	0.0%	-40.5%
SCH	5 GPF	1,033	269	-	-	-	-	1.5%	0.3%	0.0%	0.0%	0.0%	0.0%	-1,033	0.0%	-41.3%
COT	5 GPF	11,261	7,253	4,587	2,413	640	-	6.6%	3.7%	2.2%	1.1%	0.3%	0.0%	-10,621	-94.3%	-46.4%
PIN	5 GPF	23,872	16,948	12,342	8,586	3,027	5,524	12.9%	8.8%	6.1%	4.2%	1.5%	2.6%	-20,846	-87.3%	-5.5%
STP	5 GPF	16,610	11,907	8,779	6,228	4,148	2,452	15.1%	10.2%	7.1%	4.9%	3.2%	1.9%	-12,462	-75.0%	-7.1%
TBW	**5 GPF**	**62,282**	**43,455**	**31,223**	**21,676**	**11,296**	**10,945**	**9.5%**	**6.1%**	**4.1%**	**2.7%**	**1.4%**	**1.3%**	**-50,987**	**-81.9%**	**-6.5%**
PAS	Rebate Eligible	20,875	16,225	13,133	10,612	8,557	6,880	32.3%	22.8%	16.5%	11.9%	9.0%	7.0%	-12,319	-59.0%	-4.2%
NPR	Rebate Eligible	2,935	2,297	1,873	1,527	1,015	1,245	41.0%	31.3%	24.8%	19.5%	12.9%	15.8%	-1,919	-65.4%	-3.2%
NWH	Rebate Eligible	6,965	4,623	3,064	533	1,212	2,044	15.0%	9.4%	6.0%	1.0%	2.3%	4.0%	-5,753	-82.6%	-4.6%
SCH	Rebate Eligible	7,285	4,654	3,095	2,083	1,257	720	10.6%	5.8%	3.5%	2.2%	1.3%	0.7%	-6,028	-82.7%	-8.5%
COT	Rebate Eligible	38,665	27,887	20,717	14,871	10,104	6,760	22.6%	14.3%	9.7%	6.5%	4.3%	2.8%	-28,561	-73.9%	-6.5%
PIN	Rebate Eligible	61,762	46,066	35,624	27,110	14,507	20,168	33.3%	24.0%	17.7%	13.1%	7.0%	9.7%	-47,255	-76.5%	-4.2%
STP	Rebate Eligible	36,914	27,712	21,592	16,602	12,534	9,216	33.5%	23.8%	17.5%	12.9%	9.6%	7.0%	-24,380	-66.0%	-5.2%
TBW	**Rebate Eligible**	**175,402**	**129,465**	**99,099**	**73,338**	**49,186**	**47,034**	**26.8%**	**18.2%**	**13.0%**	**9.1%**	**6.0%**	**5.6%**	**-126,216**	**-72.0%**	**-4.9%**
PAS	Total Toilets	64,711	71,117	79,555	89,397	95,547	98,891	10%	10%	10%	11%	12%	12%	30,837	47.7%	1.6%
NPR	Total Toilets	7,156	7,347	7,565	7,849	7,866	7,866	1%	1%	1%	1%	1%	1%	710	9.9%	0.4%
NWH	Total Toilets	46,305	49,111	50,800	51,581	51,581	51,581	7%	7%	7%	6%	6%	6%	5,277	11.4%	0.4%
SCH	Total Toilets	68,821	79,865	87,420	93,120	96,397	98,388	11%	11%	11%	12%	12%	12%	27,576	40.1%	1.4%
COT	Total Toilets	171,166	195,293	213,323	227,072	235,159	240,341	26%	27%	28%	28%	28%	29%	63,993	37.4%	1.3%
PIN	Total Toilets	185,731	191,906	200,780	206,754	208,496	208,496	28%	27%	26%	26%	25%	25%	22,765	12.3%	0.4%
STP	Total Toilets	110,144	116,601	123,510	128,394	130,937	131,463	17%	16%	16%	16%	16%	16%	20,792	18.9%	0.7%
TBW	**Total Toilets**	**654,033**	**711,240**	**762,954**	**804,168**	**825,983**	**837,026**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**171,950**	**26.3%**	**1.0%**

Table 2-6
SF Market Potential and Program Penetration Rates for Toilets by WPDA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	3.5 GPF	60%	15,713	9,428	857
NPR	3.5 GPF	60%	1,999	1,199	109
NWH	3.5 GPF	60%	3,003	1,802	164
SCH	3.5 GPF	60%	4,415	2,649	241
COT	3.5 GPF	60%	17,051	10,231	930
PIN	3.5 GPF	60%	19,735	11,841	1,076
STP	3.5 GPF	60%	12,056	7,234	658
TBW	**3.5 GPF**	**60%**	**73,971**	**44,383**	**4,035**
PAS	5 GPF	60%	10,272	6,163	560
NPR	5 GPF	60%	1,901	1,140	104
NWH	5 GPF	60%	-	-	-
SCH	5 GPF	60%	-	-	-
COT	5 GPF	60%	11,688	7,013	638
PIN	5 GPF	60%	3,433	2,060	187
STP	5 GPF	60%	4,680	2,808	255
TBW	**5 GPF**	**60%**	**31,974**	**19,184**	**1,744**
PAS	Total	60%	25,985	15,591	1,417
NPR	Total	60%	3,900	2,340	213
NWH	Total	60%	3,003	1,802	164
SCH	Total	60%	4,415	2,649	241
COT	Total	60%	28,739	17,244	1,568
PIN	Total	60%	23,168	13,901	1,264
STP	Total	60%	16,736	10,042	913
TBW	**Total**	**60%**	**105,945**	**63,567**	**5,779**

Table 2-7
MF Market Potential and Program Penetration Rates for Toilets by WPDA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	3.5 GPF	60%	6,817	4,090	372
NPR	3.5 GPF	60%	873	524	48
NWH	3.5 GPF	60%	533	320	29
SCH	3.5 GPF	60%	2,083	1,250	114
COT	3.5 GPF	60%	12,458	7,475	680
PIN	3.5 GPF	60%	18,524	11,114	1,010
STP	3.5 GPF	60%	10,375	6,225	566
TBW	**3.5 GPF**	**60%**	**51,662**	**30,997**	**2,818**
PAS	5 GPF	60%	3,795	2,277	207
NPR	5 GPF	60%	655	393	36
NWH	5 GPF	60%	-	-	-
SCH	5 GPF	60%	-	-	-
COT	5 GPF	60%	2,413	1,448	132
PIN	5 GPF	60%	8,586	5,152	468
STP	5 GPF	60%	6,228	3,737	340
TBW	**5 GPF**	**60%**	**21,676**	**13,006**	**1,182**
PAS	Total	60%	10,612	6,367	579
NPR	Total	60%	1,527	916	83
NWH	Total	60%	533	320	29
SCH	Total	60%	2,083	1,250	114
COT	Total	60%	14,871	8,923	811
PIN	Total	60%	27,110	16,266	1,479
STP	Total	60%	16,602	9,961	906
TBW	**Total**	**60%**	**73,338**	**44,003**	**4,000**

2.3 Residential Clothes Washer Market Potential

Under a residential HE clothes washers incentive program, rebates are offered to encourage replacement of low-efficiency clothes washers with HE Water Factor (WF) 4.5 (gallons/cubic foot of laundry) models.

Table 2-8 provides the total number of single-family and multifamily in-unit[2] clothes washers by WDPA and mechanical efficiency class for base year 2014. As shown, more than 80% of single-family clothes washers have a WF of 11 or higher. Less than 20 percent of households have clothes washers operating at or below the current federal standard of a 9.5 WF implying opportunities to reduce clothes washer water use still exist in both the single-family and multifamily classes.

Table 2-9 and Table 2-10 provide the total number of rebate-eligible clothes washers by WDPA in five-year increments starting in 2014 throughout the forecast horizon, while Appendix A (Tables A-1 to A-8) provides a breakdown of these estimates for each rebate eligible mechanical efficiency class (WF 15, 11, 9.5 and 8). Rebate-eligible clothes washers are estimated after passive replacement for each forecast year as the number of appliances remaining in each of the four rebate-eligible efficiency levels (WF 15, 11, 9.5 and 8). The passive replacement algorithm assumes an average useful life of 12-years or nrr of 8.3 percent per year.[3] Although the total proportion of rebate-eligible clothes washers diminishes by about 40 percent over the forecast horizon as a result of passive replacement, approximately 50 percent of clothes washers are expected to exceed the target WF 4.5 efficiency threshold and are still considered rebate eligible in 2040. This high proportion of rebate eligible products relates in part to regulatory policies that became effective in 2015. The Department of Energy's (DOE) amended standards, effective March 12, 2015, reduce the water use requirements of both top-loading and frontloading machines to WF 8.0 and WF 4.5, respectively. Although HE models are projected to account for more than half of clothes washer market share by 2040, the remaining market supply will consist of models using nearly two times that of their HE counterparts.

Unlike the distribution of rebate-eligible toilets which remains constant, the relative proportion of each clothes washer type varies annually over the forecast horizon. Although the nrr for clothes washers is held constant at 8 percent annually (a 12-year effective life), a changing distribution across qualifying levels results from the incremental timing of proposed DOE requirements eliminating the market share of high WF products not conforming to new standards (e.g. 2011 federal standard for residential clothes washers requires a maximum WF rating of 9.5, thus eliminating the market share of WF 11 models).

Table 2-11 and Table 2-12 summarize the market potential available in the single-family and multifamily sectors and the number of eligible rebates available given an 11-year program that reduces the estimated number of rebate eligible clothes washers in 2030 by 50 percent.

[2] Multi-Housing Laundry Association, (2001). A National Study of Water & Energy Consumption in Multifamily Housing, In-Apartment Washers vs. Common Area Laundry Rooms. Comparison of in-unit washers and common area laundry rooms indicates residents' w/in-unit washers use 3.3 times more water. Given this finding and other data constraints, common area laundries were not evaluated as part of the DMP.

[3] Alliance for Water Efficiency Tracking Tool, version 3, default. The equations used to estimate passive replacement and quantify the number of clothes washers in each technological efficiency category can be found in Appendix G of the 2013 DMP.

Table 2-8
Distribution of Residential Clothes Washers by Residential Sector, Technological Efficiency Level, and WPDA (2014)

Sector	Water Factor	Base Year Clothes Washers Estimates								% of Total							
		TBW	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP
SF	15	143,124	18,066	2,276	13,523	21,626	30,884	30,778	25,973	31.1%	25.0%	38.5%	31.2%	25.5%	31.5%	35.7%	36.8%
	11	135,345	24,473	1,556	13,012	27,909	26,444	23,514	18,436	29.4%	33.9%	26.3%	30.0%	33.0%	27.0%	27.3%	26.2%
	9.5	89,146	14,739	1,102	8,194	17,324	20,006	15,120	12,663	19.3%	20.4%	18.6%	18.9%	20.5%	20.4%	17.5%	18.0%
	8	48,212	7,441	520	4,502	8,443	9,864	9,749	7,694	10.5%	10.3%	8.8%	10.4%	10.0%	10.1%	11.3%	10.9%
	6	44,938	7,570	462	4,156	9,340	10,693	6,992	5,725	9.8%	10.5%	7.8%	9.6%	11.0%	10.9%	8.1%	8.1%
	4.5	0	0	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Total	460,764	72,287	5,914	43,387	84,642	97,891	86,153	70,490	100%	100%	100%	100%	100%	100%	100%	100%
MF	15	71,403	3,357	1,519	5,153	7,027	21,522	28,006	17,939	34.8%	26.6%	39.0%	32.1%	35.8%	46.4%	40.0%	48.8%
	11	58,830	4,223	1,064	5,113	6,630	11,571	17,906	8,670	28.6%	33.4%	27.4%	31.8%	33.7%	24.9%	25.6%	23.6%
	9.5	35,820	2,192	656	2,732	3,014	7,996	12,158	5,871	17.4%	17.4%	16.9%	17.0%	15.3%	17.2%	17.4%	16.0%
	8	23,315	1,729	398	1,986	2,297	3,453	6,977	2,859	11.4%	13.7%	10.2%	12.4%	11.7%	7.4%	10.0%	7.8%
	6	15,973	1,125	253	1,073	681	1,891	4,894	1,409	7.8%	8.9%	6.5%	6.7%	3.5%	4.1%	7.0%	3.8%
	4.5	0	0	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Total	205,342	12,625	3,891	16,056	19,649	46,433	69,941	36,748	100%	100%	100%	100%	100%	100%	100%	100%

Table 2-9
SF Clothes Washers Eligible for Rebate Incentive by WPDA (2014-2014)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	Rebate Eligible	64,717	62,350	59,561	58,065	57,944	58,786	89.5%	69.6%	59.8%	54.2%	50.5%	47.8%	-5,932	-9.17%	-0.37%
NPR	Rebate Eligible	5,453	4,709	4,201	3,841	3,619	3,492	92.2%	74.7%	65.2%	59.8%	56.1%	53.5%	-1,961	-35.96%	-1.70%
NWH	Rebate Eligible	39,230	34,663	32,110	30,714	29,985	29,822	90.4%	74.3%	64.2%	57.9%	53.9%	51.1%	-9,408	-23.98%	-1.05%
SCH	Rebate Eligible	75,303	70,838	68,209	67,792	68,586	70,481	89.0%	70.0%	59.3%	52.8%	48.8%	46.1%	-4,822	-6.40%	-0.25%
COT	Rebate Eligible	87,197	78,756	74,745	73,261	73,182	74,339	89.1%	72.1%	61.4%	54.8%	50.7%	47.9%	-12,858	-14.75%	-0.61%
PIN	Rebate Eligible	79,161	68,173	61,420	57,282	54,878	53,465	91.9%	77.1%	68.2%	62.4%	58.4%	55.9%	-25,696	-32.46%	-1.50%
STP	Rebate Eligible	64,765	56,044	50,391	46,942	44,977	43,867	91.9%	76.3%	67.4%	61.5%	57.5%	54.8%	-20,898	-32.27%	-1.49%
TBW	**Rebate Eligible**	**415,826**	**375,533**	**350,638**	**337,897**	**333,170**	**334,251**	**90.2%**	**72.9%**	**62.9%**	**56.6%**	**52.6%**	**49.8%**	**-81,576**	**-19.62%**	**-0.84%**
PAS	Total CW	72,287	89,579	99,608	107,135	114,841	122,907	15.7%	17.4%	17.9%	18.0%	18.1%	18.3%	50,620	70.03%	2.06%
NPR	Total CW	5,914	6,304	6,441	6,426	6,450	6,524	1.3%	1.2%	1.2%	1.1%	1.0%	1.0%	610	10.31%	0.38%
NWH	Total CW	43,387	46,681	50,050	53,085	55,635	58,321	9.4%	9.1%	9.0%	8.9%	8.8%	8.7%	14,934	34.42%	1.14%
SCH	Total CW	84,642	101,232	115,073	128,331	140,469	152,945	18.4%	19.7%	20.6%	21.5%	22.2%	22.8%	68,302	80.70%	2.30%
COT	Total CW	97,891	109,214	121,811	133,682	144,315	155,239	21.2%	21.2%	21.8%	22.4%	22.8%	23.1%	57,348	58.58%	1.79%
PIN	Total CW	86,153	88,449	90,022	91,817	93,895	95,719	18.7%	17.2%	16.1%	15.4%	14.8%	14.3%	9,566	11.10%	0.41%
STP	Total CW	70,490	73,447	74,763	76,315	78,215	79,987	15.3%	14.3%	13.4%	12.8%	12.3%	11.9%	9,497	13.47%	0.49%
TBW	**Total CW**	**460,764**	**514,905**	**557,768**	**596,791**	**633,821**	**671,640**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**210,876**	**45.77%**	**1.46%**

Table 2-10
MF Clothes Washers Eligible for Rebate Incentive by WPDA (2014-2014)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	Rebate Eligible	11,500	10,948	10,589	10,630	10,642	10,611	2.8%	2.9%	3.0%	3.1%	3.2%	3.2%	-889	-7.73%	-0.31%
NPR	Rebate Eligible	3,637	3,089	2,764	2,577	2,416	2,277	0.9%	0.8%	0.8%	0.8%	0.7%	0.7%	-1,360	-37.39%	-1.78%
NWH	Rebate Eligible	14,983	13,216	12,033	11,234	10,630	10,183	3.6%	3.5%	3.4%	3.3%	3.2%	3.0%	-4,801	-32.04%	-1.47%
SCH	Rebate Eligible	18,967	18,523	17,962	17,670	17,444	17,287	4.6%	4.9%	5.1%	5.2%	5.2%	5.2%	-1,680	-8.86%	-0.36%
COT	Rebate Eligible	44,542	43,346	42,879	42,741	42,588	42,484	10.7%	11.5%	12.2%	12.6%	12.8%	12.7%	-2,058	-4.62%	-0.18%
PIN	Rebate Eligible	65,047	57,803	53,899	51,399	49,541	48,062	15.6%	15.4%	15.4%	15.2%	14.9%	14.4%	-16,985	-26.11%	-1.16%
STP	Rebate Eligible	35,338	33,204	31,999	31,261	30,722	30,259	8.5%	8.8%	9.1%	9.3%	9.2%	9.1%	-5,079	-14.37%	-0.60%
TBW	**Rebate Eligible**	**194,015**	**180,130**	**172,126**	**167,512**	**163,983**	**161,163**	**46.7%**	**48.0%**	**49.1%**	**49.6%**	**49.2%**	**48.2%**	**-32,852**	**-16.93%**	**-0.71%**
PAS	Total CW	12,625	14,834	16,594	18,646	19,929	20,627	2.7%	2.9%	3.0%	3.1%	3.1%	3.1%	8,002	63.38%	1.91%
NPR	Total CW	3,891	4,007	4,126	4,281	4,249	4,113	0.8%	0.8%	0.7%	0.7%	0.7%	0.6%	222	5.70%	0.21%
NWH	Total CW	16,056	17,214	17,806	18,080	17,965	17,700	3.5%	3.3%	3.2%	3.0%	2.8%	2.6%	1,644	10.24%	0.38%
SCH	Total CW	19,649	23,494	25,717	27,393	28,357	28,943	4.3%	4.6%	4.6%	4.6%	4.5%	4.3%	9,294	47.30%	1.50%
COT	Total CW	46,433	51,470	56,222	59,845	61,976	63,342	10.1%	10.0%	10.1%	10.0%	9.8%	9.4%	16,909	36.42%	1.20%
PIN	Total CW	69,941	72,147	75,484	77,730	78,384	77,881	15.2%	14.0%	13.5%	13.0%	12.4%	11.6%	7,940	11.35%	0.41%
STP	Total CW	36,748	39,242	41,567	43,211	44,067	44,244	8.0%	7.6%	7.5%	7.2%	7.0%	6.6%	7,496	20.40%	0.72%
TBW	**Total CW**	**205,342**	**222,408**	**237,515**	**249,187**	**254,929**	**256,849**	**44.6%**	**43.2%**	**42.6%**	**41.8%**	**40.2%**	**38.2%**	**51,507**	**25.08%**	**0.86%**

Table 2-11
SF Market Potential and Program Penetration Rates for Clothes Washers by WPDA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	15 WF	50%	4,490	2,245	204
NPR	15 WF	50%	566	283	26
NWH	15 WF	50%	3,361	1,680	153
SCH	15 WF	50%	5,375	2,687	244
COT	15 WF	50%	7,676	3,838	349
PIN	15 WF	50%	7,649	3,825	348
STP	15 WF	50%	6,455	3,228	293
TBW	**15 WF**	**50%**	**35,571**	**17,785**	**1,617**
PAS	11 WF	50%	13,831	6,916	629
NPR	11 WF	50%	939	469	43
NWH	11 WF	50%	8,003	4,002	364
SCH	11 WF	50%	15,582	7,791	708
COT	11 WF	50%	16,899	8,449	768
PIN	11 WF	50%	16,035	8,018	729
STP	11 WF	50%	12,494	6,247	568
TBW	**11 WF**	**50%**	**83,783**	**41,891**	**3,808**
PAS	9.5 WF	50%	13,911	6,955	632
NPR	9.5 WF	50%	835	418	38
NWH	9.5 WF	50%	6,674	3,337	303
SCH	9.5 WF	50%	15,278	7,639	694
COT	9.5 WF	50%	16,398	8,199	745
PIN	9.5 WF	50%	11,744	5,872	534
STP	9.5 WF	50%	9,977	4,989	454
TBW	**9.5 WF**	**50%**	**74,817**	**37,408**	**3,401**
PAS	8.0 WF	50%	25,833	12,916	1,174
NPR	8.0 WF	50%	1,501	751	68
NWH	8.0 WF	50%	12,676	6,338	576
SCH	8.0 WF	50%	31,558	15,779	1,434
COT	8.0 WF	50%	32,289	16,144	1,468
PIN	8.0 WF	50%	21,854	10,927	993
STP	8.0 WF	50%	18,016	9,008	819
TBW	**8.0 WF**	**50%**	**143,727**	**71,863**	**6,533**
PAS	Total	50%	11,878	5,939	540
NPR	Total	50%	654	327	30
NWH	Total	50%	5,423	2,712	247
SCH	Total	50%	12,798	6,399	582
COT	Total	50%	13,478	6,739	613
PIN	Total	50%	9,253	4,626	421
STP	Total	50%	7,910	3,955	360
TBW	**Total**	**50%**	**61,393**	**30,697**	**2,791**

Table 2-12
MF Market Potential and Program Penetration Rates for Clothes Washers by WPDA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	15 WF	50%	834	417	38
NPR	15 WF	50%	377	189	17
NWH	15 WF	50%	1,281	640	58
SCH	15 WF	50%	3,787	1,893	172
COT	15 WF	50%	15,839	7,919	720
PIN	15 WF	50%	12,120	6,060	551
STP	15 WF	50%	11,674	5,837	531
TBW	**15 WF**	**50%**	**45,912**	**22,956**	**2,087**
PAS	11 WF	50%	3,030	1,515	138
NPR	11 WF	50%	678	339	31
NWH	11 WF	50%	3,355	1,677	152
SCH	11 WF	50%	4,669	2,334	212
COT	11 WF	50%	9,284	4,642	422
PIN	11 WF	50%	13,043	6,522	593
STP	11 WF	50%	6,940	3,470	315
TBW	**11 WF**	**50%**	**40,998**	**20,499**	**1,864**
PAS	9.5 WF	50%	2,045	1,023	93
NPR	9.5 WF	50%	483	241	22
NWH	9.5 WF	50%	2,128	1,064	97
SCH	9.5 WF	50%	2,864	1,432	130
COT	9.5 WF	50%	7,282	3,641	331
PIN	9.5 WF	50%	9,865	4,933	448
STP	9.5 WF	50%	5,047	2,524	229
TBW	**9.5 WF**	**50%**	**29,713**	**14,857**	**1,351**
PAS	8.0 WF	50%	4,721	2,360	215
NPR	8.0 WF	50%	1,039	520	47
NWH	8.0 WF	50%	4,471	2,236	203
SCH	8.0 WF	50%	6,351	3,175	289
COT	8.0 WF	50%	10,337	5,168	470
PIN	8.0 WF	50%	16,370	8,185	744
STP	8.0 WF	50%	7,600	3,800	345
TBW	**8.0 WF**	**50%**	**50,889**	**25,444**	**2,313**
PAS	Total	50%	1,741	870	79
NPR	Total	50%	369	185	17
NWH	Total	50%	1,652	826	75
SCH	Total	50%	1,525	762	69
COT	Total	50%	2,698	1,349	123
PIN	Total	50%	6,444	3,222	293
STP	Total	50%	2,124	1,062	97
TBW	**Total**	**50%**	**16,552**	**8,276**	**752**

2.4 Nonresidential Toilet and Urinal Market Potential

Similar to the residential HET retrofit programs, a nonresidential (NR) fixture replacement program provides financial incentives to water customers to encourage conversion of higher flush volume toilets and urinals to HET and HEU models. Nonresidential incentives generally apply to three fixture types:

- Tank-Type HET
- Valve-Type HET
- 1/2 Gallon HEU

Nonresidential fixtures were generated in Tampa Bay Water's LTDFS to support development of a water efficiency factor to estimate passive savings as part of the econometric forecast model. Passive measures are generally assumed to be associated with current plumbing standards and increased efficiency due to an evolving HE-market for water efficient products. The development of water efficiency factors followed a logic similar to that used in the 2013 DMP where nonresidential fixtures (total and male-female specific) are estimated by multiplying FDOR fixture coefficients by parcel building area, and then aggregating up to distinct water use locations, and across the FDOR property use, nonresidential key sectors as shown in Table 2-13.

Since presence of valve-type and tank-type toilets within an establishment cannot be determined without field verification, assumptions regarding flush mechanisms were made for each key sector as shown in Table 2-13. Establishments with high traffic volumes were generally assumed to have a flush-valve mechanism. These assumptions were necessary to establish the cost and benefits of tank and flush valve programs, but do not affect water savings calculations. Additionally, these assumptions recognize the existence and permit conservative estimation of HETs in nonresidential establishments.

Table 2-13
NR Key Sectors for Fixture Estimates

Key Sector	Flush Mechanism
Churches	Tank
Education	Valve
Government	Valve
Health	Valve
Hotels	Tank
Industrial	Tank
Office	Valve
Restaurants	Valve
Retail	Tank/Valve
Others	Valve

Unlike the residential classes, parcel data does not provide nonresidential fixture estimates. Alternatively, baseline estimates of nonresidential fixtures are based on 1) parcel area (square feet) and 2) fixture per square foot coefficients for FDOR property use designations obtained from University of Florida (UF) research[4] The UF fixture and employment coefficients for commercial, institutional and industrial FDOR property use designations are based on minimum construction code requirements and are applied at a

[4] Morales et al., (2011). Estimating Water End-Use Devices in the Commercial and Institutional Sectors.

parcel level. Coefficients for total toilets, male use toilets, female use toilets and urinals are provided for each FDOR property use designation. Fixtures are estimated by multiplying a parcel's building area by its corresponding FDOR coefficients and then aggregating to distinct locations.[5]

Similar to residential fixture estimates, passive measures are generally assumed to be associated with current plumbing standards and increased efficiency due to an evolving HE-market for water efficient products. With building age determined by property appraiser data, baseline fixture estimates are assigned to the three-building age and technological efficiency cohorts corresponding to the predominant mechanical efficiency level known to exist at that time. Prior to implementing natural replacement calculations, the fixture estimates are aggregated to FDOR property use designations. Annual conversion rates obtained from literature are then calculated based on an expected product life of 30 years (3.3% nrr), slightly longer than the rate assumed for residential fixtures. A complete description of the methodology used to generate these estimates can be found in the 2018 LTDFS report.[6]

Table 2-14 and Table 2-15 provide WDPA baseline estimates of toilets and urinals for the nonresidential key sectors. The fixture estimates suggest that approximately 66% of the nonresidential toilets in the Tampa Bay region are rated at 1.6 gpf or less while the remaining 44 percent are rated 3.5 gpf or more. Urinals appear to have greater proportion of non-efficient models with an estimated 89% of urinals rated 1 gpf or more. Across the nine key sectors (excluding other), hotels represent 20 percent of total toilets followed by health and office establishments at 14 percent. These three sectors were also identified as high priority sectors in the 2013 DMP. Locations without an explicit key sector and categorized as "service other" account for the second highest proportion of nonresidential toilets at 22 percent. Many locations within this sector consist of travel and entertainment related facilities and may provide significant opportunities given the potential for high occupancy and water use.

Table 2-16 and Table 2-17 provide the total number of rebate-eligible toilets and urinals by WDPA in five-year increments starting in 2014 throughout the forecast horizon. Nonresidential rebate-eligible fixtures are estimated for each forecast year as the number of 5.0 and 3.5 gpf toilets and 3.0 and 1.0 gpf urinals remaining after passive replacement has occurred. Table 2-18 and Table 2-19 summarize the remaining market potential for toilets and urinals after passive efficiency is considered as well as the total number of available interventions associated with reducing the remaining number of eligible fixtures expected to remain in 2030 by 60 percent over the 11-year program.

[5] Fixture coefficients generally limited to first 10,000 sq. ft. of building area.

[6] Locations with fewer than two male toilets are assumed to not have urinals, therefore the number of locations estimated to have toilets and urinals within each key sector varies. This is an important distinction as future estimates of toilets and urinals rely on base-year estimates and assumptions for toilets-per-location and urinals-per-location.

Table 2-14
Distribution of Toilets by NR Sector, Technological Efficiency Level, and WPDA (2014)

Key Sector	Flow	Base Year Toilet Estimates								% of Sector Total							
	(gpf)	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP
10 Key Others	1.28	5,428	336	43	248	452	3,139	513	698	18.1%	31.3%	18.2%	15.4%	11.6%	19.3%	13.3%	22.9%
10 Key Others	1.60	27,744	1,554	201	999	2,696	16,367	2,529	3,397	18.2%	23.4%	18.1%	10.8%	14.6%	20.9%	11.6%	20.1%
10 Key Others	3.50	9,671	643	82	305	882	5,388	1,087	1,284	18.6%	30.0%	18.8%	14.3%	17.6%	18.9%	13.1%	23.9%
10 Key Others	5.00	9,818	608	130	171	725	5,503	953	1,728	23.5%	35.3%	18.3%	22.7%	25.9%	23.2%	18.0%	25.7%
10 Key Others	**Total**	**52,661**	**3,141**	**456**	**1,723**	**4,755**	**30,396**	**5,082**	**7,108**	**19.1%**	**27.1%**	**18.3%**	**12.5%**	**15.8%**	**20.7%**	**12.9%**	**22.2%**
Churches	1.28	2,092	124	15	226	475	837	195	220	7.0%	11.5%	6.3%	14.0%	12.2%	5.2%	5.1%	7.2%
Churches	1.60	9,841	584	79	1,086	2,044	4,012	941	1,096	6.5%	8.8%	7.1%	11.7%	11.1%	5.1%	4.3%	6.5%
Churches	3.50	3,803	248	30	276	688	1,630	451	479	7.3%	11.6%	6.8%	13.0%	13.8%	5.7%	5.4%	8.9%
Churches	5.00	4,638	237	59	157	695	2,429	407	654	11.1%	13.8%	8.3%	20.8%	24.8%	10.2%	7.7%	9.7%
Churches	**Total**	**20,374**	**1,193**	**183**	**1,745**	**3,903**	**8,908**	**1,994**	**2,448**	**7.4%**	**10.3%**	**7.3%**	**12.7%**	**12.9%**	**6.1%**	**5.1%**	**7.6%**
Education	1.28	2,255	175	30	217	622	845	208	158	7.5%	16.3%	12.5%	13.5%	16.0%	5.2%	5.4%	5.2%
Education	1.60	10,944	1,359	117	1,239	2,713	3,710	788	1,019	7.2%	20.4%	10.5%	13.4%	14.7%	4.7%	3.6%	6.0%
Education	3.50	2,917	269	51	449	541	1,009	379	219	5.6%	12.5%	11.6%	21.1%	10.8%	3.5%	4.6%	4.1%
Education	5.00	2,900	253	77	61	114	1,687	315	393	6.9%	14.7%	10.8%	8.1%	4.1%	7.1%	6.0%	5.8%
Education	**Total**	**19,016**	**2,056**	**274**	**1,967**	**3,990**	**7,250**	**1,690**	**1,789**	**6.9%**	**17.7%**	**11.0%**	**14.3%**	**13.2%**	**4.9%**	**4.3%**	**5.6%**
Government	1.28	1,388	45	8	40	55	1,013	127	100	4.6%	4.2%	3.4%	2.5%	1.4%	6.2%	3.3%	3.3%
Government	1.60	5,883	247	55	188	384	3,822	696	490	3.9%	3.7%	4.9%	2.0%	2.1%	4.9%	3.2%	2.9%
Government	3.50	2,209	107	17	72	88	1,438	234	254	4.3%	5.0%	3.8%	3.4%	1.8%	5.0%	2.8%	4.7%
Government	5.00	1,998	76	25	40	67	1,323	291	176	4.8%	4.4%	3.6%	5.3%	2.4%	5.6%	5.5%	2.6%
Government	**Total**	**11,478**	**475**	**105**	**340**	**594**	**7,596**	**1,348**	**1,020**	**4.2%**	**4.1%**	**4.2%**	**2.5%**	**2.0%**	**5.2%**	**3.4%**	**3.2%**
Health	1.28	3,803	190	64	111	911	1,961	216	350	12.7%	17.7%	26.9%	6.9%	23.4%	12.1%	5.6%	11.5%
Health	1.60	21,074	1,533	274	1,688	4,366	9,277	1,431	2,506	13.8%	23.0%	24.7%	18.2%	23.6%	11.8%	6.6%	14.8%
Health	3.50	7,569	359	87	159	1,592	4,038	719	614	14.6%	16.7%	19.9%	7.5%	31.8%	14.1%	8.6%	11.5%
Health	5.00	5,542	190	137	23	573	3,438	145	1,036	13.3%	11.0%	19.3%	3.0%	20.5%	14.5%	2.7%	15.4%
Health	**Total**	**37,987**	**2,272**	**561**	**1,981**	**7,442**	**18,714**	**2,511**	**4,506**	**13.8%**	**19.6%**	**22.5%**	**14.4%**	**24.7%**	**12.7%**	**6.4%**	**14.1%**
Hotels	1.28	8,257	65	55	35	536	5,294	1,706	567	27.5%	6.0%	23.3%	2.2%	13.8%	32.6%	44.1%	18.6%
Hotels	1.60	43,872	317	270	467	1,708	26,074	10,959	4,078	28.8%	4.8%	24.3%	5.1%	9.2%	33.3%	50.2%	24.1%
Hotels	3.50	13,516	228	123	59	176	8,722	3,345	863	26.0%	10.6%	28.1%	2.8%	3.5%	30.5%	40.2%	16.1%
Hotels	5.00	8,258	165	212	57	149	4,734	1,944	997	19.8%	9.6%	29.9%	7.6%	5.3%	19.9%	36.7%	14.8%
Hotels	**Total**	**73,903**	**774**	**660**	**618**	**2,570**	**44,824**	**17,953**	**6,504**	**26.8%**	**6.7%**	**26.5%**	**4.5%**	**8.5%**	**30.5%**	**45.7%**	**20.3%**
Industrial	1.28	363	11		10	14	82	173	74	1.2%	1.1%	0.0%	0.6%	0.4%	0.5%	4.5%	2.4%
Industrial	1.60	1,663	50		36	59	395	748	376	1.1%	0.8%	0.0%	0.4%	0.3%	0.5%	3.4%	2.2%
Industrial	3.50	724	17		8	21	177	309	193	1.4%	0.8%	0.0%	0.4%	0.4%	0.6%	3.7%	3.6%
Industrial	5.00	696	14		9	21	232	232	189	1.7%	0.8%	0.0%	1.2%	0.7%	1.0%	4.4%	2.8%
Industrial	**Total**	**3,446**	**92**		**62**	**114**	**885**	**1,462**	**831**	**1.2%**	**0.8%**	**0.0%**	**0.5%**	**0.4%**	**0.6%**	**3.7%**	**2.6%**
Office	1.28	3,387	29	7	287	209	1,926	377	551	11.3%	2.7%	3.1%	17.9%	5.4%	11.9%	9.7%	18.1%
Office	1.60	16,485	163	36	1,721	1,522	8,857	1,868	2,318	10.8%	2.5%	3.2%	18.6%	8.2%	11.3%	8.6%	13.7%
Office	3.50	6,682	43	14	302	278	4,201	998	845	12.9%	2.0%	3.3%	14.2%	5.6%	14.7%	12.0%	15.7%
Office	5.00	3,897	46	16	109	176	2,355	404	792	9.3%	2.6%	2.2%	14.4%	6.3%	9.9%	7.6%	11.8%
Office	**Total**	**30,450**	**281**	**73**	**2,419**	**2,186**	**17,340**	**3,646**	**4,505**	**11.0%**	**2.4%**	**2.9%**	**17.6%**	**7.2%**	**11.8%**	**9.3%**	**14.1%**
Restaurants	1.28	1,099	5	1	130	217	496	145	105	3.7%	0.4%	0.6%	8.1%	5.6%	3.0%	3.8%	3.5%
Restaurants	1.60	5,429	56	7	613	1,051	2,443	752	506	3.6%	0.8%	0.6%	6.6%	5.7%	3.1%	3.4%	3.0%
Restaurants	3.50	1,559	13	4	80	211	758	312	181	3.0%	0.6%	0.9%	3.8%	4.2%	2.7%	3.8%	3.4%
Restaurants	5.00	1,393	11	5	48	98	813	201	217	3.3%	0.6%	0.7%	6.3%	3.5%	3.4%	3.8%	3.2%
Restaurants	**Total**	**9,479**	**84**	**17**	**871**	**1,577**	**4,510**	**1,411**	**1,009**	**3.4%**	**0.7%**	**0.7%**	**6.3%**	**5.2%**	**3.1%**	**3.6%**	**3.1%**
Retail	1.28	1,910	94	13	304	408	661	206	222	6.4%	8.7%	5.6%	18.9%	10.5%	4.1%	5.3%	7.3%
Retail	1.60	9,593	788	71	1,212	1,925	3,379	1,104	1,113	6.3%	11.9%	6.4%	13.1%	10.4%	4.3%	5.1%	6.6%
Retail	3.50	3,316	219	30	418	523	1,209	486	432	6.4%	10.2%	6.8%	19.6%	10.5%	4.2%	5.8%	8.1%
Retail	5.00	2,615	123	50	79	184	1,224	405	550	6.3%	7.2%	7.0%	10.5%	6.6%	5.2%	7.6%	8.2%
Retail	**Total**	**17,434**	**1,225**	**164**	**2,014**	**3,040**	**6,473**	**2,200**	**2,318**	**6.3%**	**10.6%**	**6.6%**	**14.7%**	**10.1%**	**4.4%**	**5.6%**	**7.2%**
Total	1.28	29,981	1,074	236	1,607	3,898	16,254	3,867	3,045	10.9%	9.3%	9.5%	11.7%	12.9%	11.1%	9.8%	9.5%
Total	1.60	152,528	6,651	1,109	9,249	18,469	78,335	21,814	16,899	55.2%	57.4%	44.5%	67.3%	61.2%	53.3%	55.5%	52.7%
Total	3.50	51,964	2,145	436	2,128	5,001	28,569	8,320	5,364	18.8%	18.5%	17.5%	15.5%	16.6%	19.4%	21.2%	16.7%
Total	5.00	41,755	1,722	711	756	2,802	23,738	5,296	6,730	15.1%	14.9%	28.5%	5.5%	9.3%	16.2%	13.5%	21.0%
Total	**Total**	**276,228**	**11,593**	**2,493**	**13,740**	**30,171**	**146,896**	**39,297**	**32,038**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-15
Distribution of Urinals by NR Sector, Technological Efficiency Level, and WPDA (2014)

Key Sector	Flow	Base Year Urinal Estimates								% of Total							
	(gpf)	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP
Churches	0.5	430	22	2	47	104	174	41	39	15.4%	15.4%	2.7%	11.0%	8.0%	17.3%	13.3%	20.2%
Churches	1.0	2,074	101	12	348	440	814	176	183	17.0%	9.6%	3.6%	6.7%	11.0%	20.7%	14.2%	19.7%
Churches	3.0	1,856	88	14	119	395	838	190	212	17.8%	14.5%	3.4%	11.6%	14.0%	18.8%	14.1%	23.9%
Churches	**Total**	**4,360**	**212**	**28**	**515**	**939**	**1,825**	**407**	**434**	**17.1%**	**11.6%**	**3.4%**	**8.3%**	**11.5%**	**19.6%**	**14.1%**	**21.3%**
Education	0.5	953	82	13	89	220	396	86	68	7.0%	9.8%	5.0%	11.9%	12.3%	4.9%	7.2%	6.8%
Education	1.0	4,757	623	49	548	1,101	1,685	311	439	6.9%	6.6%	5.7%	15.7%	10.8%	4.9%	6.8%	6.1%
Education	3.0	2,760	235	52	262	471	1,199	283	258	9.3%	11.9%	6.6%	15.0%	19.8%	7.1%	8.3%	9.5%
Education	**Total**	**8,470**	**940**	**114**	**899**	**1,792**	**3,280**	**680**	**765**	**7.7%**	**8.5%**	**6.0%**	**15.1%**	**13.6%**	**5.7%**	**7.5%**	**7.4%**
Government	0.5	364	5	1	6	6	299	26	21	15.4%	35.9%	27.4%	22.3%	25.9%	11.3%	15.1%	11.9%
Government	1.0	1,425	22	7	31	45	1,073	151	96	15.8%	40.6%	23.4%	24.8%	27.1%	10.2%	12.0%	14.5%
Government	3.0	1,070	23	4	24	21	783	119	96	13.8%	31.7%	25.1%	32.9%	23.6%	10.2%	12.4%	11.5%
Government	**Total**	**2,859**	**51**	**11**	**62**	**72**	**2,155**	**296**	**212**	**15.0%**	**37.5%**	**24.6%**	**26.4%**	**25.9%**	**10.3%**	**12.5%**	**13.1%**
Health	0.5	854	57	20	28	173	437	50	89	5.9%	2.4%	1.6%	1.6%	0.7%	8.5%	4.6%	3.6%
Health	1.0	4,717	450	85	406	902	1,936	254	684	4.7%	1.4%	3.2%	1.4%	1.1%	6.5%	5.8%	3.2%
Health	3.0	3,316	169	71	41	473	1,865	286	411	5.3%	3.2%	1.7%	3.1%	1.1%	6.6%	5.2%	4.3%
Health	**Total**	**8,887**	**676**	**175**	**475**	**1,548**	**4,238**	**591**	**1,184**	**5.1%**	**2.0%**	**2.4%**	**1.8%**	**1.0%**	**6.8%**	**5.4%**	**3.6%**
Hotels	0.5	1,242	9	8	5	75	867	198	80	13.8%	24.9%	41.8%	7.0%	20.4%	12.4%	8.8%	15.7%
Hotels	1.0	6,143	46	39	61	231	4,377	929	460	15.7%	29.3%	40.6%	18.3%	22.2%	11.7%	9.8%	22.6%
Hotels	3.0	3,874	57	49	26	71	2,544	762	364	16.5%	22.8%	33.9%	5.2%	23.7%	15.8%	12.5%	18.4%
Hotels	**Total**	**11,259**	**112**	**96**	**92**	**377**	**7,788**	**1,889**	**905**	**15.8%**	**27.0%**	**37.7%**	**13.9%**	**22.4%**	**13.3%**	**10.8%**	**20.3%**
Industrial	0.5	9	-	-	0	2	5	1	0	20.1%	4.1%	17.2%	1.2%	8.8%	24.7%	34.7%	14.2%
Industrial	1.0	38	-	-	1	7	25	3	2	20.4%	3.0%	18.8%	2.7%	5.7%	26.5%	35.8%	15.2%
Industrial	3.0	37	-	-	1	5	27	4	1	19.3%	7.7%	23.4%	3.3%	3.6%	21.6%	33.4%	16.3%
Industrial	**Total**	**84**	**-**	**-**	**2**	**14**	**57**	**8**	**3**	**20.0%**	**4.5%**	**20.7%**	**2.7%**	**5.5%**	**24.5%**	**34.7%**	**15.5%**
Office	0.5	655	3	0	48	23	433	39	109	0.1%	0.0%	0.0%	0.1%	0.3%	0.2%	0.1%	0.0%
Office	1.0	2,517	16	2	148	99	1,754	139	359	0.1%	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%	0.1%
Office	3.0	1,754	6	3	63	27	1,363	104	189	0.2%	0.0%	0.0%	0.1%	0.3%	0.2%	0.2%	0.0%
Office	**Total**	**4,926**	**25**	**5**	**259**	**148**	**3,550**	**282**	**657**	**0.1%**	**0.0%**	**0.0%**	**0.1%**	**0.2%**	**0.2%**	**0.1%**	**0.1%**
Restaurants	0.5	400	2	0	51	83	196	41	27	10.6%	1.1%	0.9%	12.0%	2.7%	12.3%	6.9%	19.2%
Restaurants	1.0	1,938	21	2	237	395	953	203	127	8.4%	1.1%	1.0%	6.7%	2.4%	10.6%	5.4%	11.9%
Restaurants	3.0	1,047	7	3	47	115	619	155	102	8.8%	0.8%	1.2%	7.9%	1.3%	11.6%	4.5%	8.5%
Restaurants	**Total**	**3,385**	**30**	**5**	**335**	**593**	**1,768**	**399**	**255**	**8.7%**	**1.0%**	**1.1%**	**7.6%**	**2.1%**	**11.2%**	**5.2%**	**11.3%**
Retail	0.5	320	13	1	80	95	100	12	20	6.5%	0.7%	0.9%	12.9%	9.8%	5.6%	7.1%	4.8%
Retail	1.0	1,405	108	6	286	398	467	60	80	6.4%	1.4%	1.0%	10.7%	9.7%	5.8%	7.8%	4.2%
Retail	3.0	773	48	7	120	139	326	60	72	5.2%	1.0%	1.2%	5.9%	5.8%	5.3%	6.8%	4.5%
Retail	Total	2,498	169	14	486	632	893	132	172	6.0%	1.2%	1.1%	9.8%	8.6%	5.6%	7.3%	4.4%
10 Key Others	0.5	950	35	1	44	68	610	76	115	5.2%	5.6%	2.5%	20.0%	11.2%	2.8%	2.1%	3.5%
10 Key Others	1.0	5,122	148	8	148	449	3,406	368	595	4.7%	7.0%	2.7%	12.9%	9.8%	2.8%	2.3%	2.7%
10 Key Others	3.0	3,562	107	7	92	280	2,220	321	535	3.9%	6.5%	3.4%	15.1%	7.0%	2.8%	2.6%	3.2%
10 Key Others	**Total**	**9,634**	**290**	**16**	**284**	**797**	**6,236**	**766**	**1,245**	**4.4%**	**6.7%**	**3.0%**	**14.3%**	**9.1%**	**2.8%**	**2.4%**	**2.9%**
Total	0.5	6,176	228	47	399	848	3,517	571	567	11.0%	9.1%	10.1%	11.7%	12.3%	11.1%	10.5%	9.7%
Total	1.0	30,136	1,536	209	2,214	4,067	16,490	2,594	3,026	53.5%	61.3%	45.0%	64.9%	58.8%	51.9%	47.6%	51.9%
Total	3.0	20,049	741	208	796	1,997	11,783	2,285	2,240	35.6%	29.6%	44.8%	23.3%	28.9%	37.1%	41.9%	38.4%
Total	**Total**	**56,362**	**2,505**	**464**	**3,409**	**6,912**	**31,790**	**5,450**	**5,832**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-16
NR Toilets Eligible for Rebate Incentive by WPDA (2014-2014)

WDPA	Variable	Total Toilets						Percent of Total Toilets						Absolute Change	% Change	Annual Avg% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
NPR	3.5 GPF	436	356	301	254	214	181	2.9%	2.3%	2.0%	1.6%	1.4%	1.2%	-255	-58.6%	-3.33%
NWH	3.5 GPF	2,128	1,724	1,446	1,210	1,011	844	12.7%	10.0%	8.4%	7.0%	5.9%	4.9%	-1,284	-60.4%	-3.50%
SCH	3.5 GPF	5,001	4,045	3,381	2,824	2,358	1,967	14.8%	11.7%	9.8%	8.2%	6.8%	5.7%	-3,033	-60.7%	-3.53%
COT	3.5 GPF	28,569	23,237	19,550	16,427	13,800	11,584	15.4%	12.4%	10.4%	8.8%	7.4%	6.2%	-16,985	-59.5%	-3.41%
PIN	3.5 GPF	8,320	6,741	5,650	4,724	3,946	3,246	20.2%	16.1%	13.5%	11.3%	9.4%	7.7%	-5,073	-61.0%	-3.55%
STP	3.5 GPF	5,364	4,376	3,693	3,116	2,630	2,209	16.2%	13.1%	11.1%	9.4%	7.9%	6.6%	-3,155	-58.8%	-3.36%
TBW	**3.5 GPF**	**51,964**	**42,229**	**35,497**	**29,801**	**25,011**	**20,917**	**15.4%**	**12.3%**	**10.4%**	**8.7%**	**7.3%**	**6.1%**	**-31,046**	**-59.7%**	**-3.44%**
PAS	5 GPF	1,722	1,404	1,184	999	842	710	13.9%	11.0%	9.3%	7.8%	6.6%	5.6%	-1,012	-58.8%	-3.35%
NPR	5 GPF	711	580	489	413	349	294	4.7%	3.8%	3.2%	2.7%	2.3%	1.9%	-416	-58.6%	-3.33%
NWH	5 GPF	756	573	446	339	252	194	4.5%	3.3%	2.6%	2.0%	1.5%	1.1%	-561	-74.3%	-5.09%
SCH	5 GPF	2,802	2,133	1,694	1,351	1,061	829	8.3%	6.2%	4.9%	3.9%	3.1%	2.4%	-1,973	-70.4%	-4.58%
COT	5 GPF	23,738	19,070	15,843	13,173	10,933	9,043	12.8%	10.2%	8.5%	7.0%	5.8%	4.8%	-14,694	-61.9%	-3.64%
PIN	5 GPF	5,296	3,953	3,025	2,273	1,655	1,177	12.9%	9.4%	7.2%	5.4%	3.9%	2.8%	-4,118	-77.8%	-5.62%
STP	5 GPF	6,730	5,321	4,347	3,525	2,831	2,255	20.3%	16.0%	13.0%	10.6%	8.5%	6.8%	-4,474	-66.5%	-4.12%
TBW	**5 GPF**	**41,755**	**33,033**	**27,029**	**22,072**	**17,923**	**14,503**	**12.4%**	**9.6%**	**7.9%**	**6.4%**	**5.2%**	**4.2%**	**-27,251**	**-65.3%**	**-3.99%**
PAS	Rebate Eligible	3,868	3,154	2,661	2,245	1,894	1,597	31.3%	24.8%	20.9%	17.6%	14.9%	12.5%	-2,270	-58.7%	-3.34%
NPR	Rebate Eligible	1,147	936	790	667	563	475	7.6%	6.1%	5.1%	4.3%	3.7%	3.1%	-672	-58.6%	-3.33%
NWH	Rebate Eligible	2,884	2,297	1,892	1,549	1,263	1,038	17.1%	13.4%	11.0%	9.0%	7.3%	6.0%	-1,845	-64.0%	-3.85%
SCH	Rebate Eligible	7,803	6,178	5,075	4,175	3,419	2,796	23.1%	17.9%	14.7%	12.1%	9.9%	8.1%	-5,007	-64.2%	-3.87%
COT	Rebate Eligible	52,307	42,306	35,394	29,599	24,734	20,626	28.3%	22.6%	18.9%	15.8%	13.2%	11.0%	-31,680	-60.6%	-3.52%
PIN	Rebate Eligible	13,616	10,694	8,674	6,997	5,601	4,423	33.1%	25.5%	20.7%	16.7%	13.4%	10.6%	-9,192	-67.5%	-4.23%
STP	Rebate Eligible	12,094	9,697	8,040	6,641	5,460	4,464	36.5%	29.1%	24.1%	19.9%	16.4%	13.4%	-7,630	-63.1%	-3.76%
TBW	**Rebate Eligible**	**93,719**	**75,262**	**62,526**	**51,873**	**42,934**	**35,420**	**27.8%**	**22.0%**	**18.3%**	**15.1%**	**12.5%**	**10.3%**	**-58,298**	**-62.2%**	**-3.67%**
PAS	Total Toilets	8,452	9,522	10,173	10,640	11,047	11,450	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	380	3.1%	0.12%
NPR	Total Toilets	2,037	2,037	2,037	2,037	2,037	2,037	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	391	2.6%	0.10%
NWH	Total Toilets	12,017	12,412	12,455	12,455	12,455	12,460	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	366	2.2%	0.08%
SCH	Total Toilets	25,416	27,707	29,567	30,919	32,155	33,540	10.0%	10.1%	10.1%	10.1%	10.1%	10.1%	723	2.1%	0.08%
COT	Total Toilets	116,500	125,087	129,804	132,162	133,816	135,374	54.8%	54.7%	54.7%	54.7%	54.7%	54.7%	2,504	1.4%	0.05%
PIN	Total Toilets	34,215	35,512	35,831	35,831	35,831	35,831	12.2%	12.2%	12.2%	12.2%	12.2%	12.2%	730	1.8%	0.07%
STP	Total Toilets	24,930	25,881	26,280	26,316	26,388	26,583	9.8%	9.7%	9.7%	9.7%	9.7%	9.7%	143	0.4%	0.02%
TBW	**Total Toilets**	**223,567**	**238,157**	**246,147**	**250,361**	**253,729**	**257,275**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**5,237**	**1.6%**	**0.06%**

Table 2-17
NR Urinals Eligible for Rebate Incentive by WPDA (2014-2014)

		Total Urinals						Percent of Total Urinals						Absolute Change	% Change	Annual Avg% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	1 GPF	1,388	1,685	1,813	1,871	1,908	1,945	2.1%	2.4%	2.3%	2.1%	2.0%	2.0%	557	40.13%	1.31%
NPR	1 GPF	202	219	227	229	229	229	2.8%	3.0%	3.0%	2.9%	2.9%	2.9%	27	13.37%	0.48%
NWH	1 GPF	2,067	2,175	2,176	2,157	2,135	2,117	4.5%	4.4%	4.3%	4.2%	4.1%	4.1%	50	2.42%	0.09%
SCH	1 GPF	3,618	4,116	4,387	4,488	4,546	4,623	5.3%	5.2%	5.0%	4.8%	4.7%	4.7%	1,005	27.78%	0.95%
COT	1 GPF	13,084	15,237	16,089	16,297	16,344	16,395	7.6%	7.8%	7.5%	7.2%	7.0%	6.8%	3,311	25.31%	0.87%
PIN	1 GPF	2,226	2,537	2,627	2,641	2,638	2,636	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	410	18.42%	0.65%
STP	1 GPF	2,431	2,712	2,814	2,829	2,832	2,843	2.2%	2.3%	2.3%	2.2%	2.2%	2.2%	412	16.95%	0.60%
TBW	**1 GPF**	**25,014**	**28,682**	**30,133**	**30,511**	**30,633**	**30,789**	**3.8%**	**4.0%**	**3.9%**	**3.8%**	**3.7%**	**3.7%**	**5,775**	**23.09%**	**0.80%**
PAS	3 GPF	634	517	437	369	311	263	1.0%	0.7%	0.5%	0.4%	0.3%	0.3%	-371	-58.52%	-3.33%
NPR	3 GPF	201	164	138	117	99	83	2.8%	2.2%	1.8%	1.5%	1.3%	1.1%	-118	-58.71%	-3.34%
NWH	3 GPF	704	574	485	409	345	291	1.5%	1.2%	1.0%	0.8%	0.7%	0.6%	-413	-58.66%	-3.34%
SCH	3 GPF	1,717	1,401	1,183	998	843	711	2.5%	1.8%	1.4%	1.1%	0.9%	0.7%	-1,006	-58.59%	-3.33%
COT	3 GPF	9,563	7,803	6,586	5,559	4,693	3,961	5.6%	4.0%	3.1%	2.4%	2.0%	1.6%	-5,602	-58.58%	-3.33%
PIN	3 GPF	1,963	1,602	1,352	1,141	963	813	1.1%	0.8%	0.7%	0.6%	0.5%	0.4%	-1,150	-58.58%	-3.33%
STP	3 GPF	1,705	1,391	1,174	991	836	706	1.5%	1.2%	1.0%	0.8%	0.6%	0.5%	-999	-58.59%	-3.33%
TBW	**3 GPF**	**16,487**	**13,452**	**11,355**	**9,585**	**8,090**	**6,829**	**2.5%**	**1.9%**	**1.5%**	**1.2%**	**1.0%**	**0.8%**	**-9,658**	**-58.58%**	**-3.33%**
PAS	Rebate Eligible	2,022	2,202	2,249	2,239	2,220	2,208	3.1%	3.1%	2.8%	2.5%	2.3%	2.2%	186	9.20%	0.34%
NPR	Rebate Eligible	403	383	365	346	328	313	5.6%	5.2%	4.8%	4.4%	4.2%	4.0%	-90	-22.33%	-0.97%
NWH	Rebate Eligible	2,770	2,749	2,661	2,566	2,480	2,409	6.0%	5.6%	5.2%	5.0%	4.8%	4.7%	-361	-13.03%	-0.54%
SCH	Rebate Eligible	5,335	5,518	5,570	5,486	5,388	5,334	7.8%	6.9%	6.4%	5.9%	5.6%	5.4%	-1	-0.02%	0.00%
COT	Rebate Eligible	22,647	23,040	22,676	21,856	21,036	20,356	13.2%	11.8%	10.6%	9.6%	8.9%	8.5%	-2,291	-10.12%	-0.41%
PIN	Rebate Eligible	4,189	4,139	3,980	3,783	3,602	3,449	2.3%	2.2%	2.0%	1.8%	1.7%	1.7%	-740	-17.67%	-0.74%
STP	Rebate Eligible	4,135	4,103	3,988	3,820	3,669	3,549	3.8%	3.5%	3.2%	3.0%	2.8%	2.7%	-586	-14.17%	-0.59%
TBW	**Rebate Eligible**	**41,501**	**42,135**	**41,488**	**40,096**	**38,723**	**37,618**	**6.3%**	**5.9%**	**5.4%**	**5.0%**	**4.7%**	**4.5%**	**-3,883**	**-9.36%**	**-0.38%**
PAS	Total Urinals	2,215	2,514	2,685	2,809	2,916	3,023	4.7%	5.0%	5.2%	5.3%	5.5%	5.6%	808	36.46%	1.20%
NPR	Total Urinals	448	448	448	448	448	448	1.0%	0.9%	0.9%	0.9%	0.8%	0.8%	0	0.00%	0.00%
NWH	Total Urinals	3,125	3,234	3,245	3,245	3,245	3,247	6.7%	6.5%	6.3%	6.2%	6.1%	6.0%	122	3.89%	0.15%
SCH	Total Urinals	6,115	6,671	7,119	7,444	7,742	8,075	13.1%	13.4%	13.8%	14.1%	14.5%	14.9%	1,960	32.06%	1.08%
COT	Total Urinals	25,554	27,432	28,467	28,984	29,347	29,689	54.7%	54.9%	55.1%	55.0%	54.9%	54.7%	4,135	16.18%	0.58%
PIN	Total Urinals	4,684	4,865	4,909	4,909	4,909	4,909	10.0%	9.7%	9.5%	9.3%	9.2%	9.0%	225	4.81%	0.18%
STP	Total Urinals	4,587	4,763	4,837	4,843	4,857	4,892	9.8%	9.5%	9.4%	9.2%	9.1%	9.0%	305	6.66%	0.25%
TBW	**Total Urinals**	**46,728**	**49,928**	**51,710**	**52,683**	**53,464**	**54,283**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**7,555**	**16.17%**	**0.58%**

Table 2-18
NR Market Potential and Program Penetration Rates for Toilets by WPDA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	3.5 GPF	60%	15,713	9,428	857
NPR	3.5 GPF	60%	1,999	1,199	109
NWH	3.5 GPF	60%	3,003	1,802	164
SCH	3.5 GPF	60%	4,415	2,649	241
COT	3.5 GPF	60%	17,051	10,231	930
PIN	3.5 GPF	60%	19,735	11,841	1,076
STP	3.5 GPF	60%	12,056	7,234	658
TBW	**3.5 GPF**	**60%**	**73,971**	**44,383**	**4,035**
PAS	5 GPF	60%	10,272	6,163	560
NPR	5 GPF	60%	1,901	1,140	104
NWH	5 GPF	60%	-	-	-
SCH	5 GPF	60%	-	-	-
COT	5 GPF	60%	11,688	7,013	638
PIN	5 GPF	60%	3,433	2,060	187
STP	5 GPF	60%	4,680	2,808	255
TBW	**5 GPF**	**60%**	**31,974**	**19,184**	**1,744**
PAS	Total	60%	25,985	15,591	1,417
NPR	Total	60%	3,900	2,340	213
NWH	Total	60%	3,003	1,802	164
SCH	Total	60%	4,415	2,649	241
COT	Total	60%	28,739	17,244	1,568
PIN	Total	60%	23,168	13,901	1,264
STP	Total	60%	16,736	10,042	913
TBW	**Total**	**60%**	**105,945**	**63,567**	**5,779**

Table 2-19
NR Market Potential and Program Penetration Rates for Urinals by WPDA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	3.5 GPF	60%	6,817	4,090	372
NPR	3.5 GPF	60%	873	524	48
NWH	3.5 GPF	60%	533	320	29
SCH	3.5 GPF	60%	2,083	1,250	114
COT	3.5 GPF	60%	12,458	7,475	680
PIN	3.5 GPF	60%	18,524	11,114	1,010
STP	3.5 GPF	60%	10,375	6,225	566
TBW	**3.5 GPF**	**60%**	**51,662**	**30,997**	**2,818**
PAS	5 GPF	60%	3,795	2,277	207
NPR	5 GPF	60%	655	393	36
NWH	5 GPF	60%	-	-	-
SCH	5 GPF	60%	-	-	-
COT	5 GPF	60%	2,413	1,448	132
PIN	5 GPF	60%	8,586	5,152	468
STP	5 GPF	60%	6,228	3,737	340
TBW	**5 GPF**	**60%**	**21,676**	**13,006**	**1,182**
PAS	Total	60%	10,612	6,367	579
NPR	Total	60%	1,527	916	83
NWH	Total	60%	533	320	29
SCH	Total	60%	2,083	1,250	114
COT	Total	60%	14,871	8,923	811
PIN	Total	60%	27,110	16,266	1,479
STP	Total	60%	16,602	9,961	906
TBW	**Total**	**60%**	**73,338**	**44,003**	**4,000**

2.5 Commercial Dishwashing Market Potential

Dishwashing and scullery operations are water intensive end uses and often prime candidates for efficiency improvements in commercial kitchens. The Consortium for Energy Efficiency (CEE) and U.S. EPA Energy Star have established specifications for dishwashing technologies that have significant water savings potential. The DMP considers technology improvements for two commercial dishwashing uses, dishwashers and pre-rinse spray valves (PRSV). Virtually all restaurants with dishwashing equipment will have one or more PRSV's, while strainer baskets tend to be less common. Although additional water conserving benefits are possible, nonresidential consumer preferences towards strainer baskets and the degree of market penetration are not well understood. Therefore, strainer baskets are not considered.

2.5.1 Commercial Dishwasher Incentive

Restaurant dishwashers are available in a variety of types, sizes, and flow rates. Water use reductions can be achieved by converting older inefficient machines to an Energy Star product which typically uses 40% less water than a standard dishwasher. Dishwashers are normally selected and sized based on their ability to meet the service requirements of any given food establishment. The four main types of dishwashing machines and general capacity thresholds used to estimate presence in commercial facilities include:

- under-counter (less than 60 seats)
- door type (60 to 149 seats)
- conveyer (150 to 299 seats)
- flight (300+ seats)

Under the counter and door type dishwashers can be found in small restaurants, while conveyor and flight type dishwashers are designed for higher dishwashing capacity and are more often found in larger restaurants or cafeterias.

The Florida Department of Business and Professional Regulation (DBPR) maintains a state database of restaurant information, which provides various types of geographic, service type and general occupancy data. The DBPR database separates restaurants into full service and fast-food service establishment and for the purpose of this analysis all full-service establishments are assumed to have dishwashers. Restaurant seating capacity included in DBPR data and seat-turn over assumptions obtained from literature support the estimation of peak-hour operating capacity, are used to assign a specific dishwasher type to each restaurant location. Table 2-20 provides base-year estimates of the number of locations by WPDA identified in 2014 DBPR data that are assumed to have dishwashers. DBPR data for 2014 identifies 2,911 full-service restaurants in the Tampa Bay Region. Based on seating capacity estimates, the door-type technology accounts for a majority of commercial dishwashers in the region.

According to an ENERGY STAR market report on appliance retail sales data, the average market penetration rate for ENERGY STAR commercial dishwasher installations for 2008-2010 was 78 percent.[7] In accordance with these estimates, 78 percent of dishwasher installations associated with passive replacement are assumed compliant with Energy Star standards and not considered eligible measures.

[7] Energy Star, (1998-2010). Qualified Appliance Retail Sales Data.

Table 2-20
Distribution of Commercial Dishwashers by WPDA (2014)

Dishwasher	Base Year Commercial Dishwasher Estimates								% of Total							
Type	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP
Under-Counter	799	59	11	34	64	409	119	103	27.4%	29.2%	23.9%	25.6%	26.6%	28.1%	26.0%	27.5%
Door	1,385	104	21	67	131	687	200	175	47.6%	51.5%	45.7%	50.4%	54.4%	47.2%	43.8%	46.7%
Conveyor	653	35	13	31	43	312	130	89	22.4%	17.3%	28.3%	23.3%	17.8%	21.4%	28.4%	23.7%
Flight	74	4	1	1	3	49	8	8	2.5%	2.0%	2.2%	0.8%	1.2%	3.4%	1.8%	2.1%
Total	**2,911**	**202**	**46**	**133**	**241**	**1,457**	**457**	**375**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 2-21 summarizes the market potential for each dishwasher type and the number of available associated the 11-year implementation scenario in 5-year increments. Measures available after passive replacement are estimated by assuming the nrr's provided in Table 2-22. However, given 22 percent of dishwasher installations are assumed to not comply with EnergyStar standards, these appliances are considered rebate eligible and included in the estimate of eligible measures remaining.

Table 2-23 presents the number of rebate eligible commercial dishwashers by WPDA for the base year (2014) through the end of the forecast year (2040) in 5-year increments, while Table 2-24 presents the rebate market potential and available number of rebates given an 50 percent program penetration rate.

Table 2-21
NR Commercial Dishwashers Remaining After Natural Replacement

Variable	Type	2020	2025	2030
Measures Available After Natural Replacement	Under-Counter	425	251	148
	Door	916	648	459
	Conveyor	480	371	287
	Flight	54	42	33
Natural Replacement w/ES Products (78%)	Under-Counter	292	428	508
	Door	366	575	722
	Conveyor	135	220	285
	Flight	15	25	32
Natural Replacement w/non-HE Products (22%)	Under-Counter	82	92	100
	Door	103	117	129
	Conveyor	38	43	48
	Flight	4	5	5
Eligible Measures Remaining	Under-Counter	507	371	291
	Door	1,019	810	663
	Conveyor	518	433	368
	Flight	59	49	42

Table 2-22
Commercial Dishwasher Natural Replacement Rates

Machine Type	Product Life (years)	nrr
Under Counter	10	10.0%
Door Type	15	6.6%
Conveyor	20	5.0%
Flight	20	5.0%

Table 2-23
NR Commercial Dishwashers Eligible for Rebate Incentive by WPDA (2014-2040)

WDPA	Dishwasher Type	Total Dishwashers						Percent of Total Dishwashers in WDPA[1]						Absolute Change	% Change	Annual Avg. % Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	Under-Counter DW	59	37	27	22	18	16	29.2%	25.8%	24.0%	23.1%	22.8%	23.1%	-43	-72.96%	-4.91%
NPR	Under-Counter DW	11	7	5	4	3	3	23.9%	20.8%	19.2%	18.3%	18.0%	18.3%	-8	-72.96%	-4.91%
NWH	Under-Counter DW	34	22	16	12	10	9	25.6%	22.4%	20.7%	19.8%	19.6%	19.9%	-25	-72.96%	-4.91%
SCH	Under-Counter DW	64	41	30	23	20	17	26.6%	23.4%	21.7%	20.8%	20.6%	20.9%	-47	-72.96%	-4.91%
COT	Under-Counter DW	409	301	239	196	165	143	28.1%	27.5%	27.2%	26.9%	26.7%	26.6%	-266	-65.03%	-3.96%
PIN	Under-Counter DW	119	76	55	43	36	32	26.0%	22.7%	21.0%	20.0%	19.7%	20.0%	-87	-72.96%	-4.91%
STP	Under-Counter DW	103	65	48	38	31	28	27.5%	24.1%	22.3%	21.3%	21.1%	21.4%	-75	-72.96%	-4.91%
TBW	**Under-Counter DW**	**799**	**548**	**421**	**338**	**284**	**248**	**27.4%**	**25.6%**	**24.5%**	**24.0%**	**23.8%**	**23.8%**	**-551**	**-68.90%**	**-4.39%**
PAS	Door DW	104	77	61	50	42	36	51.5%	52.8%	53.3%	53.4%	53.2%	52.8%	-68	-65.03%	-3.96%
NPR	Door DW	21	15	12	10	8	7	45.7%	46.1%	46.0%	45.8%	45.5%	45.1%	-14	-65.03%	-3.96%
NWH	Door DW	67	49	39	32	27	23	50.4%	51.2%	51.4%	51.3%	51.0%	50.7%	-44	-65.03%	-3.96%
SCH	Door DW	131	96	77	63	53	46	54.4%	55.6%	56.0%	56.0%	55.8%	55.4%	-85	-65.03%	-3.96%
COT	Door DW	687	505	402	329	277	240	47.2%	46.3%	45.6%	45.2%	44.9%	44.7%	-447	-65.03%	-3.96%
PIN	Door DW	200	147	117	96	81	70	43.8%	44.3%	44.3%	44.1%	43.8%	43.5%	-130	-65.03%	-3.96%
STP	Door DW	175	129	102	84	71	61	46.7%	47.5%	47.7%	47.6%	47.3%	47.0%	-114	-65.03%	-3.96%
TBW	**Door DW**	**1385**	**1019**	**810**	**663**	**558**	**484**	**47.6%**	**47.5%**	**47.3%**	**47.0%**	**46.7%**	**46.5%**	**-901**	**-65.03%**	**-3.96%**
PAS	Conveyor DW	35	28	23	20	17	15	17.3%	19.2%	20.3%	21.1%	21.5%	21.6%	-20	-57.45%	-3.23%
NPR	Conveyor DW	13	10	9	7	6	6	28.3%	30.8%	32.3%	33.4%	33.9%	34.0%	-7	-57.45%	-3.23%
NWH	Conveyor DW	31	25	21	17	15	13	23.3%	25.6%	27.0%	27.9%	28.4%	28.5%	-18	-57.45%	-3.23%
SCH	Conveyor DW	43	34	29	24	21	18	17.8%	19.7%	20.8%	21.6%	22.1%	22.1%	-25	-57.45%	-3.23%
COT	Conveyor DW	312	248	207	176	152	133	21.4%	22.7%	23.5%	24.1%	24.5%	24.7%	-179	-57.45%	-3.23%
PIN	Conveyor DW	130	103	86	73	63	55	28.4%	31.1%	32.7%	33.8%	34.3%	34.4%	-75	-57.45%	-3.23%
STP	Conveyor DW	89	71	59	50	43	38	23.7%	26.1%	27.5%	28.5%	29.0%	29.1%	-51	-57.45%	-3.23%
TBW	**Conveyor DW**	**653**	**518**	**433**	**368**	**317**	**278**	**22.4%**	**24.2%**	**25.3%**	**26.1%**	**26.5%**	**26.7%**	**-375**	**-57.45%**	**-3.23%**
PAS	Flight DW	4	3	3	2	2	2	2.0%	2.2%	2.3%	2.4%	2.5%	2.5%	-2	-57.45%	-3.23%
NPR	Flight DW	1	1	1	1	0	0	2.2%	2.4%	2.5%	2.6%	2.6%	2.6%	-1	-57.45%	-3.23%
NWH	Flight DW	1	1	1	1	0	0	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	-1	-57.45%	-3.23%
SCH	Flight DW	3	2	2	2	1	1	1.2%	1.4%	1.5%	1.5%	1.5%	1.5%	-2	-57.45%	-3.23%
COT	Flight DW	49	39	33	28	24	21	3.4%	3.6%	3.7%	3.8%	3.9%	3.9%	-28	-57.45%	-3.23%
PIN	Flight DW	8	6	5	5	4	3	1.8%	1.9%	2.0%	2.1%	2.1%	2.1%	-5	-57.45%	-3.23%
STP	Flight DW	8	6	5	5	4	3	2.1%	2.3%	2.5%	2.6%	2.6%	2.6%	-5	-57.45%	-3.23%
TBW	**Flight DW**	**74**	**59**	**49**	**42**	**36**	**31**	**2.5%**	**2.7%**	**2.9%**	**3.0%**	**3.0%**	**3.0%**	**-43**	**-57.45%**	**-3.23%**
PAS	Total	202	145	114	93	79	69	6.9%	6.8%	6.7%	6.6%	6.6%	6.6%	-133	-65.88%	-4.05%
NPR	Total	46	34	27	22	19	16	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	-30	-64.62%	-3.92%
NWH	Total	133	96	76	62	53	46	4.6%	4.5%	4.4%	4.4%	4.4%	4.4%	-87	-65.23%	-3.98%
SCH	Total	241	173	137	112	95	83	8.3%	8.1%	8.0%	7.9%	7.9%	7.9%	-158	-65.69%	-4.03%
COT	Total	1457	1093	881	728	617	537	50.1%	51.0%	51.4%	51.6%	51.6%	51.5%	-920	-63.15%	-3.77%
PIN	Total	457	332	264	217	184	161	15.7%	15.5%	15.4%	15.4%	15.4%	15.4%	-296	-64.80%	-3.94%
STP	Total	375	271	215	176	149	130	12.9%	12.6%	12.5%	12.5%	12.5%	12.5%	-245	-65.24%	-3.98%
TBW	**Total**	**2911**	**2144**	**1714**	**1410**	**1195**	**1042**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**-1,869**	**-64.20%**	**-3.87%**

[1] Percent of WDPA Total DW reflects percent of regional total.

Table 2-24
Market Potential and Program Penetration Rates for Rebate Eligible Dishwashers by WDPA (2030)

WDPA	Variable	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	Under-Counter	50%	22	11	1
NPR	Under-Counter	50%	4	2	0
NWH	Under-Counter	50%	12	6	1
SCH	Under-Counter	50%	23	12	1
COT	Under-Counter	50%	196	98	9
PIN	Under-Counter	50%	43	22	2
STP	Under-Counter	50%	38	19	2
TBW	**Under-Counter**	**50%**	**338**	**169**	**15**
PAS	Door	50%	50	25	2
NPR	Door	50%	10	5	0
NWH	Door	50%	32	16	1
SCH	Door	50%	63	31	3
COT	Door	50%	329	164	15
PIN	Door	50%	96	48	4
STP	Door	50%	84	42	4
TBW	**Door**	**50%**	**663**	**331**	**30**
PAS	Conveyor	50%	20	10	1
NPR	Conveyor	50%	7	4	0
NWH	Conveyor	50%	17	9	1
SCH	Conveyor	50%	24	12	1
COT	Conveyor	50%	176	88	8
PIN	Conveyor	50%	73	37	3
STP	Conveyor	50%	50	25	2
TBW	**Conveyor**	**50%**	**368**	**184**	**17**
PAS	Flight	50%	2	1	0
NPR	Flight	50%	1	0	0
NWH	Flight	50%	1	0	0
SCH	Flight	50%	2	1	0
COT	Flight	50%	28	14	1
PIN	Flight	50%	5	2	0
STP	Flight	50%	5	2	0
TBW	**Flight**	**50%**	**42**	**21**	**2**
PAS	Total	50%	93	47	4
NPR	Total	50%	22	11	1
NWH	Total	50%	62	31	3
SCH	Total	50%	112	56	5
COT	Total	50%	728	364	33
PIN	Total	50%	217	108	10
STP	Total	50%	176	88	8
TBW	**Total**	**50%**	**1410**	**705**	**64**

2.5.2 Pre-Rinse Spray Valve Incentive

Pre-rinse spray valves save water in restaurants by controlling water flow in sprayers that rinse food waste from utensils and dishware before they enter a dishwasher. Under normal operating conditions, low-flow, pre-spray valves can reduce flow rates by 46 percent, from an average of 3 gpm to 1.6 gpm for existing spray valves.[8] Newer WaterSense labeled PRSV's use as little as 1.0 gpm but are rated at 1.28 gpm or less. WaterSense research indicates participants are generally satisfied with HE PRSV water use ranging between 1.0 and 1.25 gpm.

All 2,911 full-service restaurant locations assumed to have dishwashers were also assumed to have a pre-rinse spray valve (PRSV). Table 2-25 provides the projected number of PRSVs for the base year (2014) through the end of the forecast year (2040) in 5-year increments. Measures available after passive efficiency are calculated by assuming a 10 percent nrr (10-year).[9] After passive efficiency. 1,640 PRSV's are estimated to be eligible for retrofit in 2014. Table 2-26 summarizes the market potential, and number of available interventions associated with improving the operational efficiency of 50 percent of the number of PRSVs in the region prior to 2030.

Recent information provided by EPA WaterSense indicates new standards being applied to PRSV's will effectively eliminate the WaterSense labeling for this product in the near future. This will not affect the existing stock of products that can be retrofitted through an active and tracked program. Future stocks will be affected. Secondarily, some Tampa Bay Water Member Governments have been giving away fixtures in the region but not tracking their installation nor providing information to Tampa Bay Water on their locational existence. These are not accounted for in this evaluation.

[8] Consortium for Energy Efficiency, (2008). Commercial Kitchens Initiative.
[9] AWE Tracking Tool v2, CII Kitchen Spray Rinse Valve Replacements default.

Table 2-25
NR PRSVs Eligible for Rebate Incentive by WPDA (2014-2040)

	Total PRSVs						Percent of Total PRSVs						Absolute	%	Annual Avg%
WDPA	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040	Change	Change	Change
PAS	202	145	114	93	79	69	6.9%	6.8%	6.7%	6.6%	6.6%	6.6%	-133	65.88%	-4.05%
NPR	46	34	27	22	19	16	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	-30	64.62%	-3.92%
NWH	133	96	76	62	53	46	4.6%	4.5%	4.4%	4.4%	4.4%	4.4%	-87	65.23%	-3.98%
SCH	241	173	137	112	95	83	8.3%	8.1%	8.0%	7.9%	7.9%	7.9%	-158	65.69%	-4.03%
COT	1,457	1,093	881	728	617	537	50.1%	51.0%	51.4%	51.6%	51.6%	51.5%	-920	63.15%	-3.77%
PIN	457	332	264	217	184	161	15.7%	15.5%	15.4%	15.4%	15.4%	15.4%	-296	64.80%	-3.94%
STP	375	271	215	176	149	130	12.9%	12.6%	12.5%	12.5%	12.5%	12.5%	-245	65.24%	-3.98%
TBW	2,911	2,144	1,714	1,410	1,195	1,042	100%	100%	100%	100%	100%	100%	-1,869	64.20%	-3.87%

Table 2-26
Market Potential and Program Penetration Rates for Eligible PRSVs by WPDA (2030))

WDPA	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	50%	114	57	5
NPR	50%	26	13	1
NWH	50%	75	37	3
SCH	50%	136	68	6
COT	50%	821	410	37
PIN	50%	257	129	12
STP	50%	211	106	10
TBW	50%	1640	820	75

2.6 Cooling Tower Market Potential

Cooling towers remove heat from buildings generated by computers, lights, people, and other operations. However, many industrial processes also require chilled water to cool the equipment being used in the process itself. Heat is typically removed by a central refrigeration system and compressor, which may be either air-cooled or water-cooled. Water cooled, or chilled water systems are connected with a circulating loop to a cooling tower.

Cycles of concentration (COC) defines the accumulation of dissolved minerals (e.g. chlorides, total dissolved solids (TDS) or calcium) as number of times the tower water is concentrated over that of the makeup water. As water loss occurs through evaporation and drift, most contaminants are left behind thus increasing the dissolved mineral concentration of the tower water. Water use occurs as makeup water is added to compensate for water losses in a system, or as a result of cooling tower blowdown (i.e. discharge or bleed-off), a process which removes a portion of the concentrated water from the cooling tower and replaces it with makeup water. By increasing the COC, the amount of supplemental make-up water needed to operate the cooling tower efficiently is reduced. COC's can be optimized and increased based on tracking of pertinent water quality data, and through use of conductivity controllers. High-efficiency drift eliminators that reduce drift loss are available and may yield considerable savings.

Cooling tower market potential is based on an estimation procedure which considers multifamily and nonresidential properties with buildings greater than four stories or having more than 25,000 ft^2 of heated area in 2014. In addition to the 569 cooling towers identified in the 2013 DMP update, new properties meeting these initial criteria were identified and underwent a virtual visual verification process which positively identified an additional three cooling towers. While more are likely to exist, they could not be verified at this time through processes employed herein.

Given conversations with national/local experts and local nonresidential surveys on cooling tower water use conducted by member governments, all cooling towers in the region are assumed to operate at approximately 2.5 COC's at best, while 6 COC's or more may be possible. Taking these estimates into account, the average savings rates established for cooling towers in the 2013 DMP was based on the estimated median water savings associated with moving identified cooling towers from 2.5 to 6 COC's. These water savings estimates were carried forward and applied in the 2018 DMP update. It is anticipated COC's will be optimized through use of conductivity controllers as well as a combination of other program requirements including increased metering and tracking of water quality data.

Table 2-27 provides the total number of cooling towers identified for the base year (2014) through the end of the forecast year (2040) in 5-year increments. The base year estimate of 572 cooling towers is assumed to increase at the same rate as nonresidential accounts, resulting in 627 potential rebate eligible cooling towers by 2040. More than 50 percent of eligible measures are located within the city of Tampa, followed by 21 percent in Pinellas and 16 percent in St. Petersburg. Table 2-30 summarizes the market potential, and number of available interventions associated with improving the operational efficiency of 20 percent of the number of cooling towers in the region prior to 2030.

Table 2-27
NR Cooling Towers Eligible for Rebate Incentive by WPDA (2014-2040)

	Total Cooling Towers						Percent of Total						Absolute	%	Annual
WDPA	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040	Change	Change	Avg% Change
PAS	20	22	24	25	26	27	3.5%	3.7%	3.8%	4.0%	4.2%	4.3%	7	35.36%	1.17%
NPR	5	5	4	4	4	4	0.9%	0.8%	0.7%	0.7%	0.6%	0.6%	-1	-25.84%	-1.14%
NWH	18	18	18	18	18	18	3.1%	3.0%	2.9%	2.9%	2.9%	2.9%	0	0.22%	0.01%
SCH	17	20	22	23	25	26	3.0%	3.3%	3.5%	3.8%	4.0%	4.2%	9	55.75%	1.72%
COT	292	306	318	323	325	328	51.0%	51.2%	51.8%	52.2%	52.4%	52.3%	36	12.31%	0.45%
PIN	126	130	131	129	128	128	22.0%	21.8%	21.3%	20.9%	20.6%	20.4%	2	1.43%	0.05%
STP	94	97	98	97	96	96	16.4%	16.3%	15.9%	15.6%	15.4%	15.3%	2	2.00%	0.08%
TBW	**572**	**597**	**613**	**619**	**622**	**627**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**55**	**9.60%**	**0.35%**

Table 2-28
Market Potential and Program Penetration Rates for Eligible Cooling Towers by WPDA (2030)

WDPA	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	20%	25	5	0
NPR	20%	4	1	0
NWH	20%	18	4	0
SCH	20%	23	5	0
COT	20%	323	65	6
PIN	20%	129	26	2
STP	20%	97	19	2
TBW	**20%**	**619**	**124**	**11**

2.7 Landscape Irrigation Market Potential

In general, outdoor conservation programs can offer substantial water savings when properly planned and implemented. However, the results of several analyses conducted for the 2013 DMP suggest unintended consequences, such as directing a customer to use more water than they did prior the intervention, can occur when programs are offered through non-targeted promotion. Consequently, it is imperative these programs are undertaken with specific focus on users or areas having opportunity to increase conservation efficiency.

Landscape irrigation programs offer financial incentives and behavioral guidance intended to reduce outdoor water use. The 2018 DMP considers four separate single-family landscape and irrigation programs:

- Soil Moisture Sensor (SMS) and Evapotranspiration (ET) Irrigation Controllers
- Florida Water Star (FWS)/Florida Friendly Landscape (FFL) Incentives
- Alternative Landscape Irrigation
- Irrigation Evaluations

Multifamily and nonresidential landscape irrigation programs are not considered as part of the 2018 DMP due to difficulties associated with quantification of the potential number of measures available and water savings. Although potential landscape programs are likely tailorable for all sectors, water use practices of multifamily and nonresidential customers tend to be extremely heterogeneous. This makes it difficult to produce reliable estimates generally applicable to a broad segment of users.

Estimation of market potential for outdoor programs was implemented with the following primary objectives:

1. Identification of irrigators
2. Estimation of seasonal landscape water use
3. Estimation of landscape water requirements
4. Identification of surplus/deficit irrigators

These estimates were generated through analysis of customer parcel data, water consumption records[10], Census Tract precipitation and UF research. Assumptions provided in Table 2-29 are taken from are taken from UF EDIS AE481[11] and AE 482[12] publications to support estimation of LWR per square foot of irrigated area.

[10] Estimates are calculated annually and then averaged across 2011-2013. Excludes customers characterized as having extreme water use, negative water use, less than 365 days of consumption, a wholesale account or reclaimed water.

[11] UF EDIS, (2011). Net Irrigation Requirements for Florida Turfgrass Lawns: Part 2 - Reference Evapotranspiration Calculation, AE481.

[12] UF, EDIS, (2011). Net Irrigation Requirements for Florida Turfgrass Lawns: Part 3 - Theoretical Irrigation Requirements, AE482.

Table 2-29
Landscape Water Requirement Assumptions

RTM	ET_o	K_L	R	R_e	R_{pe}	C_u
Runtime Multiplier	Reference ET	Landscape Coefficient	Annual Precipitation	Effective Precipitation (In/Yr)	% Effective Precipitation	Conversion Factor
1.0	59.5	0.69	48.4	13.6	0.28	1.6043

Reference ET (ET_o) reflects IFAS AE481 (Tables 3 and 6) values for Tampa, while percent effective precipitation (R_{pe}) is derived as the dividend of effective precipitation (R_e) and annual rainfall (R) taken from IFAS AE482 (Table 4). The landscape coefficient (K_L) is calculated as the sum of monthly turf grass irrigation requirements (AE 482 Table 4) divided by ET_o. Because the entire water requirement of the landscape is consistent with that of turfgrass, and in order to compensate for the lack of separate K_L for non-turfgrass landscape areas with lower water requirements, irrigation efficiency (a value representing the amount of water beneficially applied divided by the total water applied) and thus the run-time multiplier (RTM) are estimated at 100 percent efficiency. Initial estimates associated with LWR are estimated in terms of water use per square foot of irrigated area and then converted to gallons per year (gpy) using conversion factor C_u and in turn to gpd by dividing by 365 days.

The complete multistep process was implemented at a parcel level as follows:

1. **Irrigators** are assumed to use more than 10 percent of their annual average consumption during the months of April, May and June and identified as follows:
    - Calculate annual average gallons per unit day (GPUD)
    - Calculate April, May and June (AMJ) average GPUD
    - Calculate ratio of AMJ GPUD to annual GPUD (>1.10 identifies an irrigator)
2. **Seasonal landscape use** is estimated as the difference in annual and minimum month water use as follows:
    - Calculate MIN GPUD
    - Calculate difference in annual GPUD and min GPUD
3. **Theoretical landscape water requirements** are estimated for irrigators using Equation 2-1, which can be summarized as follows:
    - Calculate theoretical total moisture requirements
    - Calculate parcel level effective precipitation
    - Normalize this value to per unit day terms by dividing by 365
4. **Surplus and deficit irrigators** are identified relative to the seasonal water use and theoretical landscape water requirements calculated for each parcel where
    - Deficit irrigator estimated irrigation use is equal or less than theoretical LWR
    - Surplus irrigators estimated irrigation use exceeds theoretical LWR

Equation 2-1:

$$LWR = RTM \times \left[(ET_o \times K_L) - (R_{CT}\, x\, R_{pe})\right] \times A * C_u$$

Where

LWR	=	Landscape water requirement (gpy)
RTM	=	Run-time multiplier (inverse of irrigation efficiency)
ET_o	=	Reference evapotranspiration in inches per year
K_L	=	Landscape coefficient for the dominant plant type
R_{CT}	=	Census Tract precipitation in inches per year
R_{pe}	=	Percent effective precipitation
A	=	Greenspace estimate in square feet
C_u	=	Conversion factor to express LWR in gpy

Table 2-30 provides the estimated proportions of irrigators, non-irrigators, surplus irrigators and deficit irrigator identified for existing customers between 2011 and 2013. These estimates are used to identify base year estimates and projections of households potentially eligible for participation in one of the various landscape incentive programs. Table 2-31 presents the WDPA base year estimates for each household type, while Table 2-32 provides regional estimates for the base year (2014) through the end of the forecast year (2040) in 5-year increments. WDPA level projections are provided in Appendix B (Tables B-1 to B-7).

Table 2-30
Estimated SF Surplus and Deficit Irrigators for Sample Households (2011-2013)

Variable	Estimate
Total Customers	358,994
Total Irrigators	143,906
Non-Irrigators	215,088
Surplus Irrigators	26,379
Deficit Irrigators	117,527
% Total Irrigators	40.1%
% Non-Irrigators	59.9%
% Surplus Irrigators	18.3%
% Deficit Irrigators	81.7%

Table 2-31
Estimated SF Surplus and Deficit Irrigators by WDPA (2014)

Household Type	Base Year (2014)								% of Total							
	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW	PAS	NPR	NWH	SCH	COT	PIN	STP
Total Homes	475,014	74,523	6,097	44,729	87,260	100,918	88,817	72,670	100%	100%	100%	100%	100%	100%	100%	100%
Irrigators	190,433	29,876	2,444	17,932	34,983	40,458	35,607	29,133	40.1%	40.1%	40.1%	40.1%	40.1%	40.1%	40.1%	40.1%
Surplus Irrigators	34,906	5,476	448	3,287	6,412	7,416	6,527	5,340	18.3%	18.3%	18.3%	18.3%	18.3%	18.3%	18.3%	18.3%
Deficit Irrigators	155,527	24,400	1,996	14,645	28,570	33,042	29,080	23,793	81.7%	81.7%	81.7%	81.7%	81.7%	81.7%	81.7%	81.7%

Table 2-32
Regional SF Surplus and Deficit Irrigator Projections

Household Type	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg. % Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	475,014	530,830	575,019	615,248	653,424	692,413	100%	100%	100%	100%	100%	100%	217,398	45.77%	1.46%
Cumulative New Homes	0	55,815	100,005	140,234	178,410	217,398	0%	10.5%	17.4%	22.8%	27.3%	31.4%	217,398	100.00%	NA
Irrigators	190,433	221,590	265,779	306,008	344,184	383,173	40.1%	41.7%	46.2%	49.7%	52.7%	55.3%	192,739	101.21%	2.73%
Surplus Irrigators	34,906	40,617	48,717	56,091	63,089	70,236	18.3%	18.3%	18.3%	18.3%	18.3%	18.3%	35,329	101.21%	2.73%
Deficit Irrigators	155,527	180,972	217,062	249,917	281,095	312,937	81.7%	81.7%	81.7%	81.7%	81.7%	81.7%	157,410	101.21%	2.73%

2.7.1 Soil Moisture Sensor (SMS) and Evapotranspiration (ET) Irrigation Controller Incentive

SMS and ET irrigation controllers eliminate excessive landscape water use by reducing irrigation rates towards theoretical landscape water requirements (LWR). Various research studies conducted by the UF indicate ET controllers have the potential to produce water savings (without sacrificing landscape quality) when prior irrigation habits result in excess landscape water use.

The evaluation process for this program considers all new homes eligible for an incentive, although it could be offered to existing users as well (not analyzed here). Table 2-33 provides the estimates of rebate eligible new homes for the base year (2014) through the end of the forecast year (2040) in 5-year increments. By 2040, more than a third of total single-family housing will have been constructed since 2014, with a majority of this construction occurring in South Central Hillsborough, Tampa and Pasco county. Table 2-34 summarizes the market potential, and number of available interventions for new homes associated with the 11-year implementation scenario. Given more than 140,000 new homes are projected to be built by 2030 and an 8.5 percent program penetration rate, it is estimated for more than 1,000 incentives can be offered annually.

2.7.2 Florida Water Star/Florida Friendly Landscape Incentive

FWS is a water conservation certification program for new and existing homes and commercial developments. The FWS Program was developed by the St. Johns River Water Management District in 2006 and became a statewide program in 2012. The certification program includes standards and guidelines for water efficiency for:

- Indoor fixtures and appliances
- Landscape design
- Irrigation systems

The FWS/FFL Incentive program replaces the Landscape and Irrigation Modification Program previously considered under the 2013 DMP. Similar to the SMS and ET Controller Incentive program, the FWS/FFL Incentive program generally targets new homes. Table 2-35 provides the estimates of rebate eligible new homes for the base year (2014) through the end of the forecast year (2040) in 5-year increments, while Table 2-36 summarizes the market potential, and number of available interventions associated with the 11-year implementation scenario at an 8.5 percent program penetration rate. Collectively, the SMS and ET Controller and FWS/FFL Incentive programs developed in this analysis targets more than 17 percent of new home construction, potentially reaching more than 24,000 homes over the targeted 11-year implementation scenario

Table 2-33
SF New Homes Eligible for ET/SMS Controller Incentives by WDPA (2014-2040)

WDPA	Type	Total						Percent of Total SF Homes in WDPA[1]						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	New Homes	0	17,826	28,166	35,926	43,870	52,185	0.0%	19.3%	27.4%	32.5%	37.1%	41.2%	52,185	100%	NA
NPR	New Homes	0	401	543	527	552	629	0.0%	6.2%	8.2%	8.0%	8.3%	9.3%	629	100%	NA
NWH	New Homes	0	3,397	6,869	9,999	12,628	15,396	0.0%	7.1%	13.3%	18.3%	22.0%	25.6%	15,396	100%	NA
SCH	New Homes	0	17,102	31,372	45,040	57,553	70,415	0.0%	16.4%	26.4%	34.0%	39.7%	44.7%	70,415	100%	NA
COT	New Homes	0	11,673	24,660	36,898	47,860	59,122	0.0%	10.4%	19.6%	26.8%	32.2%	36.9%	59,122	100%	NA
PIN	New Homes	0	2,367	3,989	5,839	7,981	9,862	0.0%	2.6%	4.3%	6.2%	8.2%	10.0%	9,862	100%	NA
STP	New Homes	0	3,049	4,406	6,006	7,964	9,790	0.0%	4.0%	5.7%	7.6%	9.9%	11.9%	9,790	100%	NA
TBW	**New Homes**	**0**	**55,815**	**100,005**	**140,234**	**178,410**	**217,398**	**0.0%**	**10.5%**	**17.4%**	**22.8%**	**27.3%**	**31.4%**	**217,398**	**100%**	**NA**
PAS	Total SF Homes	74,523	92,349	102,689	110,449	118,393	126,708	15.7%	17.4%	17.9%	18.0%	18.1%	18.3%	52,185	70.03%	2.06%
NPR	Total SF Homes	6,097	6,498	6,641	6,624	6,649	6,726	1.3%	1.2%	1.2%	1.1%	1.0%	1.0%	629	10.31%	0.38%
NWH	Total SF Homes	44,729	48,125	51,597	54,727	57,356	60,124	9.4%	9.1%	9.0%	8.9%	8.8%	8.7%	15,396	34.42%	1.14%
SCH	Total SF Homes	87,260	104,362	118,632	132,300	144,814	157,675	18.4%	19.7%	20.6%	21.5%	22.2%	22.8%	70,415	80.70%	2.30%
COT	Total SF Homes	100,918	112,592	125,578	137,816	148,779	160,040	21.2%	21.2%	21.8%	22.4%	22.8%	23.1%	59,122	58.58%	1.79%
PIN	Total SF Homes	88,817	91,184	92,806	94,656	96,799	98,679	18.7%	17.2%	16.1%	15.4%	14.8%	14.3%	9,862	11.10%	0.41%
STP	Total SF Homes	72,670	75,719	77,076	78,676	80,634	82,460	15.3%	14.3%	13.4%	12.8%	12.3%	11.9%	9,790	13.47%	0.49%
TBW	Total SF Homes	475,014	530,830	575,019	615,248	653,424	692,413	100%	100%	100%	100%	100%	100%	217,398	45.77%	1.46%

[1] Percent of Total SF Homes reflects percent of regional (TBW) total.

Table 2-34
Market Potential and Program Penetration Rates for ET/SMS Controller Incentives by WDPA (2030)

WDPA	Type	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	New Homes	8.5%	35,926	3,054	278
NPR	New Homes	8.5%	527	45	4
NWH	New Homes	8.5%	9,999	850	77
SCH	New Homes	8.5%	45,040	3,828	348
COT	New Homes	8.5%	36,898	3,136	285
PIN	New Homes	8.5%	5,839	496	45
STP	New Homes	8.5%	6,006	510	46
TBW	New Homes	8.5%	140,234	11,920	1,084

Table 2-35
SF New Homes Eligible for FWS/FFL Incentives by WPDA (2014-2040)

WDPA	Type	Total						Percent of Total SF Homes in WDPA[1]						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	New Homes	0	17,826	28,166	35,926	43,870	52,185	0.0%	19.3%	27.4%	32.5%	37.1%	41.2%	52,185	100%	NA
NPR	New Homes	0	401	543	527	552	629	0.0%	6.2%	8.2%	8.0%	8.3%	9.3%	629	100%	NA
NWH	New Homes	0	3,397	6,869	9,999	12,628	15,396	0.0%	7.1%	13.3%	18.3%	22.0%	25.6%	15,396	100%	NA
SCH	New Homes	0	17,102	31,372	45,040	57,553	70,415	0.0%	16.4%	26.4%	34.0%	39.7%	44.7%	70,415	100%	NA
COT	New Homes	0	11,673	24,660	36,898	47,860	59,122	0.0%	10.4%	19.6%	26.8%	32.2%	36.9%	59,122	100%	NA
PIN	New Homes	0	2,367	3,989	5,839	7,981	9,862	0.0%	2.6%	4.3%	6.2%	8.2%	10.0%	9,862	100%	NA
STP	New Homes	0	3,049	4,406	6,006	7,964	9,790	0.0%	4.0%	5.7%	7.6%	9.9%	11.9%	9,790	100%	NA
TBW	**New Homes**	**0**	**55,815**	**100,005**	**140,234**	**178,410**	**217,398**	**0.0%**	**10.5%**	**17.4%**	**22.8%**	**27.3%**	**31.4%**	**217,398**	**100%**	**NA**
PAS	Total SF Homes	74,523	92,349	102,689	110,449	118,393	126,708	15.7%	17.4%	17.9%	18.0%	18.1%	18.3%	52,185	70.03%	2.06%
NPR	Total SF Homes	6,097	6,498	6,641	6,624	6,649	6,726	1.3%	1.2%	1.2%	1.1%	1.0%	1.0%	629	10.31%	0.38%
NWH	Total SF Homes	44,729	48,125	51,597	54,727	57,356	60,124	9.4%	9.1%	9.0%	8.9%	8.8%	8.7%	15,396	34.42%	1.14%
SCH	Total SF Homes	87,260	104,362	118,632	132,300	144,814	157,675	18.4%	19.7%	20.6%	21.5%	22.2%	22.8%	70,415	80.70%	2.30%
COT	Total SF Homes	100,918	112,592	125,578	137,816	148,779	160,040	21.2%	21.2%	21.8%	22.4%	22.8%	23.1%	59,122	58.58%	1.79%
PIN	Total SF Homes	88,817	91,184	92,806	94,656	96,799	98,679	18.7%	17.2%	16.1%	15.4%	14.8%	14.3%	9,862	11.10%	0.41%
STP	Total SF Homes	72,670	75,719	77,076	78,676	80,634	82,460	15.3%	14.3%	13.4%	12.8%	12.3%	11.9%	9,790	13.47%	0.49%
TBW	**Total SF Homes**	**475,014**	**530,830**	**575,019**	**615,248**	**653,424**	**692,413**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**217,398**	**45.77%**	**1.46%**

[1] Percent of Total SF Homes reflects percent of regional (TBW) total

Table 2-36
Market Potential and Program Penetration Rates for FWS/FFL Incentives by WDPA (2030)

WDPA	Type	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	New Homes	8.5%	35,926	3,054	278
NPR	New Homes	8.5%	527	45	4
NWH	New Homes	8.5%	9,999	850	77
SCH	New Homes	8.5%	45,040	3,828	348
COT	New Homes	8.5%	36,898	3,136	285
PIN	New Homes	8.5%	5,839	496	45
STP	New Homes	8.5%	6,006	510	46
TBW	New Homes	8.5%	140,234	11,920	1,084

2.7.3 Alternative Landscape Irrigation Incentive

Alternative irrigation sources reduce or eliminate outdoor potable water use through non-descriptive but reliable outdoor source modification. Examples of alternative sources for this analysis may include irrigation wells, reclaimed water or even harvested rainwater. Both irrigation wells and reclaimed water programs have been implemented successfully by Tampa Bay Water member governments. While alternative irrigation source programs present substantial savings opportunities for most regular users of automatic irrigation systems, it is assumed customers most likely to invest in such technology are those with water use equal to or greater than upper quartile deficit irrigators (DQ3), or the top 25 percent of irrigators using less than their theoretical LWR. Expanding an alternative incentive program to include irrigators using less than that of the 258 gpd DQ3 irrigation average was found to not be cost-effective. Thus, the market potential and savings estimates for this program are based on analysis of DQ3 irrigators.

Table 2-37 provides the estimates of rebate eligible DQ3 irrigators for the base year (2014) through the end of the forecast year (2040) in 5-year increments, while Table 2-38 summarizes the market potential, and number of available interventions associated with the 11-year implementation scenario at a 13 percent program penetration rate. By 2040, DQ3 irrigators are estimated to increase by more than 100 percent and comprise approximately 10 percent of total single-family homes regionally, ranging from 8.6 to 11.2 percent across WDPA's.

2.7.4 Irrigation Evaluations Incentive

Irrigation System Evaluation (ISE) programs provide landscape-specific irrigation schedules and recommendations to improve the performance and technological efficiency of automated irrigation. ISE's have been offered in the Northwest Hillsborough, South Central Hillsborough, City of Tampa, and St. Petersburg WDPAs. As discussed in Section 3 of the 2013 DMP, member government ISE programs were assessed for effectiveness in reducing water use at individual participating locations. The results of the analyses indicated that water savings from ISEs range from 6.9-7.4 percent in the year following the evaluation. Overall, the vast majority (68%) of ISE participants were estimated to be deficit irrigators prior to having an evaluation and this group on average used about 233 gpd (84,992 gpy) less than their estimated average LWR's. Analysis of pre and post participation water use showed that on average, deficit irrigators reduced outdoor water demand by approximately 8 percent. However, some deficit participants actually increased their water use to the extent to be classified as surplus irrigators subsequent to the program. However, as a group, surplus irrigators reduced water use by nearly 30 percent or 50,898 gpy from pre-program averages and therefore ISE market potential and savings estimates focuses entirely on estimated impacts on surplus irrigators only.

Table 2-39 provides the estimates of rebate eligible surplus irrigators for the base year (2014) through the end of the forecast year (2040) in 5-year increments. Similar to DQ3 irrigators (top 25% of irrigators using less than their theoretical LWR), surplus irrigators are estimated to increase by more than 100 percent by 2040 and comprise approximately 10 percent of total single-family homes regionally, ranging from 7.4 to 11.4 percent across WDPA's. Table 2-40 summarizes the market potential and number of available interventions associated with the targeted 11-year implementation scenario and 5 percent program penetration rate.

Table 2-37
SF Rebate DQ3 Irrigators Eligible for Alternative Landscape Irrigation Incentives by WPDA (2014-2040)

WDPA	Type	Total						Percent of Total SF Homes in WDPA[1]						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	DQ3 Irrigators	6,100	8,021	10,132	11,716	13,338	15,036	8.2%	8.7%	9.9%	10.6%	11.3%	11.9%	8,936	146.49%	3.53%
NPR	DQ3 Irrigators	499	541	570	567	572	587	8.2%	8.3%	8.6%	8.6%	8.6%	8.7%	88	17.70%	0.63%
NWH	DQ3 Irrigators	3,661	4,069	4,778	5,417	5,954	6,519	8.2%	8.5%	9.3%	9.9%	10.4%	10.8%	2,858	78.06%	2.24%
SCH	DQ3 Irrigators	7,143	9,093	12,007	14,797	17,352	19,978	8.2%	8.7%	10.1%	11.2%	12.0%	12.7%	12,836	179.70%	4.04%
COT	DQ3 Irrigators	8,261	9,715	12,367	14,865	17,104	19,403	8.2%	8.6%	9.8%	10.8%	11.5%	12.1%	11,142	134.88%	3.34%
PIN	DQ3 Irrigators	7,270	7,542	7,873	8,251	8,689	9,073	8.2%	8.3%	8.5%	8.7%	9.0%	9.2%	1,803	24.79%	0.86%
STP	DQ3 Irrigators	5,948	6,262	6,539	6,866	7,266	7,639	8.2%	8.3%	8.5%	8.7%	9.0%	9.3%	1,690	28.42%	0.97%
TBW	**DQ3 Irrigators**	**38,882**	**45,243**	**54,265**	**62,479**	**70,274**	**78,234**	**8.2%**	**8.5%**	**9.4%**	**10.2%**	**10.8%**	**11.3%**	**39,353**	**101.21%**	**2.73%**
PAS	Total SF Homes	74,523	92,349	102,689	110,449	118,393	126,708	15.7%	17.4%	17.9%	18.0%	18.1%	18.3%	52,185	70.03%	2.06%
NPR	Total SF Homes	6,097	6,498	6,641	6,624	6,649	6,726	1.3%	1.2%	1.2%	1.1%	1.0%	1.0%	629	10.31%	0.38%
NWH	Total SF Homes	44,729	48,125	51,597	54,727	57,356	60,124	9.4%	9.1%	9.0%	8.9%	8.8%	8.7%	15,396	34.42%	1.14%
SCH	Total SF Homes	87,260	104,362	118,632	132,300	144,814	157,675	18.4%	19.7%	20.6%	21.5%	22.2%	22.8%	70,415	80.70%	2.30%
COT	Total SF Homes	100,918	112,592	125,578	137,816	148,779	160,040	21.2%	21.2%	21.8%	22.4%	22.8%	23.1%	59,122	58.58%	1.79%
PIN	Total SF Homes	88,817	91,184	92,806	94,656	96,799	98,679	18.7%	17.2%	16.1%	15.4%	14.8%	14.3%	9,862	11.10%	0.41%
STP	Total SF Homes	72,670	75,719	77,076	78,676	80,634	82,460	15.3%	14.3%	13.4%	12.8%	12.3%	11.9%	9,790	13.47%	0.49%
TBW	**Total SF Homes**	**475,014**	**530,830**	**575,019**	**615,248**	**653,424**	**692,413**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**217,398**	**45.77%**	**1.46%**

[1] Percent of Total SF Homes reflects percent of regional (TBW) total

Table 2-38
Market Potential and Program Penetration Rates for Alternative Landscape Irrigation Incentives by WDPA (2030)

WDPA	Type	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	DQ3 Irrigators	13%	11,716	1,523	138
NPR	DQ3 Irrigators	13%	567	74	7
NWH	DQ3 Irrigators	13%	5,417	704	64
SCH	DQ3 Irrigators	13%	14,797	1,924	175
COT	DQ3 Irrigators	13%	14,865	1,932	176
PIN	DQ3 Irrigators	13%	8,251	1,073	98
STP	DQ3 Irrigators	13%	6,866	893	81
TBW	**DQ3 Irrigators**	**13%**	**62,479**	**8,122**	**738**

Table 2-39
SF Surplus Irrigators Eligible for Landscape Irrigation Evaluations by WPDA (2014-2030)

WDPA	Type	Total						Percent of Total SF Homes in WDPA[1]						Absolute Change	% Change	Annual Avg. % Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	Surplus Irrigators	5,476	7,201	9,096	10,518	11,974	13,499	7.3%	7.8%	8.9%	9.5%	10.1%	10.7%	8,022	146.49%	3.53%
NPR	Surplus Irrigators	448	486	512	509	513	527	7.3%	7.5%	7.7%	7.7%	7.7%	7.8%	79	17.70%	0.63%
NWH	Surplus Irrigators	3,287	3,653	4,289	4,863	5,345	5,852	7.3%	7.6%	8.3%	8.9%	9.3%	9.7%	2,566	78.06%	2.24%
SCH	Surplus Irrigators	6,412	8,163	10,779	13,284	15,578	17,936	7.3%	7.8%	9.1%	10.0%	10.8%	11.4%	11,523	179.70%	4.04%
COT	Surplus Irrigators	7,416	8,722	11,102	13,345	15,355	17,419	7.3%	7.7%	8.8%	9.7%	10.3%	10.9%	10,003	134.88%	3.34%
PIN	Surplus Irrigators	6,527	6,771	7,068	7,408	7,800	8,145	7.3%	7.4%	7.6%	7.8%	8.1%	8.3%	1,618	24.79%	0.86%
STP	Surplus Irrigators	5,340	5,622	5,871	6,164	6,523	6,858	7.3%	7.4%	7.6%	7.8%	8.1%	8.3%	1,517	28.42%	0.97%
TBW	**Surplus Irrigators**	**34,906**	**40,617**	**48,717**	**56,091**	**63,089**	**70,236**	**7.3%**	**7.7%**	**8.5%**	**9.1%**	**9.7%**	**10.1%**	**35,329**	**101.21%**	**2.73%**
PAS	SF Homes	74,523	92,349	102,689	110,449	118,393	126,708	15.7%	17.4%	17.9%	18.0%	18.1%	18.3%	52,185	70.03%	2.06%
NPR	SF Homes	6,097	6,498	6,641	6,624	6,649	6,726	1.3%	1.2%	1.2%	1.1%	1.0%	1.0%	629	10.31%	0.38%
NWH	SF Homes	44,729	48,125	51,597	54,727	57,356	60,124	9.4%	9.1%	9.0%	8.9%	8.8%	8.7%	15,396	34.42%	1.14%
SCH	SF Homes	87,260	104,362	118,632	132,300	144,814	157,675	18.4%	19.7%	20.6%	21.5%	22.2%	22.8%	70,415	80.70%	2.30%
COT	SF Homes	100,918	112,592	125,578	137,816	148,779	160,040	21.2%	21.2%	21.8%	22.4%	22.8%	23.1%	59,122	58.58%	1.79%
PIN	SF Homes	88,817	91,184	92,806	94,656	96,799	98,679	18.7%	17.2%	16.1%	15.4%	14.8%	14.3%	9,862	11.10%	0.41%
STP	SF Homes	72,670	75,719	77,076	78,676	80,634	82,460	15.3%	14.3%	13.4%	12.8%	12.3%	11.9%	9,790	13.47%	0.49%
TBW	SF Homes	**475,014**	**530,830**	**575,019**	**615,248**	**653,424**	**692,413**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**217,398**	**45.77%**	**1.46%**

[1] Percent of Total SF Homes reflects percent of regional (TBW) total.

Table 2-40
Market Potential and Program Penetration Rates for Landscape Irrigation Evaluations by WDPA (2030)

WDPA	Type	Penetration Rate	Market Potential	Available Rebates	Annual Rebates
PAS	Surplus Irrigators	5%	10,518	526	48
NPR	Surplus Irrigators	5%	509	25	2
NWH	Surplus Irrigators	5%	4,863	243	22
SCH	Surplus Irrigators	5%	13,284	664	60
COT	Surplus Irrigators	5%	13,345	667	61
PIN	Surplus Irrigators	5%	7,408	370	34
STP	Surplus Irrigators	5%	6,164	308	28
TBW	**Surplus Irrigators**	**5%**	**56,091**	**2,805**	**255**

3. Active Demand Management Program Development

The AWE Tool was used as the primary instrument to formulate, screen and select demand management program measures and to conduct an "avoided supply cost" analysis. The market potential estimates discussed in the preceding section support the formulation of programs, while the final selection of programs is based on a comprehensive assessment of the net benefits and costs of fully formulated water efficiency measures.

3.1 Determining Benefit Cost Ratios

Both the screening process and avoided costs analysis consider the present value (PV) of total costs and benefits (cost savings) of demand management programs. Nominal program costs for each water efficiency measure and forecast year reflect the expected implementation costs measured nominally when the costs are incurred. Future nominal costs are estimated by adjusting the average unit program costs in 2017 dollars to account for an annual average inflation rate of 3 percent.

However, in order to assess the future value of the proposed expenditures, cost to implement water efficiency measures must be assessed in terms of constant dollars to remove the effects of inflation over time and then discounted to the time value of money (e.g., the cost to borrow). Discounting renders benefits and costs that occur in different time periods comparable by expressing their values in present terms, indicating how much future benefits and costs are worth today. It is accomplished by multiplying annual program costs in constant dollars by an annual discount factor. The discount factor and annual discount rates are estimated according to Equation 3-1 and Equation 3-2.

Equation 3-1

$$df = \frac{r - i}{1 + i}$$

Where:

df = factor discount
r = nominal interest rate
i = assumed inflation rate

Equation 3-2

$$d_n = \frac{1}{(1 + df)^{(n-y)}}$$

Where:

d_n = annual discount rate
d = discount factor
r = nominal interest rate
i = assumed inflation rate
n = current year
y = analysis start year (2010)

An annual average inflation rate of 3 percent and nominal interest rate of 4 percent is assumed to estimate discounted PV's expressed in terms of in 2017 dollars. PV is calculated according to Equation 3-3. Net present value (NPV) is the PV benefits of avoided supply cost less the PV costs of program implementation and is calculated as shown in Equation 3-4. The benefit cost ratio (BCR) is the PV benefits divide by the PV costs. A positive NPV (BCR greater than one) indicates the measures would benefit the regional utility and rate payers or rather, that is, the PV of future utility costs would be lower with conservation than without it. A negative NPV (BCR ratio less than one) indicates the utility and its rate payers would face higher costs with the conservation measure implemented (i.e., a measure with a negative NPV costs more to implement than the value of the water savings it would generate).

Equation 3-3

$$PV = FV/(1+r)^n$$

Where:

PV = present value
FV = future value
r = discount rate (or interest rate)
n = the number of periods in the future the cash flow

Equation 3-4

$$NPV = FV/[(1+r)^n] - i$$

Where:

PV = present value
FV = future value
r = discount rate (or interest rate)
i = initial investment
n = the number of periods in the future the cash flow

3.2 Screening and Ranking

The 2013 DMP update screening process considered 18 programs / technologies, either applied through evaluation of existing programs (regionally and nationally) or developed based upon specific application of technologies in specific sectors or water end uses. The process utilized regional and national literature and other secondary sources, along with information gleaned from survey and analysis of regional water use characteristics.

The criteria used to screen, rank and select conservation measures for inclusion in the 2013 DMP include:

- Ability to identify and match water uses and applicable water technology usage
- Water saving potential
- Public acceptability (survey results or communication with utility coordinators)
- Cost effectiveness
- Administrative feasibility
- Generally accepted program penetration rates

Programs were eliminated from further consideration if:

- Significant applicability or availability to sectors in region did not exist
- Insufficient data was available to assess market potential
- Savings rates were highly variable due to programs' nature and/or were not verifiable
- Program successes were not well defined
- Avoided benefit/cost (BCR[13]) ratio was less than 1

As part of the 2018 update, savings rates, utility costs, benefit cost ratios and implementation strategies were reviewed and updated as deemed appropriate to ensure feasible targeting and implementation strategies. This assessment resulted in the selection of 11 programs for the 2018 update. Remaining market potential for water efficient technology (beyond what is likely accounted for by passive measures) was determined through the 2040 demand forecast planning horizon for the 11 programs selected for inclusion in the 2018 DMP update as described in Section 2. The portfolio of programs included in the 2018 update are shown in Table 3-1.

Table 3-1
Programs Meeting Screening Criteria

Program	Sector	Utility Cost ($/unit)	Unit Savings (GPY)	Useful Life of Savings (yrs)	Savings Over Useful Life (Gallons)	$/1000 gal	BCR
Cooling Towers	NR	$1,225	1,386,530	10	13,865,299	0.09	8.6
HET (Valve)	NR	$100	22,103	30	663,093	0.15	2.8
HEU (1/2 Gallon)	NR	$100	18,928	30	567,840	0.18	4.5
PRSV	NR	$75	37,426	10	374,260	0.20	2.8
Alternative Irrigation Sources	SF	$575	94,034	25	2,350,850	0.24	3.0
HET (Tank)	NR	$100	13,020	30	390,587	0.26	2.4
Dishwashers (Conveyor)	NR	$425	59,951	20	1,199,027	0.35	2.1
HET	SF	$125	12,854	25	321,350	0.39	1.8
HET	MF	$100	9,679	25	241,977	0.41	1.2
ET/SMS Irrigation Controller	SF	$300	56,645	10	566,449	0.53	1.4
FWS/FFL Incentive	SF	$725	50,560	25	1,264,000	0.57	1.3

Of the 11 programs, 6 programs are applicable to the non-residential (NR) sector, 4 to the single-family (SF) sector and 1 to the multi-family (MF) sector. Indoor water efficiency still exists after passive efficiency in all sectors of water use, while outdoor opportunities exist primarily in the single-family sector. While the potential for outdoor efficiency is assumed to exist in the multifamily and nonresidential sectors, the potential savings rates for these programs are highly variable due to the diversity of nonresidential properties and establishment types.

Estimates of gallons saved reflect savings over the life of each measure, which vary depending on measure implementation assumptions, unit savings rates, and useful life of the technology. Estimated unit costs were compared with unit costs of supply alternatives to evaluate the viability of demand management programs and estimate the BCR. As identified in Table 3-1, program cost effectiveness ranges from $0.09/1000 gallons for the cooling tower retrofit to $0.57/1000 gallons for FWS / FFL Incentives.

[13] BCR is the NPV benefits divide by the NPV costs

3.3 Planned Interventions

Table 3-2 summarizes the number of planned annual interventions while Table 3-3 summarizes the cumulative number of planned interventions for each active water efficiency measure and forecast year. The number of annual average interventions are derived by first equally distributing the number of available measures estimated for each program in Section 2 across an 11-year implementation scenario. A delayed start approach (due to creation of a newly developed regionally coordinated programmatic strategy) is then employed to reduce the number of rebates in the first year of each program by 50 percent then distributes the remaining available interventions for this program year over the 10 remaining years.14 Finally, the number of interventions for each program are smoothed at a WDPA level through rounding procedures. Appendix C (Tables C-1 to C-8) provide the cumulative number of remaining interventions available and planned interventions for each the water efficiency measures by WDPA

3.4 Water Savings Potential

Program water savings provided in Table 3-4 are based on the number of planned interventions provided in Table 3-2 as well as the unit water savings rates and savings useful life estimates provided for each measure in Table 3-1. The cumulative water savings of planned program measures are summarized in Table 3-5 for each forecast year, while Appendix D (Tables D-1 to D-2) provides the cumulative annual active water savings for planned interventions by WDPA.

As shown in Figure 3-1 savings potential for selected measures vary greatly from 0.03 to 2.14 MGD. The single-family alternative irrigation source measure has the highest expected water savings at 2.14 MGD, followed by single-family HET replacement at 1.92 MGD. Together these measures account for about 35 percent of the total 11.4 MGD of program water savings estimated for 2030. Nonresidential conveyor dishwashers and PRSV measures have the lowest potential savings estimates at 0.03 and 0.05 MGD of water saved, respectively, with each accounting for less than 1 percent of total program savings potential. Although PRSV's have the second lowest total savings potential estimate, this measure is ranked fourth in terms of its BCR meaning the measure should result in high supply cost savings benefit for minimal cost when compared to other measures.

Figure 3-2 compares annual savings estimates for the residential and nonresidential sectors. Residential savings estimates include four single-family and one multifamily residential measure as provided in Table 3-2, while the nonresidential sector savings are associated with the remaining six programs. Overall, residential water savings shown in Figure 3-2 increase at a much faster pace and account for a much greater proportion of the overall savings potential then the nonresidential measures. By 2025, residential program savings are estimated to account for 74 percent (4.5 MGD) of program savings while, nonresidential programs account for the remaining 26 percent at 1.6 MGD.

14 FWS/FFL Incentive program reflects a two-year delayed start where the average annual interventions are reduced to 200 measures in year 1 and by 50 percent in year 2.

3.5 Program Costs

Estimates of the total annual nominal costs to implement the planned interventions provided in Table 3-6 for each forecast year. These costs reflect the constant annual variable utility costs provided in Table 3-4 measured nominally when cost are incurred (i.e. annual program budget). Table 3-7 and Table 3-8 provide annual and cumulative PV costs (discounted) of planned interventions, while Figure 3-3 provides a comparison of the total nominal cost expenditures associated with each measure by 2030. The PV discounted cost estimates reflect the time value of money (e.g., the cost to borrow) adjusted for inflation, indicating how much future benefits and costs are worth today.

The single-family FWS/FFL Incentive and the residential HET programs result in the highest cumulative PV costs at $7.4M and $7.1M, respectively. Similar to the savings estimates, these programs also account for approximately 46 percent of the $31.5M estimated PV program costs. Although there are a variety of other programs which cost less in absolute terms, identification of programs with the greatest monetary benefits occurs through assessment of BCR's reflecting PV costs and benefits as previously discussed. However, it is important to note that the efficacy of past FWS implementation strategies is currently being evaluated and that the program could be replaced by a UF FFL installation program with similar costs and benefits, if program implementation strategies are deemed ineffective. Annual nominal, annual PV and cumulative PV costs for planned interventions are provided by WDPA in Appendix E (Tables E-1 to E-8).

Table 3-2
Planned Annual Interventions

	SF				MF	NR					
Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HET (Valve)	HET (Tank)	HEU (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
2020	325	2900	402	200	2100	900	520	1090	40	6	4
2021	800	6100	1185	603	4300	1950	1050	2300	71	20	13
2022	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2023	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2024	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2025	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2026	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2027	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2028	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2029	800	6100	1185	1185	4300	1950	1050	2300	71	20	13
2030	800	6100	1185	1185	4300	1950	1050	2300	71	20	13

Table 3-3
Planned Cumulative Interventions

	SF				MF	NR					
Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HET (Valve)	HET (Tank)	HEU (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
2020	325	2,900	402	200	2,100	900	520	1,090	40	6	4
2021	1,125	9,000	1,587	803	6,400	2,850	1,570	3,390	111	26	17
2022	1,925	15,100	2,772	1,988	10,700	4,800	2,620	5,690	182	46	30
2023	2,725	21,200	3,957	3,173	15,000	6,750	3,670	7,990	253	66	43
2024	3,525	27,300	5,142	4,358	19,300	8,700	4,720	10,290	324	86	56
2025	4,325	33,400	6,327	5,543	23,600	10,650	5,770	12,590	395	106	69
2026	5,125	39,500	7,512	6,728	27,900	12,600	6,820	14,890	466	126	82
2027	5,925	45,600	8,697	7,913	32,200	14,550	7,870	17,190	537	146	95
2028	6,725	51,700	9,882	9,098	36,500	16,500	8,920	19,490	608	166	108
2029	7,525	57,800	11,067	10,283	40,800	18,450	9,970	21,790	679	186	121
2030	8,325	63,900	12,252	11,468	45,100	20,400	11,020	24,090	750	206	134

Table 3-4
Program Annual Water Savings (MGD)

Activity Name	SF				MF	NR						Total Active Water Savings
	Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HETs	HET (Valve)	HET (Tank)	HEU (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
2020	0.08	0.10	0.06	0.03	0.06	0.04	0.02	0.06	0.00	0.00	0.02	0.47
2021	0.21	0.21	0.18	0.08	0.11	0.1	0.04	0.12	0.01	0.00	0.05	1.11
2022	0.21	0.20	0.18	0.16	0.11	0.09	0.04	0.12	0.01	0.00	0.05	1.17
2023	0.21	0.20	0.18	0.16	0.10	0.09	0.03	0.11	0.01	0.00	0.05	1.15
2024	0.21	0.19	0.18	0.16	0.10	0.09	0.03	0.11	0.01	0.00	0.05	1.13
2025	0.21	0.18	0.18	0.16	0.09	0.09	0.03	0.11	0.01	0.00	0.05	1.11
2026	0.21	0.18	0.18	0.16	0.09	0.08	0.03	0.11	0.00	0.00	0.05	1.10
2027	0.21	0.17	0.18	0.16	0.08	0.08	0.03	0.11	0.00	0.00	0.05	1.08
2028	0.21	0.17	0.18	0.16	0.08	0.08	0.03	0.10	0.00	0.00	0.05	1.07
2029	0.21	0.16	0.18	0.16	0.07	0.08	0.03	0.10	0.00	0.00	0.05	1.05
2030	0.21	0.16	0.12	0.16	0.07	0.07	0.03	0.10	0.00	0.00	0.03	0.96
Total	2.14	1.92	1.84	1.59	0.96	0.89	0.34	1.14	0.05	0.03	0.49	11.40

Table 3-5
Program Cumulative Annual Water Savings (MGD)

Activity Name	SF				MF	NR						Total Active Water Savings
	Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HETs	HET (Valve)	HET (Tank)	HEU (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
2020	0.08	0.10	0.06	0.03	0.06	0.04	0.02	0.06	0.00	0.00	0.02	0.47
2021	0.29	0.31	0.25	0.11	0.17	0.14	0.06	0.17	0.01	0.00	0.06	1.58
2022	0.50	0.52	0.43	0.28	0.27	0.23	0.09	0.29	0.02	0.01	0.11	2.75
2023	0.70	0.71	0.61	0.44	0.37	0.32	0.13	0.40	0.02	0.01	0.16	3.90
2024	0.91	0.91	0.80	0.60	0.47	0.41	0.16	0.52	0.03	0.01	0.21	5.03
2025	1.11	1.09	0.98	0.77	0.56	0.5	0.19	0.62	0.03	0.02	0.26	6.14
2026	1.32	1.27	1.17	0.93	0.65	0.58	0.22	0.73	0.04	0.02	0.31	7.24
2027	1.53	1.44	1.35	1.10	0.73	0.66	0.25	0.84	0.04	0.02	0.36	8.32
2028	1.73	1.61	1.53	1.26	0.81	0.74	0.28	0.94	0.05	0.03	0.41	9.39
2029	1.94	1.77	1.72	1.42	0.89	0.81	0.31	1.04	0.05	0.03	0.46	10.44
2030	2.14	1.92	1.84	1.59	0.96	0.89	0.34	1.14	0.05	0.03	0.49	11.40

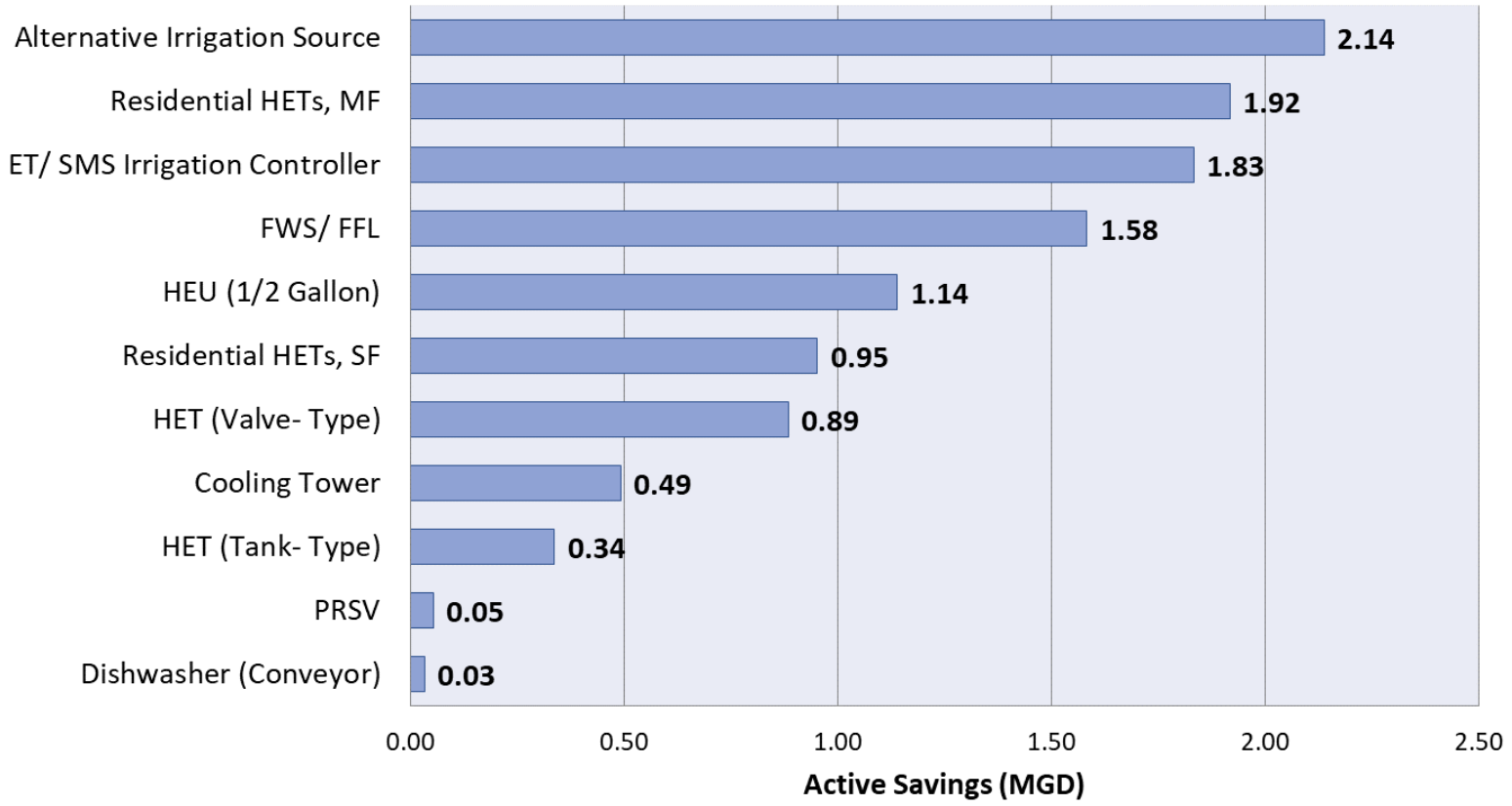

Figure 3-1: Program Total Water Savings (MGD)

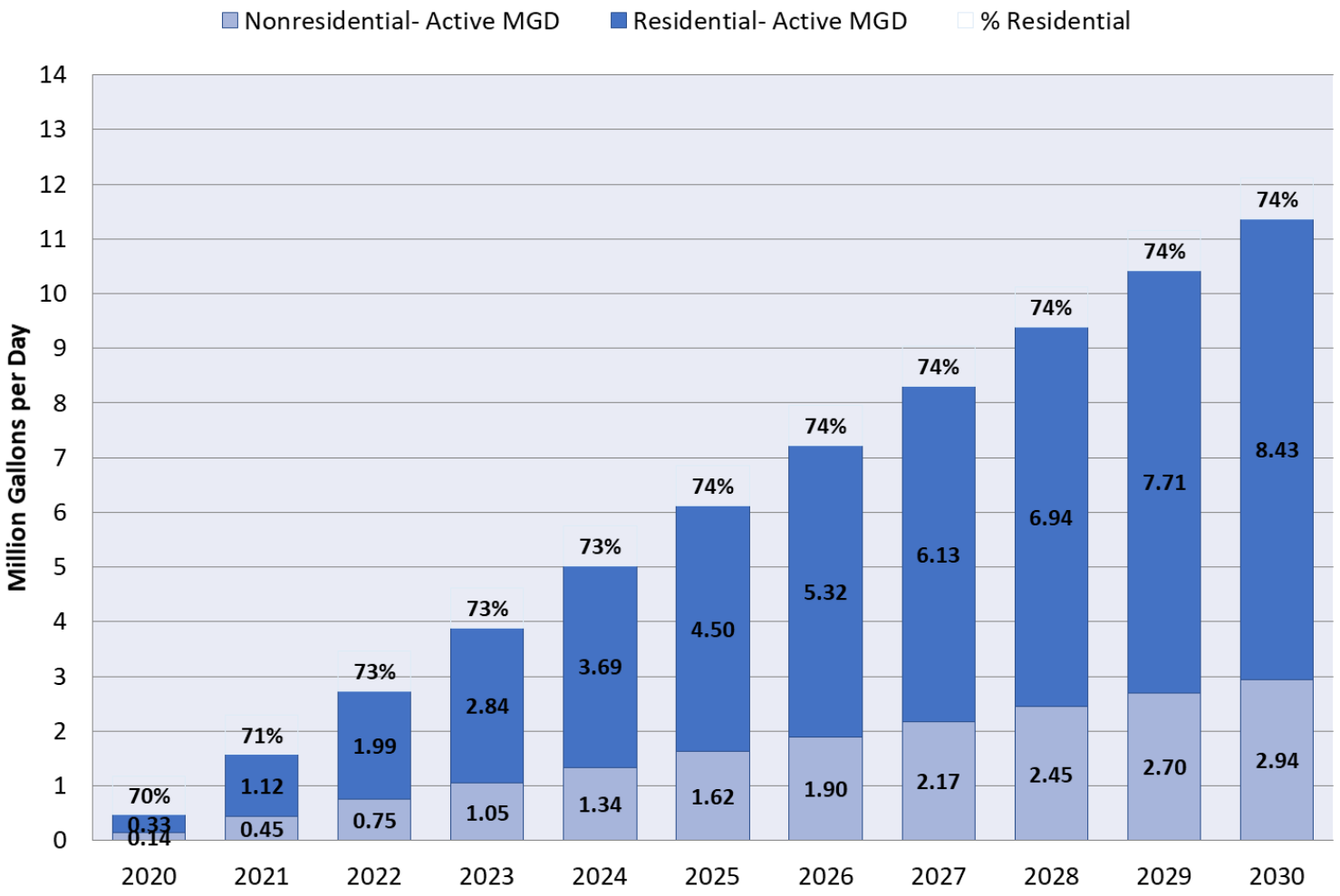

Figure 3-2: Residential and NR Active Savings (MGD)

Table 3-6
Program Nominal Annual Costs (Thousands)

Year	Annual Program Budget ($/Yr)	SF				MF	NR					
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSVs	Dishwasher (Conveyor)	Cooling Towers
2020	$1,286,425	$186,875	$362,500	$120,600	$145,000	$210,000	$90,000	$52,000	$109,000	$3,000	$2,550	$4,900
2021	$3,004,925	$460,000	$762,500	$355,500	$437,175	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2022	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2023	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2024	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2025	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2026	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2027	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2028	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2029	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
2030	$3,426,875	$460,000	$762,500	$355,500	$859,125	$430,000	$195,000	$105,000	$230,000	$5,325	$8,500	$15,925
Total	$35,133,225	$4,786,875	$7,987,500	$3,675,600	$8,314,300	$4,510,000	$2,040,000	$1,102,000	$2,409,000	$56,250	$87,550	$164,150

Table 3-7
Program Present Value Annual Costs (Thousands)

Year	Total PV Costs	SF				MF	NR					
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSVs	Dishwasher (Conveyor)	Cooling Towers
2020	$1,213,970	$176,350	$342,083	$113,807	$136,833	$198,172	$84,931	$49,071	$102,861	$2,831	$2,406	$4,624
2021	$2,808,412	$429,917	$712,635	$332,251	$408,585	$401,879	$182,248	$98,133	$214,959	$4,977	$7,944	$14,884
2022	$3,171,972	$425,784	$705,783	$329,057	$795,220	$398,015	$180,495	$97,190	$212,892	$4,929	$7,868	$14,740
2023	$3,141,472	$421,690	$698,996	$325,893	$787,574	$394,188	$178,760	$96,255	$210,845	$4,882	$7,792	$14,599
2024	$3,111,266	$417,635	$692,275	$322,759	$780,001	$390,398	$177,041	$95,330	$208,817	$4,835	$7,717	$14,458
2025	$3,081,350	$413,619	$685,619	$319,656	$772,501	$386,644	$175,339	$94,413	$206,810	$4,788	$7,643	$14,319
2026	$3,051,721	$409,642	$679,026	$316,582	$765,073	$382,926	$173,653	$93,505	$204,821	$4,742	$7,569	$14,182
2027	$3,022,378	$405,703	$672,497	$313,538	$757,717	$379,244	$171,983	$92,606	$202,852	$4,696	$7,497	$14,045
2028	$2,993,317	$401,802	$666,031	$310,523	$750,431	$375,598	$170,329	$91,716	$200,901	$4,651	$7,425	$13,910
2029	$2,964,535	$397,939	$659,627	$307,537	$743,215	$371,986	$168,691	$90,834	$198,969	$4,607	$7,353	$13,776
2030	$2,936,030	$394,112	$653,284	$304,580	$736,069	$368,409	$167,069	$89,960	$197,056	$4,562	$7,283	$13,644
Total PV Costs	$31,496,422	$4,294,192	$7,167,855	$3,296,184	$7,433,220	$4,047,460	$1,830,538	$989,014	$2,161,782	$50,500	$78,497	$147,182
%of Total PV Costs	100%	13.63%	22.76%	10.47%	23.60%	12.85%	5.81%	3.14%	6.86%	0.16%	0.25%	0.47%

Table 3-8
Program Present Value Cumulative Costs

		SF				MF	NR					
Year	Total PV Costs	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSVs	Dishwasher (Conveyor)	Cooling Towers
2020	$1,213,970	$176,350	$342,083	$113,807	$136,833	$198,172	$84,931	$49,071	$102,861	$2,831	$2,406	$4,624
2021	$4,022,382	$606,267	$1,054,718	$446,059	$545,418	$600,051	$267,179	$147,205	$317,819	$7,808	$10,351	$19,508
2022	$7,194,354	$1,032,051	$1,760,500	$775,115	$1,340,639	$998,067	$447,674	$244,394	$530,711	$12,737	$18,218	$34,248
2023	$10,335,826	$1,453,740	$2,459,496	$1,101,008	$2,128,212	$1,392,255	$626,433	$340,649	$741,556	$17,618	$26,010	$48,847
2024	$13,447,092	$1,871,375	$3,151,772	$1,423,767	$2,908,214	$1,782,652	$803,474	$435,979	$950,373	$22,453	$33,727	$63,305
2025	$16,528,442	$2,284,994	$3,837,390	$1,743,423	$3,680,715	$2,169,296	$978,813	$530,392	$1,157,183	$27,241	$41,370	$77,624
2026	$19,580,163	$2,694,636	$4,516,416	$2,060,005	$4,445,788	$2,552,222	$1,152,465	$623,897	$1,362,004	$31,983	$48,940	$91,806
2027	$22,602,541	$3,100,339	$5,188,913	$2,373,543	$5,203,505	$2,931,467	$1,324,448	$716,504	$1,564,856	$36,679	$56,437	$105,851
2028	$25,595,858	$3,502,141	$5,854,944	$2,684,066	$5,953,935	$3,307,064	$1,494,777	$808,219	$1,765,757	$41,331	$63,861	$119,761
2029	$28,560,392	$3,900,080	$6,514,571	$2,991,603	$6,697,151	$3,679,050	$1,663,469	$899,053	$1,964,726	$45,937	$71,214	$133,538
2030	$31,496,422	$4,294,192	$7,167,855	$3,296,184	$7,433,220	$4,047,460	$1,830,538	$989,014	$2,161,782	$50,500	$78,497	$147,182

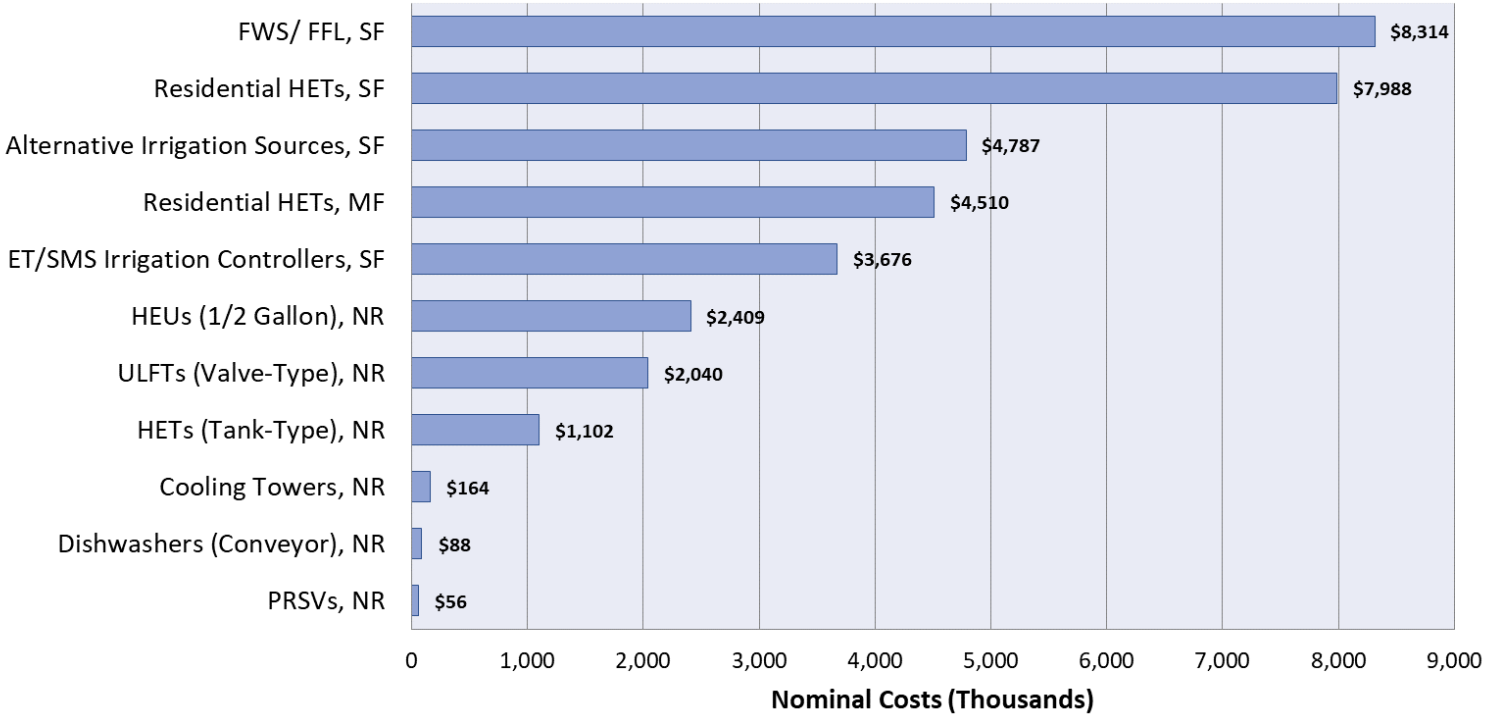

Figure 3-3: Program Cumulative Nominal Costs ($ Thousands)

4. Avoided Cost Analysis

Greater efficiency can lead to avoided or deferred variable costs of supplies (current and future) and capital costs (future). The "avoided supply cost" analysis compares the benefits of various increments of conserved water to the variable operating cost of existing water supplies and total cost of new supply development (capital and operating costs). Consideration of cost savings and water supply benefits permits a consistent "apples to apples" comparison to other water supply alternatives. Additionally, decreased water consumption should also prolong the operating life of existing water and wastewater treatment facilities.

4.1 Supply Cost Assumptions

As part of its 2018 LTMWP update, Tampa Bay Water has determined that approximately 20 MGD of new supplies will need to be developed during the 2040 planning horizon. This includes the need for additional supplies to be delivered to South Central Hillsborough (SCH). The amount of new supply needed during the next planning horizon (2020-2040) is a combination of demand projections and existing supply and system reliability and Interlocal Agreement requirements. Seven potential pathways were identified as part 2018 LTMWP update to provide the additional 20 MGD to both SCH and the Region. Each of the recommended supply projects relies on one of two solutions to increase supplies in SCH by 2024. These options include:

- South county pipeline
- Groundwater WTP using South Hillsborough Aquifer Recharge Project (SHARP) credits

While these options are fully described in the 2018 LTMWP update, the capacity, timing and capital/operational costs associated with these projects were considered as potential supply options to inform the avoided cost analysis conducted for the 2018 DMP update. In consultation with Tampa Bay Water, the supply options provided in Table 4-1 were ultimately selected and used in the avoided cost analysis.

Table 4-1
Tampa Bay Water Planning and Operation Water Supply Variable O&M Costs (2017$)

Online Year	Project	Capacity, MGD	Capital Cost, $M	O&M Cost, $M/year	O&M Cost, $/MG
2024	Groundwater WTP via SHARP credits	7.5	$105.27	$1.03	$376
2030	South county pipeline	12.5	$75.87	$0.71	$156
2033	SWTP expansion w/ existing source	12.5	$88.24	$1.59	$348

4.2 Active Water Savings Scenarios

Benefits for active measures are avoided or deferred variable costs of supplies (current and future) and capital costs (future). The PV benefit-cost comparisons (at present value, 2017 dollars) for active programs are provided in Table 4-2 and further illustrated in Figure 4-1. All active programs identified in Table 4-2, have positive BCRs and NPV's due to the PV supply benefits exceeding the PV implementation costs. As shown in Table 4-2, the BCRs for the selected programs vary from about 1.17 for MF Residential HETs to 8.63 for cooling tower interventions. Overall for every dollar spent on demand management, member government utility costs are reduced by approximately $2.07 in 2017 dollars.

Table 4-2
PV Benefits and Costs for Selected Active Measures (2017$)

Activity Name	Class	Present Value Cost	Present Value Benefit	NPV	% of Total NPV	BCR
Cooling Tower	NR	$147,182	$1,269,503	$1,122,321	3.3%	8.63
HEU (1/2 Gal.)	NR	$2,161,782	$9,807,009	$7,645,227	22.8%	4.54
HET (Valve)	NR	$1,830,538	$6,605,893	$4,775,355	14.2%	3.61
Alternative Irrigation Source	SF	$4,294,192	$12,724,540	$8,430,348	25.1%	2.96
PRSV	NR	$50,500	$141,928	$91,428	0.3%	2.81
HET (Tank)	NR	$989,014	$2,381,068	$1,392,054	4.1%	2.41
Dishwasher (Conveyor)	NR	$78,497	$163,216	$84,719	0.3%	2.08
HET (SF)	SF	$7,167,855	$13,094,409	$5,926,554	17.7%	1.83
ET/SMS Irrigation Controller	SF	$3,296,184	$4,742,597	$1,446,414	4.3%	1.44
FWS/FFL Incentive	SF	$7,433,220	$9,402,241	$1,969,021	5.9%	1.26
HET (MF)	MF	$4,047,460	$4,729,273	$681,814	2.0%	1.17
TOTAL		**$31,496,422**	**$65,061,678**	**$33,565,256**	**100%**	**2.07**

Table 4-3 compares BCR, NPV and water savings rankings across the selected measures. Following NR Cooling Towers, the NR HEU, HET (valve) and SF Alternative Irrigation Source programs have the highest BCRs at 4.54, 3.61 and 2.96 respectively. Although each program has significant benefits, the Alternative Irrigation Source program ranks first in terms of savings and NPV across the top ranked programs. While the NR HEU and HET (valve) programs rank second and fourth in terms of NPV, collectively these measures account for only 10 and 7.8 percent of total the 11.4 MGD program savings.

It should be noted, however, measures with the highest BCR's do not necessarily correspond to the greatest total return, or NPV. For example, the Cooling Tower program ranks first in terms of its BCR, this measure ranks eighth in terms of both NPV and water savings offering just over $1.1 million in total net benefits and 4.3 percent of the total savings. Conversely, the FWS/FFL Incentive ranks tenth in terms of its BCR, but fourth and fifth in terms of water savings and NPV. Selected measures are deemed to have a positive NPV regardless of the level of capital outlay, however, implementation strategies should be tailored to consider key factors affecting long-term effects, including the level of return on investment and total savings potential.

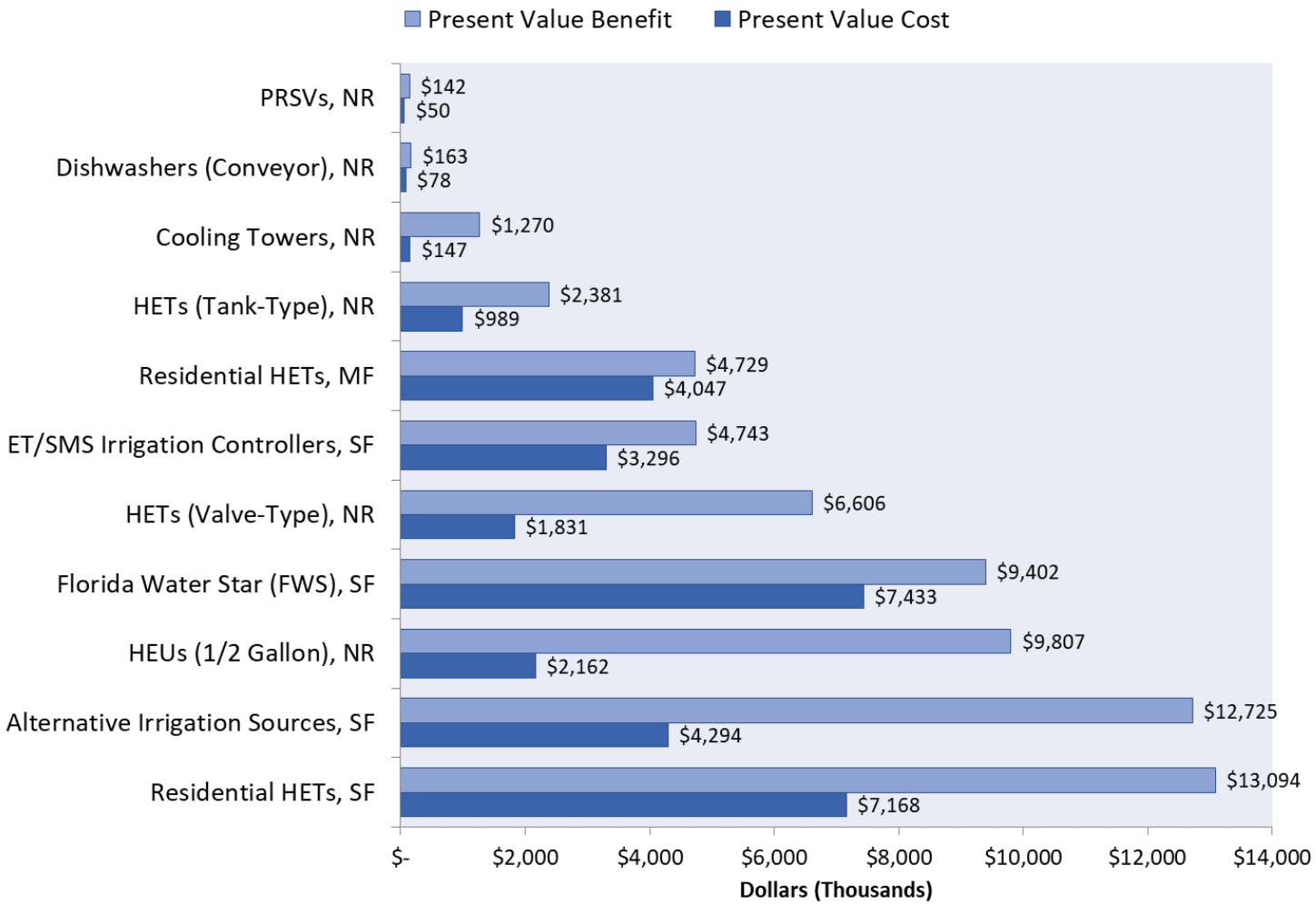

Figure 4-1
Present Value of Benefits and Costs (2017$)

Table 4-3
Comparison of BCR, NPV and Water Savings Ranks

Activity Name	Class	BCR	NPV	Savings MGD	% of Water Savings	BCR Rank	NPV Rank	Water Savings Rank
Alternative Irrigation Source	SF	2.96	$8,430,348	2.14	18.8%	4	1	1
HET (SF)	SF	1.83	$5,926,554	1.92	16.9%	8	3	2
ET/SMS Irrigation Controller	SF	1.44	$1,446,414	1.84	16.1%	9	6	3
FWS/FFL Incentive	SF	1.26	$1,969,021	1.59	13.9%	10	5	4
HEU (1/2 Gal.)	NR	4.54	$7,645,227	1.14	10.0%	2	2	5
HET (MF)	MF	1.17	$681,814	0.96	8.4%	11	9	6
HET (Valve)	NR	3.61	$4,775,355	0.89	7.8%	3	4	7
Cooling Tower	NR	8.63	$1,122,321	0.49	4.3%	1	8	8
HET (Tank)	NR	2.41	$1,392,054	0.34	3.0%	6	7	9
PRSV	NR	2.81	$91,428	0.05	0.5%	5	10	10
Dishwasher (Conveyor)	NR	2.08	$84,719	0.03	0.3%	7	11	11
		2.07	$33,565,256	11.40	100.0%			

4.3 Demand Forecast Scenarios with Passive and Active Water Savings

Accounting for prospective changes in efficiency standards, fixture life, and market penetration of high efficiency products allows adjustment of the baseline demand forecast to reflect market-based passive demand reductions. As previously mentioned, **estimates** of passive savings were generated as part of Tampa Bay Water's Long-Term Demand Forecast. In addition to passive savings, water savings related to implementation of active demand management measures can result in additional demand reductions.

Estimated impacts of passive water savings and potential active demand management on the region's long-term demands were evaluated over the planning horizon. Table 4-4 and Table 4-5 present the 2015-2040 baseline water demand projections and projected water savings in five-year increments as compared to the demand projections produced when passive and active demand management programs are considered. As shown in Table 4-4, total baseline demands are projected to increase at an annualized average rate of 1 percent per year to about 285 MGD in 2040, based on the Agency's 2017 demand forecast. This represents a 26 percent (59 MGD) increase in total baseline demands from the 2015.

However, given the projected 18 MGD water use reduction associated with the impact of passive changes (i.e., existing and new plumbing codes), this projected increase is reduced to 41 MGD (or 18 percent) from 227 MGD to 268 MGD. By 2040, approximately 26 MGD of total passive and active savings potential was identified. This 26 MGD reduction corresponds to a 1 percent reduction in baseline production demands for 2040. Of this total, 17.9 MGD of water use reduction is associated with the impact of passive changes, while the estimated additional savings from active efficiency is 7.6 MGD,

By 2030, approximately 11.4 MGD of water savings potential is estimated and attributable solely to active water efficiency, resulting in a 4 percent reduction in baseline demands. However, it is important to note that no savings resulting from additional demand management programs implemented beyond 2030 have been estimated. As such, the savings for programs with a life expectancy less than 20 years could deteriorate prior to the forecast horizon thus resulting in a decrease in active savings from 11.4 MGD in 2030 to 7.6 MGD by 2040. In order to maintain these reductions, additional demand management measures would need to be implemented, actual product lifetimes could increase, baseline water use efficiency requirements could change or passive efficiency market penetrations rates could change. As part of the 5-year updates to the DMP, Tampa Bay Water will reassess market potential and program/fixture lifetimes in 2023.

Figure 4-2 illustrates the magnitude of estimated water demand reductions from both passive and active savings relative to the updated 2018 baseline demand forecast and current sustainable system capacity.

Table 4-4
Comparison of Demand Projections Scenarios with Passive and Active Savings

Demand Profile	Projected Water Demand (MGD)						2015-2030			2015-2040		
	2015	2020	2025	2030	2035	2040	Absolute Change	% Change	Avg. Annual % Change	Absolute Change	% Change	Avg. Annual % Change
Baseline	226.8	251.1	264.2	273.5	279.9	285.5	46.8	20.6%	0.8%	59	25.9%	1.0%
Baseline w/Passive Efficiency	226.8	246.3	255.1	260.7	264.2	267.5	34.0	15.0%	0.6%	41	18.0%	0.7%
Baseline w/Active Efficiency	226.8	245.8	249.0	249.3	254.8	259.9	22.6	9.9%	0.4%	33	14.6%	0.6%

Table 4-5
Projected Water Savings from Passive and Active Water Conservation

Water Savings	Projected Water Savings (MGD) / Percent Reduction (%)					
	2015	2020	2025	2030	2035	2040
Passive Savings	0.0 / 0	4.8 / 1.7	9.1 / 3.2	12.8 / 4.5	15.7 / 5.5	17.9 / 6.3
Active Savings	0.0 / 0	0.5 / 0.2	6.1 / 2.1	11.4 / 4.0	9.4 / 3.3	7.6 / 2.7
Total Savings	0.0 / 0	5.3 / 1.9	15.2 / 5.3	24.2 / 8.5	25.1 / 8.8	25.5 / 8.9

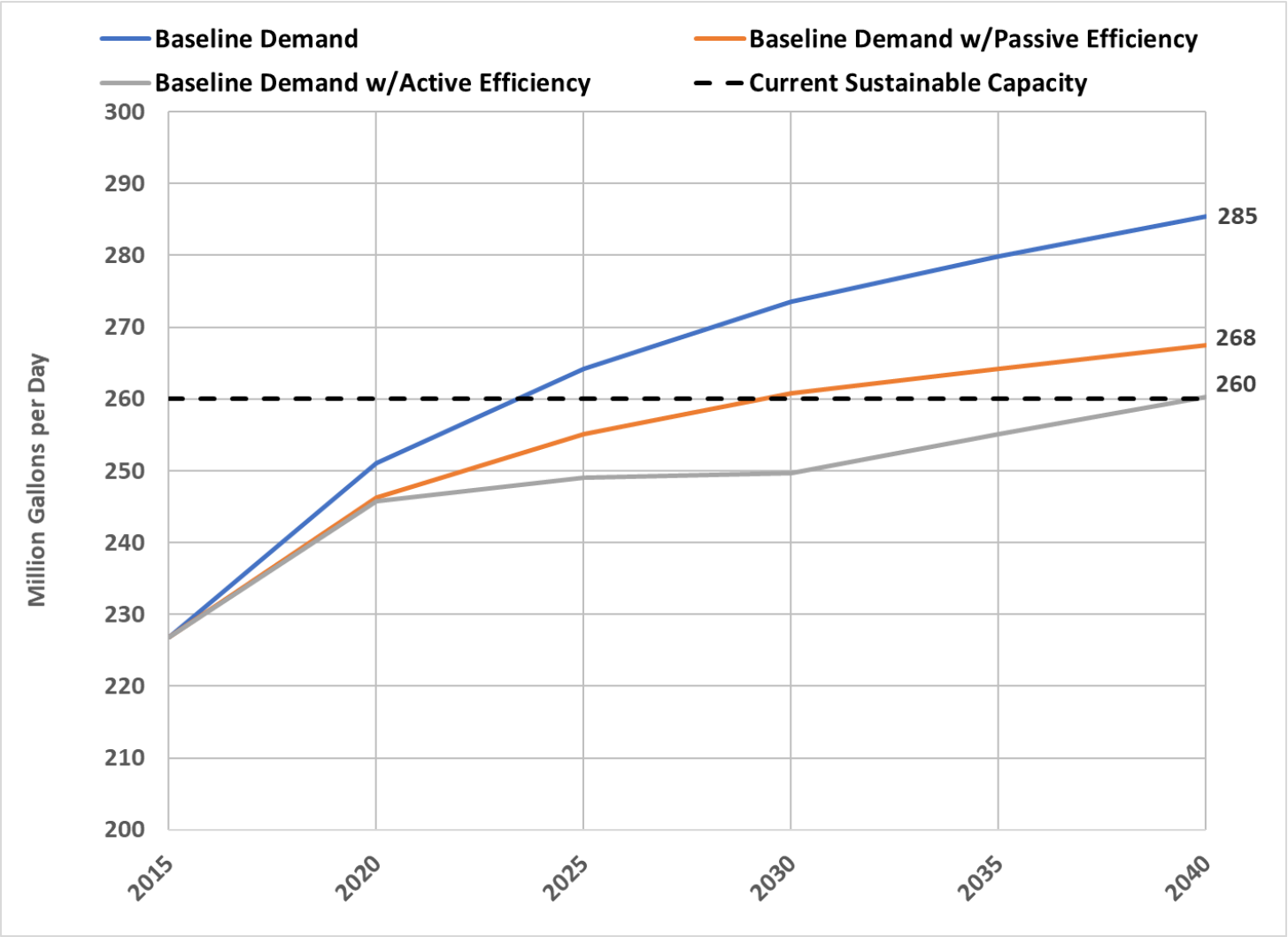

Figure 4-2
Baseline Demand Forecast with Estimated Passive and Active Savings

Quantification of supply-side benefits are based on the accrual of avoided costs and demonstrates the benefits of proposed efficiency measures and deferral of source development. Avoided costs (or benefits) from water use efficiency generally result from:

- Capital deferral;
- Capital elimination; and
- Reduction in variable cost.

Using the AWE Tool, the impacts of potential active demand management activities on Tampa Bay Water's ability to meet future demands were evaluated. As previously mentioned, Tampa Bay Water has determined that approximately 20 MGD of new supplies will need to be developed during the 2040 planning horizon. Given the selected supply option will add 7.5 MGD by 2024, this increment was not considered as an avoidable supply alternative for the 2018 DMP update. Although the exact timing of when new supplies need to be on line will continue to be evaluated during the next several years, the AWE Tool estimates the timing of a capacity shortfall relative to the agencies baseline demand forecast and an estimate of peak season delivery capacity (estimated at 275.5 MGD for this analysis) to support the benefits-cost analysis of active demand management.[15]

Savings and costs were determined over a 60-year planning horizon (2014-2073) allowing savings rates in this analysis to mature over the life of the technology installed. Net avoided costs of viable demand management programs were evaluated over two separate timeframes; the total life of all savings and through the 2040 forecast horizon. When cost and benefits are evaluated though the forecast horizon only, the NPV of avoided costs remains positive but is reduced to $8.88 million, with PV costs remaining at $31.5 million, and PV benefits estimated at $40.38 million by 2040. Given these benefits and costs, the collective portfolio of demand management measures has a BCR of 1.3. When costs and benefits of the portfolio of viable demand management programs are evaluated over total life of the savings (through the end of 2073), a NPV of more than $33.6 million in benefits was identified (as shown in Table 4-6). Given the PV cost of the program at $31.5 million, the collective portfolio of demand management measures has a BCR of 2.1.

As exemplified by the BCRs in Table 4-7, extending the life of the program savings also adds net benefits for individual measures. In terms of total net avoided cost, a NPV estimate of $33.6 million is likely a conservative estimate as avoided costs for supply increments beyond the 2040 forecast horizon were held constant as 2040 levels (since demand projections do not exist for periods beyond this point). Note: These benefits do not include benefits to individual water users.

The avoided supply cost analysis indicates investment in active water efficiency would result in reduced capital, operational and maintenance costs for Tampa Bay Water and its member governments. Should additional supply capacity be necessary prior to 2040, the net benefits associated with the selected portfolio of active measures would likely increase substantially, providing cost-effective opportunities for deferred or eliminated capital and operating costs of new water supply development.

[15] The primary function of the AWE Water Conservation Tracking Tool (v3) was to calculate and summarize the results of the avoided cost analysis.

Table 4-6
Net Present Value (NPV) of Avoided Costs

	PV Cost ($M)	PV Benefit ($M)	NPV ($M)	BCR
Life of Savings to 2073	$31.50	$65.06	$33.57	2.1
Life of Savings to 2040	$31.50	$40.38	$8.88	1.3

Table 4-7
Comparison of 2040 and 2073 PV Benefits and Costs for Selected Active Measures (2017$)

		PV Cost	PV Benefit		BCR	
Activity Name	**Sector**		**2040**	**2073**	**2040**	**2073**
Cooling Towers	NR	$147,182	$1,269,503	$1,269,503	8.6	8.63
PRSVs	NR	$50,500	$141,928	$141,928	2.8	2.81
ET/SMS Irrigation Controllers	SF	$3,296,184	$4,742,597	$4,742,597	1.4	1.44
HETs (Valve-Type)	NR	$1,830,538	$3,345,136	$6,605,893	1.83	3.61
HEUs (1/2 Gallon)	NR	$2,161,782	$4,462,882	$9,807,009	2.1	4.54
Alternative Irrigation Sources	SF	$4,294,192	$8,461,297	$12,724,540	2.0	2.96
Residential HETs	SF	$7,167,855	$7,109,142	$13,094,409	1.0	1.83
Dishwashers (Conveyor)	NR	$78,497	$131,158	$163,216	1.7	2.08
Residential HETs	MF	$4,047,460	$3,325,257	$4,729,273	0.8	1.17
HETs (Tank-Type)	NR	$989,014	$1,261,433	$2,381,068	1.28	2.41
FWS/FFL Incentive	SF	$7,433,220	$6,128,722	$12,724,540	0.8	1.26
	Total	$31,496,422	$40,379,055	$65,061,678	1.28	2.07

5. Summary and Recommendations

This Demand Management Plan (DMP) update has investigated and presented the benefits and costs of water demand management as a quantifiable, alternative to water supply source development being considered as part of the agency's 2018 Long-term Master Water Plan. As a component of Tampa Bay Water's strategic goals to achieve reliability of its water supply and delivery system to its member governments, this 2018 DMP update defines how water efficiency activities may impact long-range demand projections.

The demand management evaluation effort included an analysis of water savings (past and future) and an analysis of avoided supply costs related to improved water use efficiency. The "avoided supply cost" analysis considered increments of conserved water versus

- costs to operate existing water supply sources and
- total costs (capital and operating costs) to develop new water supply.

The DMP's consideration of cost savings and water supply benefits permits a consistent "apples to apples" comparison to other water supply alternatives.

The 2018 DMP update assessed available water efficiency potential and articulates a water demand management and planning strategy for Tampa Bay Water and its member governments that may defer the need for more costly capital supply investments. The implementation of this plan is estimated to save approximately 11.4 MGD by 2030 with a NPV of more than $33.6 million in benefits over total life of the programs savings (through the end of 2073).

5.1 Determination of Market Potential for Active Demand Management Programs

Remaining market potential for water efficient technology (beyond what is likely accounted for by passive measures) was determined through the 2040 demand forecast planning horizon and used to help assess and define the applicability and timing of active (utility sponsored) programs. Estimates of water savings potential are based on assumptions concerning changes in the mix of water using technology and the rate (or intensity) at which water using technology is used. These estimates are designed to account for historical changes in fixture water efficiency occurring as a result of customers replacing old products with new more efficient models, and the installation of efficient water-using fixtures in new construction in accordance with revised building codes, federal standards and market changes.

Assessment of technology and program-based savings potential requires starting-point (or base-year) estimates of fixture or appliance age distribution and efficiency regionally by water use sector and water efficiency technology market penetration. Evaluation of existing (or baseline) water efficiency utilizes parcel information, in conjunction with assumptions of the useful life of water fixtures. Using estimates of these main parameters for the base year, remaining water efficiency potential is evaluated over the agency's long-term water demand horizon (2040).

5.2 Active Demand Management Program Development

The 2013 DMP update identified 24 measures deemed viable for implementation, of which only 18 were judged to have sufficient information to estimate the presence of end uses and support a comprehensive assessment of efficiency potential and cost. As part of the 2018 update, savings rates, utility costs, benefit cost ratios and implementation strategies were reviewed and updated as deemed appropriate to ensure feasible targeting and implementation strategies.

The AWE Tool was used as the primary instrument to formulate, screen and select demand management program measures. The market potential estimates support the formulation of active demand management programs, while the final selection is based on a comprehensive assessment of the net benefits and costs of fully formulated water efficiency measures. This assessment resulted in the selection of 11 programs for the 2018 update. Of the 11 programs, 6 programs are applicable to the non-residential (NR) sector, 4 to the single-family (SF) sector and 1 to the multi-family (MF) sector.

5.3 Avoided Cost Analysis

Impacts of passive water use efficiency and potential active demand management programs were estimated over the planning horizon. Collectively, passive water savings and potential active demand management would be estimated to reduce long-term demands by 26 MGD over the planning horizon. Of this total, 17.9 MGD of water use reduction is associated with the impact of passive changes, while the estimated additional savings from active efficiency is 7.6 MGD. By 2030, approximately 11.4 MGD of water savings potential is estimated and attributable solely to active water efficiency. However, it is important to note that no savings resulting from additional demand management programs implemented beyond 2030 have been estimated. As such, the savings for programs with a life expectancy less than 20 years could deteriorate prior to the forecast horizon thus resulting in a decrease in active savings from 11.4 MGD in 2030 to 7.6 MGD by 2040. In order to maintain these reductions, additional demand management measures would need to be implemented, actual product lifetimes could increase, baseline water use efficiency requirements could change or passive efficiency market penetrations rates could change. As part of the 5-year updates to the DMP, Tampa Bay Water will reassess market potential and program/fixture lifetimes in 2023. It is important to note the 11.4 MGD reductions by 2030, even though reduced by 2040, effectively reduce the need to develop new supplies (using the current forecast) until at least 2040.

The assessment of avoided supply costs related to improved water use efficiency, subjected all demand management programs judged to be potentially viable for implementation to economic evaluation. Quantification of supply-side benefits were based on the accrual of avoided costs (or benefits) from water use efficiency generally resulting from:

- Capital deferral;
- Capital elimination; and
- Reduction in variable cost.

Savings and costs were determined over a 60-year planning horizon (2010-2073) allowing savings rates in this analysis to mature over the life of the technology installed. Net avoided costs of viable demand management programs were evaluated over two separate timeframes; the total life of all savings and

through the 2040 forecast horizon. A NPV of $33.57 million in benefits to utility customers (evaluation of the impact to individual customers is not provided here) was identified over the life of the potential programs with an estimated BCR of 2.1. NPV of avoided costs were estimated to be $8.9 million over the shorter 2040 planning horizon.

In addition to these avoided cost benefits, the environmental benefits associated with water demand management include reduction in greenhouse gas emissions. The Congressional Research Service, in 2010, estimated that about 12.6 percent of the nation's energy demand is used to treat, pump, and heat water.[16] On the water supply side, pumping water is the main consumer of energy; this includes pumping untreated water to treatment plants and delivery of treated water to customers. Therefore, a reduction in water use saves energy because less water needs to be pumped and treated.

The utility and individual customer benefits from reduced electrical usage were estimated using the AWE Tool. Table 5-1 presents the utility benefits of electrical consumption reductions associated with reduced water production.[17]

Table 5-1
Utility Benefits of Electrical Consumption Reductions

Benefits	Units	2014	2020	2025	2030	2035	2040
Electricity Savings	MWh	0	251	3268	6068	5021	4054
Value of Electricity Savings	2017 $ (Thou.)	0	19	245	455	377	304
GHG Emission Reductions	Tons	0	168	2188	4063	3362	2714

5.4 Recommendations

The DMP update results indicate demand management activities stemming from gains in water efficiency can effectively serve as a complementary component to traditional water supply planning processes in meeting current and future water demands. Through efficient use of available supplies and use of targeted implementation strategies, increases water use efficiency, whether they occur passively or are expedited by utility policies, can help manage peak and average day water demand in conjunction with reducing long-term future water supply requirements.

Regular monitoring and routine updates of the passive efficiency forecast should continue to reduce uncertainties over the water supply planning horizon, particularly with respect to Tampa Bay Water's long-term demand forecasting, future need analysis, and LTMWP updates.

Cost-effective alternatives to new supply development and other valuable benefits can be realized through demand side management including optimization of existing facilities, deferred capital investment costs, improved public perception, support of future supply projects, reductions electric consumption, and environmental stewardship and protection.

[16] Copeland, Claudia. Energy-Water-Nexus: The Water Sector's Energy Use. Congressional Research Service. January 3, 2014. https://www.fas.org/sgp/crs/misc/R43200.pdf. Page 3.

[17] Assumes average rate of $0.02/KWh and average energy use of 1,458 KWh/MG.

It is recommended Tampa Bay Water continue to estimate and assess avoided operational and capital costs as a formal part of its water supply planning process. As part of this process, Tampa Bay Water should continue to refine and optimize the predicted schedule and need of additional water supply and/or the optimization of existing facilities, by estimating the level of demand reductions possible or necessary to eliminate or defer meaningful amounts of capital and operational investments.

Furthermore, it is recommended Tampa Bay Water:

- Work with member governments to develop implementation strategies that can be used to reduce potential supply development capital and operating costs consistent with the interlocal agreement requirements.
- Collaborate with local home builders, nonresidential organizations and IFAS (Institute of Food and Agricultural Sciences) to promote and design programs that will result in market uptake.
- Pursue cooperative funding and other grant opportunities such as Southwest Florida Water Management funds, Florida Department of Environmental Protection Safe Drinking Water Act State Revolving Funds to help support the program, and further increase the economic benefits identified in this plan.
- Design and implement customized implementation and marketing strategies for individual programs.
- Identify program administration needs and qualifications.

Incorporation of the effects of increased water-use efficiency into the Agency's long-term planning process provides the Board of Directors with more supply policy options, affords Tampa Bay Water and its member governments a supply buffer (increased water use efficiency reduces demand) and allows the agency to prepare and plan for observed and anticipated changes in water use efficiency. These activities should continue to be supported by the types of analytical methods and strategies described in both the 2013 and 2018 DMP updates, and through deliberate integration of anticipated water savings into ongoing water demand forecasting and supply planning.

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Appendix A: Clothes Washers by WPDA

Table A-1
Single- Family Rebate Eligible Clothes Washers (PAS)

		Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	15 WF	18,066	10,718	6,937	4,490	2,906	1,881	25.0%	12.0%	7.0%	4.2%	2.5%	1.5%	-16,185	89.59%	-8.33%
PAS	11 WF	24,473	18,713	15,750	13,831	12,590	11,786	33.9%	20.9%	15.8%	12.9%	11.0%	9.6%	-12,686	51.84%	-2.77%
PAS	9.5 WF	14,739	16,055	14,753	13,911	13,365	13,012	20.4%	17.9%	14.8%	13.0%	11.6%	10.6%	-1,726	11.71%	-0.48%
PAS	8 WF	7,441	16,863	22,120	25,833	29,083	32,106	10.3%	18.8%	22.2%	24.1%	25.3%	26.1%	24,665	-331.50%	5.78%
PAS	6 WF	7,570	11,878	11,878	11,878	11,878	11,878	10.5%	13.3%	11.9%	11.1%	10.3%	9.7%	4,309	-56.92%	1.75%
PAS	4.5 WF	0	15,350	28,169	37,192	45,019	52,243	0.0%	17.1%	28.3%	34.7%	39.2%	42.5%	52,243	N/A	N/A
PAS	Rebate Eligible	64,717	62,350	59,561	58,065	57,944	58,786	89.5%	69.6%	59.8%	54.2%	50.5%	47.8%	-5,932	9.17%	-0.37%
PAS	Total CW	72,287	89,579	99,608	107,135	114,841	122,907	100%	100%	100%	100%	100%	100%	50,620	-70.03%	2.06%

Table A-2
Single- Family Rebate Eligible Clothes Washers (NPR)

		Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
NPR	15 WF	2,276	1,350	874	566	366	237	38.5%	21.4%	13.6%	8.8%	5.7%	3.6%	-2,039	89.59%	-8.33%
NPR	11 WF	1,556	1,222	1,050	939	867	820	26.3%	19.4%	16.3%	14.6%	13.4%	12.6%	-735	47.26%	-2.43%
NPR	9.5 WF	1,102	1,036	914	835	784	751	18.6%	16.4%	14.2%	13.0%	12.2%	11.5%	-350	31.79%	-1.46%
NPR	8 WF	520	1,101	1,363	1,501	1,601	1,683	8.8%	17.5%	21.2%	23.4%	24.8%	25.8%	1,163	-223.75%	4.62%
NPR	6 WF	462	654	654	654	654	654	7.8%	10.4%	10.1%	10.2%	10.1%	10.0%	192	-41.55%	1.35%
NPR	4.5 WF	0	941	1,586	1,931	2,178	2,379	0.0%	14.9%	24.6%	30.0%	33.8%	36.5%	2,379	N/A	N/A
NPR	Rebate Eligible	5,453	4,709	4,201	3,841	3,619	3,492	92.2%	74.7%	65.2%	59.8%	56.1%	53.5%	-1,961	35.96%	-1.70%
NPR	Total CW	5,914	6,304	6,441	6,426	6,450	6,524	100%	100%	100%	100%	100%	100%	610	-10.31%	0.38%

Table A-3
Single- Family Rebate Eligible Clothes Washers (NWH)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
NWH	15 WF	13,523	8,023	5,193	3,361	2,175	1,408	31.2%	17.2%	10.4%	6.3%	3.9%	2.4%	-12,115	89.59%	-8.33%
NWH	11 WF	13,012	10,301	8,906	8,003	7,419	7,041	30.0%	22.1%	17.8%	15.1%	13.3%	12.1%	-5,972	45.89%	-2.33%
NWH	9.5 WF	8,194	7,890	7,151	6,674	6,364	6,164	18.9%	16.9%	14.3%	12.6%	11.4%	10.6%	-2,030	24.77%	-1.09%
NWH	8 WF	4,502	8,449	10,860	12,676	14,026	15,210	10.4%	18.1%	21.7%	23.9%	25.2%	26.1%	10,708	-237.85%	4.79%
NWH	6 WF	4,156	5,423	5,423	5,423	5,423	5,423	9.6%	11.6%	10.8%	10.2%	9.7%	9.3%	1,267	-30.48%	1.03%
NWH	4.5 WF	0	6,595	12,516	16,948	20,228	23,075	0.0%	14.1%	25.0%	31.9%	36.4%	39.6%	23,075	N/A	N/A
NWH	Rebate Eligible	39,230	34,663	32,110	30,714	29,985	29,822	90.4%	74.3%	64.2%	57.9%	53.9%	51.1%	-9,408	23.98%	-1.05%
NWH	15 WF	13,523	8,023	5,193	3,361	2,175	1,408	31.2%	17.2%	10.4%	6.3%	3.9%	2.4%	-12,115	89.59%	-8.33%

Table A-3
Single- Family Rebate Eligible Clothes Washers (SCH)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
SCH	15 WF	21,626	12,830	8,304	5,375	3,479	2,251	25.5%	12.7%	7.2%	4.2%	2.5%	1.5%	-19,374	89.59%	-8.33%
SCH	11 WF	27,909	21,238	17,804	15,582	14,144	13,213	33.0%	21.0%	15.5%	12.1%	10.1%	8.6%	-14,697	52.66%	-2.84%
SCH	9.5 WF	17,324	17,633	16,203	15,278	14,679	14,291	20.5%	17.4%	14.1%	11.9%	10.4%	9.3%	-3,033	17.51%	-0.74%
SCH	8 WF	8,443	19,137	25,897	31,558	36,285	40,725	10.0%	18.9%	22.5%	24.6%	25.8%	26.6%	32,282	-382.36%	6.24%
SCH	6 WF	9,340	12,798	12,798	12,798	12,798	12,798	11.0%	12.6%	11.1%	10.0%	9.1%	8.4%	3,458	-37.02%	1.22%
SCH	4.5 WF	0	17,596	34,066	47,741	59,085	69,666	0.0%	17.4%	29.6%	37.2%	42.1%	45.6%	69,666	N/A	N/A
SCH	Rebate Eligible	75,303	70,838	68,209	67,792	68,586	70,481	89.0%	70.0%	59.3%	52.8%	48.8%	46.1%	-4,822	6.40%	-0.25%
SCH	Total CW	84,642	101,232	115,073	128,331	140,469	152,945	100%	100%	100%	100%	100%	100%	68,302	-80.70%	2.30%

Table A-4
Single- Family Rebate Eligible Clothes Washers (COT)

		Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
COT	15 WF	30,884	18,323	11,859	7,676	4,968	3,215	31.5%	16.8%	9.7%	5.7%	3.4%	2.1%	-27,668	89.59%	-8.33%
COT	11 WF	26,444	21,278	18,619	16,899	15,785	15,064	27.0%	19.5%	15.3%	12.6%	10.9%	9.7%	-11,380	43.03%	-2.14%
COT	9.5 WF	20,006	19,194	17,497	16,398	15,687	15,227	20.4%	17.6%	14.4%	12.3%	10.9%	9.8%	-4,779	23.89%	-1.04%
COT	8 WF	9,864	19,961	26,770	32,289	36,742	40,833	10.1%	18.3%	22.0%	24.2%	25.5%	26.3%	30,969	-313.97%	5.62%
COT	6 WF	10,693	13,478	13,478	13,478	13,478	13,478	10.9%	12.3%	11.1%	10.1%	9.3%	8.7%	2,784	-26.04%	0.89%
COT	4.5 WF	0	16,980	33,588	46,943	57,655	67,422	0.0%	15.5%	27.6%	35.1%	40.0%	43.4%	67,422	N/A	N/A
COT	Rebate Eligible	87,197	78,756	74,745	73,261	73,182	74,339	89.1%	72.1%	61.4%	54.8%	50.7%	47.9%	-12,858	14.75%	-0.61%
COT	Total CW	97,891	109,214	121,811	133,682	144,315	155,239	100%	100%	100%	100%	100%	100%	57,348	-58.58%	1.79%

Table A-5
Single- Family Rebate Eligible Clothes Washers (PIN)

		Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PIN	15 WF	30,778	18,260	11,819	7,649	4,951	3,204	35.7%	20.6%	13.1%	8.3%	5.3%	4.0%	-27,574	89.59%	-8.33%
PIN	11 WF	23,514	19,466	17,383	16,035	15,162	14,598	27.3%	22.0%	19.3%	17.5%	16.1%	18.3%	-8,917	37.92%	-1.82%
PIN	9.5 WF	15,120	14,218	12,716	11,744	11,114	10,707	17.5%	16.1%	14.1%	12.8%	11.8%	13.4%	-4,413	29.19%	-1.32%
PIN	8 WF	9,749	16,228	19,502	21,854	23,650	24,956	11.3%	18.3%	21.7%	23.8%	25.2%	31.2%	15,207	-155.99%	3.68%
PIN	6 WF	6,992	9,253	9,253	9,253	9,253	9,253	8.1%	10.5%	10.3%	10.1%	9.9%	11.6%	2,261	-32.33%	1.08%
PIN	4.5 WF	0	11,023	19,349	25,282	29,764	33,001	0.0%	12.5%	21.5%	27.5%	31.7%	41.3%	33,001	N/A	N/A
PIN	Rebate Eligible	79,161	68,173	61,420	57,282	54,878	53,465	91.9%	77.1%	68.2%	62.4%	58.4%	66.8%	-25,696	32.46%	-1.50%
PIN	Total CW	86,153	88,449	90,022	91,817	93,895	95,719	100%	100%	100%	100%	100%	120%	9,566	-11.10%	0.41%

Table A-6
Single- Family Rebate Eligible Clothes Washers (STP)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
STP	15 WF	25,973	15,409	9,973	6,455	4,178	2,704	36.8%	21.0%	13.3%	8.5%	5.3%	3.4%	-23,269	89.59%	-8.33%
STP	11 WF	18,436	15,220	13,565	12,494	11,800	11,352	26.2%	20.7%	18.1%	16.4%	15.1%	14.2%	-7,085	38.43%	-1.85%
STP	9.5 WF	12,663	12,104	10,813	9,977	9,436	9,086	18.0%	16.5%	14.5%	13.1%	12.1%	11.4%	-3,576	28.24%	-1.27%
STP	8 WF	7,694	13,311	16,040	18,016	19,562	20,725	10.9%	18.1%	21.5%	23.6%	25.0%	25.9%	13,031	-169.36%	3.88%
STP	6 WF	5,725	7,910	7,910	7,910	7,910	7,910	8.1%	10.8%	10.6%	10.4%	10.1%	9.9%	2,185	-38.18%	1.25%
STP	4.5 WF	0	9,493	16,462	21,464	25,329	28,210	0.0%	12.9%	22.0%	28.1%	32.4%	35.3%	28,210	N/A	N/A
STP	Rebate Eligible	64,765	56,044	50,391	46,942	44,977	43,867	91.9%	76.3%	67.4%	61.5%	57.5%	54.8%	-20,898	32.27%	-1.49%
STP	Total CW	70,490	73,447	74,763	76,315	78,215	79,987	100%	100%	100%	100%	100%	100%	9,497	-13.47%	0.49%

Table A-7
Multifamily Rebate Eligible Clothes Washers (PAS)

		Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PAS	15 WF	3,357	1,992	1,289	834	540	349	26.6%	13.4%	7.8%	4.5%	2.7%	1.7%	-3,007	89.59%	-8.33%
PAS	11 WF	4,223	3,577	3,245	3,030	2,890	2,800	33.4%	24.1%	19.6%	16.2%	14.5%	13.6%	-1,422	33.68%	-1.57%
PAS	9.5 WF	2,192	2,364	2,171	2,045	1,964	1,911	17.4%	15.9%	13.1%	11.0%	9.9%	9.3%	-280	12.79%	-0.52%
PAS	8 WF	1,729	3,016	3,885	4,721	5,248	5,549	13.7%	20.3%	23.4%	25.3%	26.3%	26.9%	3,821	-221.02%	4.59%
PAS	6 WF	1,125	1,741	1,741	1,741	1,741	1,741	8.9%	11.7%	10.5%	9.3%	8.7%	8.4%	615	-54.69%	1.69%
PAS	4.5 WF	0	2,145	4,264	6,276	7,547	8,276	0.0%	14.5%	25.7%	33.7%	37.9%	40.1%	8,276	N/A	N/A
PAS	Rebate Eligible	11,500	10,948	10,589	10,630	10,642	10,611	91.1%	73.8%	63.8%	57.0%	53.4%	51.4%	-889	7.73%	-0.31%
PAS	Total CW	12,625	14,834	16,594	18,646	19,929	20,627	100%	100%	100%	100%	100%	100%	8,002	-63.38%	1.91%

Table A-8
Multifamily Rebate Eligible Clothes Washers (NPR)

		Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
WDPA	Variable	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
NPR	15 WF	1,519	901	583	377	244	158	39.0%	22.5%	14.1%	8.8%	5.7%	3.8%	-1,361	89.59%	-8.33%
NPR	11 WF	1,064	855	747	678	633	603	27.4%	21.3%	18.1%	15.8%	14.9%	14.7%	-461	43.31%	-2.16%
NPR	9.5 WF	656	610	532	483	450	429	16.9%	15.2%	12.9%	11.3%	10.6%	10.4%	-227	34.56%	-1.62%
NPR	8 WF	398	724	901	1,039	1,089	1,087	10.2%	18.1%	21.8%	24.3%	25.6%	26.4%	688	-172.73%	3.93%
NPR	6 WF	253	369	369	369	369	369	6.5%	9.2%	8.9%	8.6%	8.7%	9.0%	116	-45.62%	1.46%
NPR	4.5 WF	0	549	993	1,335	1,464	1,466	0.0%	13.7%	24.1%	31.2%	34.5%	35.7%	1,466	N/A	N/A
NPR	Rebate Eligible	3,637	3,089	2,764	2,577	2,416	2,277	93.5%	77.1%	67.0%	60.2%	56.9%	55.4%	-1,360	37.39%	-1.78%
NPR	Total CW	3,891	4,007	4,126	4,281	4,249	4,113	100%	100%	100%	100%	100%	100%	222	-5.70%	0.21%

Table A-9
Multifamily Rebate Eligible Clothes Washers (NWH)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
NWH	15 WF	5,153	3,057	1,979	1,281	829	536	32.1%	17.8%	11.1%	7.1%	4.6%	3.0%	-4,616	89.59%	-8.33%
NWH	11 WF	5,113	4,161	3,672	3,355	3,150	3,017	31.8%	24.2%	20.6%	18.6%	17.5%	17.0%	-2,096	40.99%	-2.01%
NWH	9.5 WF	2,732	2,642	2,330	2,128	1,997	1,912	17.0%	15.3%	13.1%	11.8%	11.1%	10.8%	-820	30.01%	-1.36%
NWH	8 WF	1,986	3,355	4,053	4,471	4,655	4,717	12.4%	19.5%	22.8%	24.7%	25.9%	26.6%	2,731	-137.55%	3.38%
NWH	6 WF	1,073	1,652	1,652	1,652	1,652	1,652	6.7%	9.6%	9.3%	9.1%	9.2%	9.3%	579	-53.96%	1.67%
NWH	4.5 WF	0	2,347	4,122	5,194	5,683	5,866	0.0%	13.6%	23.1%	28.7%	31.6%	33.1%	5,866	N/A	N/A
NWH	Rebate Eligible	14,983	13,216	12,033	11,234	10,630	10,183	93.3%	76.8%	67.6%	62.1%	59.2%	57.5%	-4,801	32.04%	-1.47%
NWH	Total CW	16,056	17,214	17,806	18,080	17,965	17,700	100%	100%	100%	100%	100%	100%	1,644	-10.24%	0.38%

Table A-10
Multifamily Rebate Eligible Clothes Washers (SCH)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
SCH	15 WF	7,027	5,273	4,371	3,787	3,409	3,164	35.8%	22.4%	17.0%	13.8%	12.0%	10.9%	-3,863	54.97%	-3.02%
SCH	11 WF	6,630	5,568	5,022	4,669	4,440	4,292	33.7%	23.7%	19.5%	17.0%	15.7%	14.8%	-2,338	35.26%	-1.66%
SCH	9.5 WF	3,014	3,278	3,026	2,864	2,758	2,690	15.3%	14.0%	11.8%	10.5%	9.7%	9.3%	-324	10.74%	-0.44%
SCH	8 WF	2,297	4,404	5,543	6,351	6,838	7,141	11.7%	18.7%	21.6%	23.2%	24.1%	24.7%	4,844	-210.84%	4.46%
SCH	6 WF	681	1,525	1,525	1,525	1,525	1,525	3.5%	6.5%	5.9%	5.6%	5.4%	5.3%	843	-123.82%	3.15%
SCH	4.5 WF	0	3,446	6,230	8,199	9,388	10,131	0.0%	14.7%	24.2%	29.9%	33.1%	35.0%	10,131	N/A	N/A
SCH	Rebate Eligible	18,967	18,523	17,962	17,670	17,444	17,287	96.5%	78.8%	69.8%	64.5%	61.5%	59.7%	-1,680	8.86%	-0.36%
SCH	Total CW	19,649	23,494	25,717	27,393	28,357	28,943	100%	100%	100%	100%	100%	100%	9,294	-47.30%	1.50%

Table A-11
Multifamily Rebate Eligible Clothes Washers (COT)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
COT	15 WF	21,522	18,446	16,863	15,839	15,175	14,746	46.4%	35.8%	30.0%	26.5%	24.5%	23.3%	-6,776	31.48%	-1.44%
COT	11 WF	11,571	10,333	9,696	9,284	9,017	8,844	24.9%	20.1%	17.2%	15.5%	14.5%	14.0%	-2,726	23.56%	-1.03%
COT	9.5 WF	7,996	7,940	7,541	7,282	7,114	7,006	17.2%	15.4%	13.4%	12.2%	11.5%	11.1%	-990	12.38%	-0.51%
COT	8 WF	3,453	6,627	8,780	10,337	11,281	11,888	7.4%	12.9%	15.6%	17.3%	18.2%	18.8%	8,435	-244.29%	4.87%
COT	6 WF	1,891	2,698	2,698	2,698	2,698	2,698	4.1%	5.2%	4.8%	4.5%	4.4%	4.3%	807	-42.69%	1.38%
COT	4.5 WF	0	5,425	10,644	14,406	16,691	18,160	0.0%	10.5%	18.9%	24.1%	26.9%	28.7%	18,160	N/A	N/A
COT	Rebate Eligible	44,542	43,346	42,879	42,741	42,588	42,484	95.9%	84.2%	76.3%	71.4%	68.7%	67.1%	-2,058	4.62%	-0.18%
COT	Total CW	46,433	51,470	56,222	59,845	61,976	63,342	100%	100%	100%	100%	100%	100%	16,909	-36.42%	1.20%

Table A-12
Multifamily Rebate Eligible Clothes Washers (PIN)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
PIN	15 WF	28,006	19,408	14,984	12,120	10,267	9,067	40.0%	26.9%	19.9%	15.6%	13.1%	11.6%	-18,939	67.62%	-4.24%
PIN	11 WF	17,906	15,274	13,920	13,043	12,476	12,109	25.6%	21.2%	18.4%	16.8%	15.9%	15.5%	-5,797	32.38%	-1.49%
PIN	9.5 WF	12,158	11,552	10,528	9,865	9,436	9,159	17.4%	16.0%	13.9%	12.7%	12.0%	11.8%	-2,999	24.67%	-1.08%
PIN	8 WF	6,977	11,568	14,468	16,370	17,362	17,728	10.0%	16.0%	19.2%	21.1%	22.2%	22.8%	10,751	-154.10%	3.65%
PIN	6 WF	4,894	6,444	6,444	6,444	6,444	6,444	7.0%	8.9%	8.5%	8.3%	8.2%	8.3%	1,550	-31.67%	1.06%
PIN	4.5 WF	0	7,901	15,141	19,887	22,399	23,375	0.0%	11.0%	20.1%	25.6%	28.6%	30.0%	23,375	N/A	N/A
PIN	Rebate Eligible	65,047	57,803	53,899	51,399	49,541	48,062	93.0%	80.1%	71.4%	66.1%	63.2%	61.7%	-16,985	26.11%	-1.16%
PIN	Total CW	69,941	72,147	75,484	77,730	78,384	77,881	100%	100%	100%	100%	100%	100%	7,940	-11.35%	0.41%

Table A-13
Multifamily Rebate Eligible Clothes Washers (STP)

WDPA	Variable	Clothes Washers						Percent of Total Clothes Washers						Absolute Change	% Change	Annual Avg.% Change
		2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
STP	15 WF	17,939	14,548	12,804	11,674	10,943	10,470	48.8%	37.1%	30.8%	27.0%	24.8%	23.7%	-7,468	41.63%	-2.05%
STP	11 WF	8,670	7,734	7,252	6,940	6,739	6,608	23.6%	19.7%	17.4%	16.1%	15.3%	14.9%	-2,062	23.78%	-1.04%
STP	9.5 WF	5,871	5,718	5,311	5,047	4,877	4,766	16.0%	14.6%	12.8%	11.7%	11.1%	10.8%	-1,105	18.82%	-0.80%
STP	8 WF	2,859	5,204	6,633	7,600	8,163	8,415	7.8%	13.3%	16.0%	17.6%	18.5%	19.0%	5,556	-194.30%	4.24%
STP	6 WF	1,409	2,124	2,124	2,124	2,124	2,124	3.8%	5.4%	5.1%	4.9%	4.8%	4.8%	714	-50.68%	1.59%
STP	4.5 WF	0	3,915	7,444	9,826	11,221	11,861	0.0%	10.0%	17.9%	22.7%	25.5%	26.8%	11,861	N/A	N/A
STP	Rebate Eligible	35,338	33,204	31,999	31,261	30,722	30,259	96.2%	84.6%	77.0%	72.3%	69.7%	68.4%	-5,079	14.37%	-0.60%
STP	Total CW	36,748	39,242	41,567	43,211	44,067	44,244	100%	100%	100%	100%	100%	100%	7,496	-20.40%	0.72%

Appendix B: Irrigators by WDPA

Table B-1
SF Surplus and Deficit Irrigator Projections (PAS)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	74,523	92,349	102,689	110,449	118,393	126,708	100%	100%	100%	100%	100%	100%	52,185	-70.03%	2.06%
Cumulative New SF Homes	0	17,826	28,166	35,926	43,870	52,185	0.0%	19.3%	27.4%	32.5%	37.1%	41.2%	52,185	N/A	N/A
Irrigators	29,876	39,283	49,623	57,383	65,327	73,642	40.1%	42.5%	48.3%	52.0%	55.2%	58.1%	43,766	-146.49%	3.53%
Surplus Irrigators	5,476	7,201	9,096	10,518	11,974	13,499	7.3%	7.8%	8.9%	9.5%	10.1%	10.7%	8,022	-146.49%	3.53%
Deficit Irrigators	24,400	32,083	40,527	46,865	53,353	60,143	32.7%	34.7%	39.5%	42.4%	45.1%	47.5%	35,743	-146.49%	3.53%

Table B-2
SF Surplus and Deficit Irrigator Projections (NPR)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	6,097	6,498	6,641	6,624	6,649	6,726	100%	100%	100%	100%	100%	100%	629	-10.31%	0.38%
Cumulative New SF Homes	0	401	543	527	552	629	0.0%	6.2%	8.2%	8.0%	8.3%	9.3%	629	N/A	N/A
Irrigators	2,444	2,650	2,792	2,776	2,801	2,877	40.1%	40.8%	42.0%	41.9%	42.1%	42.8%	433	-17.70%	0.63%
Surplus Irrigators	448	486	512	509	513	527	7.3%	7.5%	7.7%	7.7%	7.7%	7.8%	79	-17.70%	0.63%
Deficit Irrigators	1,996	2,164	2,280	2,267	2,287	2,350	32.7%	33.3%	34.3%	34.2%	34.4%	34.9%	353	-17.70%	0.63%

Table B-3
SF Surplus and Deficit Irrigator Projections (NWH)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	44,729	48,125	51,597	54,727	57,356	60,124	100%	100%	100%	100%	100%	100%	15,396	-34.42%	1.14%
Cumulative New Homes	0	3,397	6,869	9,999	12,628	15,396	0.0%	7.1%	13.3%	18.3%	22.0%	25.6%	15,396	N/A	N/A
Irrigators	17,932	19,929	23,401	26,531	29,160	31,928	40.1%	41.4%	45.4%	48.5%	50.8%	53.1%	13,997	-78.06%	2.24%
Surplus Irrigators	3,287	3,653	4,289	4,863	5,345	5,852	7.3%	7.6%	8.3%	8.9%	9.3%	9.7%	2,566	-78.06%	2.24%
Deficit Irrigators	14,645	16,276	19,112	21,668	23,815	26,076	32.7%	33.8%	37.0%	39.6%	41.5%	43.4%	11,431	-78.06%	2.24%

Table B-4
SF Surplus and Deficit Irrigator Projections (SCH)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	87,260	104,362	118,632	132,300	144,814	157,675	100%	100%	100%	100%	100%	100%	70,415	-80.70%	2.30%
Cumulative New Homes	0	17,102	31,372	45,040	57,553	70,415	0.0%	16.4%	26.4%	34.0%	39.7%	44.7%	70,415	N/A	N/A
Irrigators	34,983	44,536	58,805	72,473	84,987	97,848	40.1%	42.7%	49.6%	54.8%	58.7%	62.1%	62,865	-179.70%	4.04%
Surplus Irrigators	6,412	8,163	10,779	13,284	15,578	17,936	7.3%	7.8%	9.1%	10.0%	10.8%	11.4%	11,523	-179.70%	4.04%
Deficit Irrigators	28,570	36,372	48,026	59,189	69,409	79,912	32.7%	34.9%	40.5%	44.7%	47.9%	50.7%	51,342	-179.70%	4.04%

Table B-5
SF Surplus and Deficit Irrigator Projections (COT)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	100,918	112,592	125,578	137,816	148,779	160,040	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	59,122	-58.58%	1.79%
Cumulative New Homes	0	11,673	24,660	36,898	47,860	59,122	0.0%	10.4%	19.6%	26.8%	32.2%	36.9%	59,122	N/A	N/A
Irrigators	40,458	47,582	60,569	72,806	83,769	95,030	40.1%	42.3%	48.2%	52.8%	56.3%	59.4%	54,572	-134.88%	3.34%
Surplus Irrigators	7,416	8,722	11,102	13,345	15,355	17,419	7.3%	7.7%	8.8%	9.7%	10.3%	10.9%	10,003	-134.88%	3.34%
Deficit Irrigators	33,042	38,860	49,466	59,461	68,414	77,611	32.7%	34.5%	39.4%	43.1%	46.0%	48.5%	44,569	-134.88%	3.34%

Table B-6
SF Surplus and Deficit Irrigator Projections (PIN)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	88,817	91,184	92,806	94,656	96,799	98,679	100%	100%	100%	100%	100%	100%	9,862	-11.10%	0.41%
Cumulative New SF Homes	0	2,367	3,989	5,839	7,981	9,862	0.0%	2.6%	4.3%	6.2%	8.2%	10.0%	9,862	N/A	N/A
Irrigators	35,607	36,940	38,562	40,412	42,555	44,435	40.1%	40.5%	41.6%	42.7%	44.0%	45.0%	8,828	-24.79%	0.86%
Surplus Irrigators	6,527	6,771	7,068	7,408	7,800	8,145	7.3%	7.4%	7.6%	7.8%	8.1%	8.3%	1,618	-24.79%	0.86%
Deficit Irrigators	29,080	30,169	31,494	33,005	34,754	36,290	32.7%	33.1%	33.9%	34.9%	35.9%	36.8%	7,210	-24.79%	0.86%

Table B-7
SF Surplus and Deficit Irrigator Projections (STP)

Variable	Total						Percent of Total Homes						Absolute Change	% Change	Annual Avg.% Change
	2014	2020	2025	2030	2035	2040	2014	2020	2025	2030	2035	2040			
Total Homes	72,670	75,719	77,076	78,676	80,634	82,460	100%	100%	100%	100%	100%	100%	9,790	-13.47%	0.49%
Cumulative New SF Homes	0	3,049	4,406	6,006	7,964	9,790	0.0%	4.0%	5.7%	7.6%	9.9%	11.9%	9,790	N/A	N/A
Irrigators	29,133	30,670	32,027	33,627	35,586	37,412	40.1%	40.5%	41.6%	42.7%	44.1%	45.4%	8,279	-28.42%	0.97%
Surplus Irrigators	5,340	5,622	5,871	6,164	6,523	6,858	7.3%	7.4%	7.6%	7.8%	8.1%	8.3%	1,517	-28.42%	0.97%
Deficit Irrigators	23,793	25,049	26,157	27,463	29,063	30,554	32.7%	33.1%	33.9%	34.9%	36.0%	37.1%	6,761	-28.42%	0.97%

Appendix C: Planned Interventions by WDPA

Table C-1
Planned Annual Interventions (PAS)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PAS	2020	65	700	100	68	300	60	20	60	4	1	1
PAS	2021	150	1,500	300	150	600	100	40	130	5	1	1
PAS	2022	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2023	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2024	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2025	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2026	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2027	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2028	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2029	150	1,500	300	300	600	100	40	130	5	1	1
PAS	2030	150	1,500	300	300	600	100	40	130	5	1	1

Table C-2
Planned Annual Interventions (NPR)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NPR	2020	5	100	2	2	40	10	10	10	1	0	0
NPR	2021	10	200	5	3	100	20	10	20	1	0	0
NPR	2022	10	200	5	5	100	20	10	20	1	0	0
NPR	2023	10	200	5	5	100	20	10	20	1	0	0
NPR	2024	10	200	5	5	100	20	10	20	1	0	0
NPR	2025	10	200	5	5	100	20	10	20	1	0	0
NPR	2026	10	200	5	5	100	20	10	20	1	0	0
NPR	2027	10	200	5	5	100	20	10	20	1	0	0
NPR	2028	10	200	5	5	100	20	10	20	1	0	0
NPR	2029	10	200	5	5	100	20	10	20	1	0	0
NPR	2030	10	200	5	5	100	20	10	20	1	0	0

Table C-3
Planned Annual Interventions (NWH)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NWH	2020	25	80	30	20	60	30	10	70	3	1	0
NWH	2021	70	200	80	60	100	70	20	150	3	1	0
NWH	2022	70	200	80	80	100	70	20	150	3	1	0
NWH	2023	70	200	80	80	100	70	20	150	3	1	0
NWH	2024	70	200	80	80	100	70	20	150	3	1	0
NWH	2025	70	200	80	80	100	70	20	150	3	1	0
NWH	2026	70	200	80	80	100	70	20	150	3	1	0
NWH	2027	70	200	80	80	100	70	20	150	3	1	0
NWH	2028	70	200	80	80	100	70	20	150	3	1	0
NWH	2029	70	200	80	80	100	70	20	150	3	1	0
NWH	2030	70	200	80	80	100	70	20	150	3	1	0

Table C-4
Planned Annual Interventions (SCH)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
SCH	2020	80	120	200	70	100	100	30	150	5	1	0
SCH	2021	180	300	400	250	100	190	60	310	5	1	0
SCH	2022	180	300	400	400	100	190	60	310	5	1	0
SCH	2023	180	300	400	400	100	190	60	310	5	1	0
SCH	2024	180	300	400	400	100	190	60	310	5	1	0
SCH	2025	180	300	400	400	100	190	60	310	5	1	0
SCH	2026	180	300	400	400	100	190	60	310	5	1	0
SCH	2027	180	300	400	400	100	190	60	310	5	1	0
SCH	2028	180	300	400	400	100	190	60	310	5	1	0
SCH	2029	180	300	400	400	100	190	60	310	5	1	0
SCH	2030	180	300	400	400	100	190	60	310	5	1	0

Table C-5
Planned Annual Interventions (COT)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
COT	2020	50	800	50	20	400	500	300	600	17	1	1
COT	2021	190	1,600	300	100	900	1,100	620	1,250	36	10	7
COT	2022	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2023	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2024	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2025	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2026	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2027	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2028	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2029	190	1,600	300	300	900	1,100	620	1,250	36	10	7
COT	2030	190	1,600	300	300	900	1,100	620	1,250	36	10	7

Table C-6
Planned Annual Interventions (PIN)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PIN	2020	50	600	10	10	700	100	100	100	5	1	1
PIN	2021	100	1,300	50	20	1,600	200	200	220	11	4	3
PIN	2022	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2023	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2024	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2025	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2026	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2027	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2028	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2029	100	1,300	50	50	1,600	200	200	220	11	4	3
PIN	2030	100	1,300	50	50	1,600	200	200	220	11	4	3

Table C-7
Planned Annual Interventions (STP)

WDPA	Year	SF				MF	NR					
		Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
STP	2020	50	500	10	10	500	100	50	100	5	1	1
STP	2021	100	1,000	50	20	900	270	100	220	10	3	2
STP	2022	100	1,000	50	50	900	270	100	220	10	3	2
STP	2023	100	1,000	50	50	900	270	100	220	10	3	2
STP	2024	100	1,000	50	50	900	270	100	220	10	3	2
STP	2025	100	1,000	50	50	900	270	100	220	10	3	2
STP	2026	100	1,000	50	50	900	270	100	220	10	3	2
STP	2027	100	1,000	50	50	900	270	100	220	10	3	2
STP	2028	100	1,000	50	50	900	270	100	220	10	3	2
STP	2029	100	1,000	50	50	900	270	100	220	10	3	2
STP	2030	100	1,000	50	50	900	270	100	220	10	3	2

Table C-8
Planned Cumulative Interventions (PAS)

		SF				MF	NR					
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PAS	2020	65	700	100	68	300	60	20	60	4	1	1
PAS	2021	215	2,200	400	218	900	160	60	190	9	2	2
PAS	2022	365	3,700	700	518	1,500	260	100	320	14	3	3
PAS	2023	515	5,200	1,000	818	2,100	360	140	450	19	4	4
PAS	2024	665	6,700	1,300	1,118	2,700	460	180	580	24	5	5
PAS	2025	815	8,200	1,600	1,418	3,300	560	220	710	29	6	6
PAS	2026	965	9,700	1,900	1,718	3,900	660	260	840	34	7	7
PAS	2027	1,115	11,200	2,200	2,018	4,500	760	300	970	39	8	8
PAS	2028	1,265	12,700	2,500	2,318	5,100	860	340	1,100	44	9	9
PAS	2029	1,415	14,200	2,800	2,618	5,700	960	380	1,230	49	10	10
PAS	2030	1,565	15,700	3,100	2,918	6,300	1,060	420	1,360	54	11	11

Table C-9
Planned Cumulative Interventions (NPR)

		SF				MF	NR					
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NPR	2020	5	100	2	2	40	10	10	10	1	0	0
NPR	2021	15	300	7	5	140	30	20	30	2	0	0
NPR	2022	25	500	12	10	240	50	30	50	3	0	0
NPR	2023	35	700	17	15	340	70	40	70	4	0	0
NPR	2024	45	900	22	20	440	90	50	90	5	0	0
NPR	2025	55	1,100	27	25	540	110	60	110	6	0	0
NPR	2026	65	1,300	32	30	640	130	70	130	7	0	0
NPR	2027	75	1,500	37	35	740	150	80	150	8	0	0
NPR	2028	85	1,700	42	40	840	170	90	170	9	0	0
NPR	2029	95	1,900	47	45	940	190	100	190	10	0	0
NPR	2030	105	2,100	52	50	1,040	210	110	210	11	0	0

Table C-10
Planned Cumulative Interventions (NWH)

		SF				MF	NR					
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NWH	2020	25	80	30	20	60	30	10	70	3	1	0
NWH	2021	95	280	110	80	160	100	30	220	6	2	0
NWH	2022	165	480	190	160	260	170	50	370	9	3	0
NWH	2023	235	680	270	240	360	240	70	520	12	4	0
NWH	2024	305	880	350	320	460	310	90	670	15	5	0
NWH	2025	375	1,080	430	400	560	380	110	820	18	6	0
NWH	2026	445	1,280	510	480	660	450	130	970	21	7	0
NWH	2027	515	1,480	590	560	760	520	150	1,120	24	8	0
NWH	2028	585	1,680	670	640	860	590	170	1,270	27	9	0
NWH	2029	655	1,880	750	720	960	660	190	1,420	30	10	0
NWH	2030	725	2,080	830	800	1,060	730	210	1,570	33	11	0

Table C-11
Planned Cumulative Interventions (SCH)

		SF				MF	NR					
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
SCH	2020	80	120	200	70	100	100	30	150	5	1	0
SCH	2021	260	420	600	320	200	290	90	460	10	2	0
SCH	2022	440	720	1,000	720	300	480	150	770	15	3	0
SCH	2023	620	1,020	1,400	1,120	400	670	210	1,080	20	4	0
SCH	2024	800	1,320	1,800	1,520	500	860	270	1,390	25	5	0
SCH	2025	980	1,620	2,200	1,920	600	1,050	330	1,700	30	6	0
SCH	2026	1,160	1,920	2,600	2,320	700	1,240	390	2,010	35	7	0
SCH	2027	1,340	2,220	3,000	2,720	800	1,430	450	2,320	40	8	0
SCH	2028	1,520	2,520	3,400	3,120	900	1,620	510	2,630	45	9	0
SCH	2029	1,700	2,820	3,800	3,520	1,000	1,810	570	2,940	50	10	0
SCH	2030	1,880	3,120	4,200	3,920	1,100	2,000	630	3,250	55	11	0

Table C-12
Planned Cumulative Interventions (COT)

		SF				MF	NR					
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
COT	2020	50	800	50	20	400	500	300	600	17	1	1
COT	2021	240	2,400	350	120	1,300	1,600	920	1,850	53	11	8
COT	2022	430	4,000	650	420	2,200	2,700	1,540	3,100	89	21	15
COT	2023	620	5,600	950	720	3,100	3,800	2,160	4,350	125	31	22
COT	2024	810	7,200	1,250	1,020	4,000	4,900	2,780	5,600	161	41	29
COT	2025	1,000	8,800	1,550	1,320	4,900	6,000	3,400	6,850	197	51	36
COT	2026	1,190	10,400	1,850	1,620	5,800	7,100	4,020	8,100	233	61	43
COT	2027	1,380	12,000	2,150	1,920	6,700	8,200	4,640	9,350	269	71	50
COT	2028	1,570	13,600	2,450	2,220	7,600	9,300	5,260	10,600	305	81	57
COT	2029	1,760	15,200	2,750	2,520	8,500	10,400	5,880	11,850	341	91	64
COT	2030	1,950	16,800	3,050	2,820	9,400	11,500	6,500	13,100	377	101	71

Table C-13
Planned Cumulative Interventions (PIN)

		SF				MF	NR					
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PIN	2020	50	600	10	10	700	100	100	100	5	1	1
PIN	2021	150	1,900	60	30	2,300	300	300	320	16	5	4
PIN	2022	250	3,200	110	80	3,900	500	500	540	27	9	7
PIN	2023	350	4,500	160	130	5,500	700	700	760	38	13	10
PIN	2024	450	5,800	210	180	7,100	900	900	980	49	17	13
PIN	2025	550	7,100	260	230	8,700	1,100	1,100	1,200	60	21	16
PIN	2026	650	8,400	310	280	10,300	1,300	1,300	1,420	71	25	19
PIN	2027	750	9,700	360	330	11,900	1,500	1,500	1,640	82	29	22
PIN	2028	850	11,000	410	380	13,500	1,700	1,700	1,860	93	33	25
PIN	2029	950	12,300	460	430	15,100	1,900	1,900	2,080	104	37	28
PIN	2030	1,050	13,600	510	480	16,700	2,100	2,100	2,300	115	41	31

Table C-14
Planned Cumulative Interventions (STP)

		SF			MF				NR			
WDPA	Year	Alternative Irrigation Sources	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HET (Valve)	HET (Tank)	HEUs (1/2 gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
STP	2020	50	500	10	10	500	100	50	100	5	1	1
STP	2021	150	1,500	60	30	1,400	370	150	320	15	4	3
STP	2022	250	2,500	110	80	2,300	640	250	540	25	7	5
STP	2023	350	3,500	160	130	3,200	910	350	760	35	10	7
STP	2024	450	4,500	210	180	4,100	1,180	450	980	45	13	9
STP	2025	550	5,500	260	230	5,000	1,450	550	1,200	55	16	11
STP	2026	650	6,500	310	280	5,900	1,720	650	1,420	65	19	13
STP	2027	750	7,500	360	330	6,800	1,990	750	1,640	75	22	15
STP	2028	850	8,500	410	380	7,700	2,260	850	1,860	85	25	17
STP	2029	950	9,500	460	430	8,600	2,530	950	2,080	95	28	19
STP	2030	1,050	10,500	510	480	9,500	2,800	1,050	2,300	105	31	21

Appendix D: Water Savings (MGD) by WDPA

Table D-1
Program Annual Water Savings for PAS (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
PAS	2020	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0	0.00	0.00	0.00	0.09
PAS	2021	0.06	0.08	0.06	0.03	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.28
PAS	2022	0.09	0.13	0.11	0.07	0.04	0.01	0.00	0.02	0.00	0.00	0.01	0.48
PAS	2023	0.13	0.17	0.15	0.11	0.05	0.02	0.00	0.02	0.00	0.00	0.02	0.69
PAS	2024	0.17	0.22	0.20	0.15	0.07	0.02	0.01	0.03	0.00	0.00	0.02	0.89
PAS	2025	0.21	0.27	0.25	0.20	0.08	0.03	0.01	0.04	0.00	0.00	0.02	1.09
PAS	2026	0.25	0.31	0.29	0.24	0.09	0.03	0.01	0.04	0.00	0.00	0.03	1.29
PAS	2027	0.29	0.35	0.34	0.28	0.10	0.03	0.01	0.05	0.00	0.00	0.03	1.49
PAS	2028	0.33	0.39	0.39	0.32	0.11	0.04	0.01	0.05	0.00	0.00	0.03	1.68
PAS	2029	0.36	0.43	0.43	0.36	0.12	0.04	0.01	0.06	0.00	0.00	0.04	1.87
PAS	2030	0.40	0.47	0.46	0.40	0.13	0.05	0.01	0.06	0.00	0.00	0.04	2.04

Table D-2
Program Annual Water Savings for NPR (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
NPR	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.01
NPR	2021	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.02
NPR	2022	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0	0.00	0.00	0.00	0.04
NPR	2023	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0	0.00	0.00	0.00	0.05
NPR	2024	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0	0.00	0.00	0.00	0.07
NPR	2025	0.01	0.04	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.08
NPR	2026	0.02	0.04	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.10
NPR	2027	0.02	0.05	0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.11
NPR	2028	0.02	0.05	0.01	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.12
NPR	2029	0.02	0.06	0.01	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.14
NPR	2030	0.03	0.06	0.01	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.15

Table D-3
Program Annual Water Savings for NWH (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
NWH	2020	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.02
NWH	2021	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.08
NWH	2022	0.04	0.02	0.03	0.02	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.15
NWH	2023	0.06	0.02	0.04	0.03	0.01	0.01	0.00	0.03	0.00	0.00	0.00	0.21
NWH	2024	0.08	0.03	0.05	0.04	0.01	0.01	0.00	0.03	0.00	0.00	0.00	0.27
NWH	2025	0.10	0.04	0.07	0.06	0.01	0.02	0.00	0.04	0.00	0.00	0.00	0.33
NWH	2026	0.11	0.04	0.08	0.07	0.02	0.02	0.00	0.05	0.00	0.00	0.00	0.39
NWH	2027	0.13	0.05	0.09	0.08	0.02	0.02	0.00	0.05	0.00	0.00	0.00	0.45
NWH	2028	0.15	0.05	0.10	0.09	0.02	0.03	0.01	0.06	0.00	0.00	0.00	0.51
NWH	2029	0.17	0.06	0.12	0.10	0.02	0.03	0.01	0.07	0.00	0.00	0.00	0.57
NWH	2030	0.19	0.06	0.12	0.11	0.02	0.03	0.01	0.07	0.00	0.00	0.00	0.62

Table D-4
Program Annual Water Savings for SCH (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
SCH	2020	0.02	0.00	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.08
SCH	2021	0.07	0.01	0.09	0.04	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.27
SCH	2022	0.11	0.02	0.15	0.10	0.01	0.02	0.01	0.04	0.00	0.00	0.00	0.47
SCH	2023	0.16	0.03	0.22	0.15	0.01	0.03	0.01	0.05	0.00	0.00	0.00	0.67
SCH	2024	0.21	0.04	0.28	0.21	0.01	0.04	0.01	0.07	0.00	0.00	0.00	0.87
SCH	2025	0.25	0.05	0.34	0.27	0.01	0.05	0.01	0.08	0.00	0.00	0.00	1.07
SCH	2026	0.30	0.06	0.40	0.32	0.02	0.06	0.01	0.1	0.00	0.00	0.00	1.27
SCH	2027	0.34	0.07	0.46	0.38	0.02	0.06	0.01	0.11	0.00	0.00	0.00	1.47
SCH	2028	0.39	0.08	0.53	0.43	0.02	0.07	0.02	0.13	0.00	0.00	0.00	1.67
SCH	2029	0.44	0.09	0.59	0.49	0.02	0.08	0.02	0.14	0.00	0.00	0.00	1.86
SCH	2030	0.48	0.09	0.62	0.54	0.02	0.09	0.02	0.15	0.00	0.00	0.00	2.03

Table D-5
Program Annual Water Savings for COT (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
COT	2020	0.01	0.03	0.01	0.00	0.01	0.02	0.01	0.03	0.00	0.00	0.00	0.13
COT	2021	0.06	0.08	0.05	0.02	0.03	0.08	0.03	0.1	0.01	0.00	0.03	0.49
COT	2022	0.11	0.14	0.10	0.06	0.06	0.13	0.05	0.16	0.01	0.00	0.06	0.87
COT	2023	0.16	0.19	0.15	0.10	0.08	0.18	0.07	0.22	0.01	0.01	0.08	1.25
COT	2024	0.21	0.24	0.19	0.14	0.10	0.23	0.09	0.28	0.01	0.01	0.11	1.62
COT	2025	0.26	0.29	0.24	0.18	0.12	0.28	0.11	0.34	0.02	0.01	0.14	1.97
COT	2026	0.31	0.33	0.29	0.22	0.13	0.33	0.13	0.4	0.02	0.01	0.16	2.33
COT	2027	0.35	0.38	0.33	0.27	0.15	0.37	0.15	0.45	0.02	0.01	0.19	2.68
COT	2028	0.40	0.42	0.38	0.31	0.17	0.42	0.17	0.51	0.02	0.01	0.22	3.03
COT	2029	0.45	0.46	0.43	0.35	0.18	0.46	0.18	0.57	0.03	0.01	0.24	3.36
COT	2030	0.50	0.50	0.46	0.39	0.20	0.50	0.20	0.62	0.03	0.02	0.27	3.68

Table D-6
Program Annual Water Savings for PIN (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
PIN	2020	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.07
PIN	2021	0.04	0.07	0.01	0.00	0.06	0.01	0.01	0.02	0.00	0.00	0.02	0.24
PIN	2022	0.06	0.11	0.02	0.01	0.10	0.02	0.02	0.03	0.00	0.00	0.03	0.40
PIN	2023	0.09	0.15	0.02	0.02	0.14	0.03	0.02	0.04	0.00	0.00	0.04	0.56
PIN	2024	0.12	0.19	0.03	0.02	0.17	0.04	0.03	0.05	0.00	0.00	0.05	0.72
PIN	2025	0.14	0.23	0.04	0.03	0.21	0.05	0.04	0.06	0.01	0.00	0.06	0.87
PIN	2026	0.17	0.27	0.05	0.04	0.24	0.06	0.04	0.07	0.01	0.00	0.07	1.02
PIN	2027	0.19	0.31	0.06	0.05	0.27	0.07	0.05	0.08	0.01	0.00	0.08	1.16
PIN	2028	0.22	0.34	0.06	0.05	0.30	0.08	0.05	0.09	0.01	0.01	0.09	1.30
PIN	2029	0.24	0.38	0.07	0.06	0.33	0.08	0.06	0.1	0.01	0.01	0.11	1.44
PIN	2030	0.27	0.41	0.08	0.07	0.35	0.09	0.06	0.11	0.01	0.01	0.11	1.57

Table D-7
Program Annual Water Savings for STP (MGD)

		SF				MF	NR						
WDPA	Year	Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	Active Water Savings
STP	2020	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.06
STP	2021	0.04	0.05	0.01	0.00	0.04	0.02	0.01	0.02	0.00	0.00	0.01	0.19
STP	2022	0.06	0.09	0.02	0.01	0.06	0.03	0.01	0.03	0.00	0.00	0.02	0.33
STP	2023	0.09	0.12	0.02	0.02	0.08	0.04	0.01	0.04	0.00	0.00	0.03	0.45
STP	2024	0.12	0.15	0.03	0.02	0.10	0.06	0.02	0.05	0.00	0.00	0.03	0.58
STP	2025	0.14	0.18	0.04	0.03	0.12	0.07	0.02	0.06	0.00	0.00	0.04	0.70
STP	2026	0.17	0.21	0.05	0.04	0.14	0.08	0.02	0.07	0.01	0.00	0.05	0.83
STP	2027	0.19	0.24	0.06	0.05	0.15	0.09	0.02	0.08	0.01	0.00	0.06	0.94
STP	2028	0.22	0.26	0.06	0.05	0.17	0.10	0.03	0.09	0.01	0.00	0.06	1.06
STP	2029	0.24	0.29	0.07	0.06	0.19	0.11	0.03	0.1	0.01	0.00	0.07	1.17
STP	2030	0.27	0.32	0.08	0.07	0.20	0.12	0.03	0.11	0.01	0.01	0.08	1.28

Table D-8
Program Cumulative Annual Water Savingsfor PAS (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
PAS	2020	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0	0.00	0.00	0.00	0.09
PAS	2021	0.07	0.10	0.08	0.04	0.03	0.01	0.00	0.01	0.00	0.00	0.01	0.28
PAS	2022	0.17	0.23	0.19	0.11	0.07	0.02	0.01	0.03	0.00	0.00	0.02	0.48
PAS	2023	0.30	0.40	0.34	0.22	0.12	0.04	0.01	0.05	0.00	0.00	0.04	0.69
PAS	2024	0.47	0.62	0.54	0.38	0.19	0.06	0.02	0.08	0.01	0.00	0.06	0.89
PAS	2025	0.68	0.89	0.79	0.57	0.27	0.09	0.02	0.12	0.01	0.00	0.08	1.09
PAS	2026	0.93	1.20	1.08	0.81	0.36	0.12	0.03	0.16	0.01	0.00	0.11	1.29
PAS	2027	1.21	1.55	1.42	1.09	0.46	0.15	0.04	0.2	0.01	0.01	0.14	1.49
PAS	2028	1.54	1.95	1.81	1.41	0.57	0.19	0.05	0.26	0.02	0.01	0.17	1.68
PAS	2029	1.90	2.38	2.25	1.77	0.69	0.23	0.07	0.32	0.02	0.01	0.21	1.87
PAS	2030	2.30	2.85	2.71	2.18	0.83	0.28	0.08	0.38	0.03	0.01	0.25	2.04

Table D-9
Program Cumulative Annual Water Savings for NPR (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
NPR	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.01
NPR	2021	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.02
NPR	2022	0.01	0.03	0.00	0.00	0.01	0.00	0.00	0	0.00	0.00	0.00	0.04
NPR	2023	0.02	0.05	0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.05
NPR	2024	0.03	0.08	0.01	0.01	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.07
NPR	2025	0.05	0.12	0.01	0.01	0.04	0.02	0.01	0.02	0.00	0.00	0.00	0.08
NPR	2026	0.06	0.16	0.02	0.01	0.06	0.02	0.01	0.02	0.00	0.00	0.00	0.10
NPR	2027	0.08	0.21	0.02	0.02	0.07	0.03	0.01	0.03	0.00	0.00	0.00	0.11
NPR	2028	0.10	0.26	0.03	0.03	0.09	0.04	0.01	0.04	0.00	0.00	0.00	0.12
NPR	2029	0.13	0.32	0.04	0.03	0.11	0.05	0.02	0.05	0.00	0.00	0.00	0.14
NPR	2030	0.16	0.38	0.05	0.04	0.14	0.05	0.02	0.06	0.01	0.00	0.00	0.15

Table D-10
Program Cumulative Annual Water Savings for NWH (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
NWH	2020	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.02
NWH	2021	0.03	0.01	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.08
NWH	2022	0.07	0.03	0.05	0.04	0.01	0.01	0.00	0.03	0.00	0.00	0.00	0.15
NWH	2023	0.13	0.05	0.09	0.07	0.02	0.03	0.01	0.06	0.00	0.00	0.00	0.21
NWH	2024	0.21	0.08	0.15	0.11	0.03	0.04	0.01	0.09	0.00	0.00	0.00	0.27
NWH	2025	0.31	0.12	0.21	0.17	0.05	0.06	0.01	0.13	0.01	0.00	0.00	0.33
NWH	2026	0.42	0.16	0.29	0.23	0.06	0.08	0.02	0.18	0.01	0.00	0.00	0.39
NWH	2027	0.56	0.20	0.38	0.31	0.08	0.10	0.02	0.24	0.01	0.01	0.00	0.45
NWH	2028	0.71	0.26	0.49	0.40	0.10	0.13	0.03	0.3	0.01	0.01	0.00	0.51
NWH	2029	0.87	0.31	0.60	0.50	0.12	0.16	0.03	0.37	0.01	0.01	0.00	0.57
NWH	2020	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.02

Table D-11
Program Cumulative Annual Water Savings for SCH (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
SCH	2020	0.02	0.00	0.03	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.08
SCH	2021	0.09	0.02	0.12	0.05	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.27
SCH	2022	0.20	0.04	0.28	0.15	0.02	0.04	0.01	0.07	0.00	0.00	0.00	0.47
SCH	2023	0.36	0.08	0.50	0.31	0.03	0.07	0.02	0.13	0.00	0.00	0.00	0.67
SCH	2024	0.57	0.12	0.77	0.52	0.04	0.11	0.03	0.19	0.01	0.00	0.00	0.87
SCH	2025	0.82	0.17	1.12	0.78	0.05	0.16	0.04	0.28	0.01	0.00	0.00	1.07
SCH	2026	1.12	0.24	1.52	1.10	0.07	0.22	0.05	0.38	0.01	0.00	0.00	1.27
SCH	2027	1.46	0.31	1.98	1.48	0.09	0.28	0.06	0.49	0.02	0.01	0.00	1.47
SCH	2028	1.85	0.38	2.51	1.91	0.11	0.36	0.08	0.62	0.02	0.01	0.00	1.67
SCH	2029	2.29	0.47	3.10	2.40	0.13	0.44	0.10	0.76	0.02	0.01	0.00	1.86
SCH	2030	2.77	0.56	3.72	2.94	0.15	0.52	0.12	0.91	0.03	0.01	0.00	2.03

Table D-12
Program Cumulative Annual Water Savings for COT (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
COT	2020	0.01	0.03	0.01	0.00	0.01	0.02	0.01	0.03	0.00	0.00	0.00	0.13
COT	2021	0.07	0.11	0.06	0.02	0.04	0.10	0.04	0.13	0.01	0.00	0.03	0.49
COT	2022	0.19	0.25	0.16	0.08	0.10	0.23	0.10	0.28	0.02	0.01	0.09	0.87
COT	2023	0.34	0.44	0.31	0.18	0.18	0.42	0.17	0.5	0.03	0.01	0.17	1.25
COT	2024	0.55	0.68	0.50	0.32	0.28	0.65	0.26	0.78	0.04	0.02	0.28	1.62
COT	2025	0.81	0.96	0.74	0.50	0.39	0.93	0.38	1.12	0.06	0.03	0.42	1.97
COT	2026	1.12	1.29	1.03	0.72	0.53	1.25	0.51	1.52	0.08	0.04	0.58	2.33
COT	2027	1.47	1.67	1.36	0.99	0.68	1.62	0.66	1.97	0.10	0.05	0.77	2.68
COT	2028	1.87	2.09	1.74	1.30	0.85	2.04	0.82	2.49	0.12	0.06	0.99	3.03
COT	2029	2.33	2.56	2.17	1.65	1.03	2.49	1.01	3.05	0.15	0.08	1.23	3.36
COT	2030	2.83	3.06	2.63	2.03	1.23	2.99	1.20	3.67	0.18	0.09	1.50	3.68

Table D-13
Program Cumulative Annual Water Savings for PIN (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
PIN	2020	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.07
PIN	2021	0.05	0.09	0.01	0.01	0.08	0.02	0.01	0.02	0.00	0.00	0.02	0.24
PIN	2022	0.12	0.20	0.03	0.02	0.18	0.04	0.03	0.05	0.00	0.00	0.05	0.40
PIN	2023	0.21	0.35	0.05	0.03	0.31	0.08	0.06	0.09	0.01	0.00	0.08	0.56
PIN	2024	0.32	0.54	0.09	0.06	0.49	0.12	0.09	0.14	0.01	0.01	0.13	0.72
PIN	2025	0.46	0.77	0.13	0.09	0.70	0.17	0.12	0.2	0.02	0.01	0.19	0.87
PIN	2026	0.63	1.04	0.17	0.13	0.93	0.23	0.16	0.27	0.02	0.01	0.27	1.02
PIN	2027	0.82	1.35	0.23	0.18	1.20	0.30	0.21	0.35	0.03	0.02	0.35	1.16
PIN	2028	1.04	1.69	0.29	0.23	1.50	0.37	0.27	0.44	0.04	0.03	0.44	1.30
PIN	2029	1.29	2.06	0.36	0.29	1.83	0.46	0.33	0.53	0.05	0.03	0.55	1.44
PIN	2030	1.56	2.47	0.44	0.35	2.18	0.55	0.39	0.64	0.05	0.04	0.66	1.57

Table D-14
Program Cumulative Annual Water Savings for STP (MGD)

WDPA	Year	SF				MF	NR						Active Water Savings
		Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS/ FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower	
STP	2020	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.06
STP	2021	0.05	0.07	0.01	0.01	0.05	0.02	0.01	0.02	0.00	0.00	0.02	0.19
STP	2022	0.12	0.16	0.03	0.02	0.11	0.05	0.02	0.05	0.00	0.00	0.03	0.33
STP	2023	0.21	0.27	0.05	0.03	0.19	0.10	0.03	0.09	0.01	0.00	0.06	0.45
STP	2024	0.32	0.42	0.09	0.06	0.29	0.15	0.04	0.14	0.01	0.01	0.09	0.58
STP	2025	0.46	0.60	0.13	0.09	0.41	0.22	0.06	0.2	0.02	0.01	0.14	0.70
STP	2026	0.63	0.81	0.17	0.13	0.54	0.30	0.08	0.27	0.02	0.01	0.19	0.83
STP	2027	0.82	1.04	0.23	0.18	0.70	0.39	0.11	0.35	0.03	0.02	0.24	0.94
STP	2028	1.04	1.31	0.29	0.23	0.87	0.49	0.13	0.44	0.03	0.02	0.31	1.06
STP	2029	1.29	1.60	0.36	0.29	1.05	0.60	0.16	0.53	0.04	0.02	0.38	1.17
STP	2030	1.56	1.91	0.44	0.35	1.25	0.72	0.19	0.64	0.05	0.03	0.45	1.28

Appendix E: Program Costs by WDPA

Table E-1
Program Nominal Annual Costs (PAS)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PAS	2020	$250,125	$37,375	$87,500	$30,000	$49,300	$30,000	$6,000	$2,000	$6,000	$300	$425	$1,225
PAS	2021	$561,525	$86,250	$187,500	$90,000	$108,750	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2022	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2023	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2024	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2025	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2026	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2027	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2028	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2029	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	2030	$670,275	$86,250	$187,500	$90,000	$217,500	$60,000	$10,000	$4,000	$13,000	$375	$425	$1,225
PAS	Total	$6,844,125	$899,875	$1,962,500	$930,000	$2,115,550	$630,000	$106,000	$42,000	$136,000	$4,050	$4,675	$13,475

Table E-2
Program Nominal Annual Costs (NPR)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NPR	2020	$24,500	$2,875	$12,500	$600	$1,450	$4,000	$1,000	$1,000	$1,000	$75	$0	$0
NPR	2021	$49,500	$5,750	$25,000	$1,500	$2,175	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2022	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2023	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2024	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2025	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2026	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2027	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2028	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2029	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	2030	$50,950	$5,750	$25,000	$1,500	$3,625	$10,000	$2,000	$1,000	$2,000	$75	$0	$0
NPR	Total	$532,550	$60,375	$262,500	$15,600	$36,250	$104,000	$21,000	$11,000	$21,000	$825	$0	$0

Table E-3
Program Nominal Annual Costs (NWH)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NWH	2020	$65,525	$14,375	$10,000	$9,000	$14,500	$6,000	$3,000	$1,000	$7,000	$225	$425	$0
NWH	2021	$167,400	$40,250	$25,000	$24,000	$43,500	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2022	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2023	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2024	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2025	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2026	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2027	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2028	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2029	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	2030	$181,900	$40,250	$25,000	$24,000	$58,000	$10,000	$7,000	$2,000	$15,000	$225	$425	$0
NWH	Total	$1,870,025	$416,875	$260,000	$249,000	$580,000	$106,000	$73,000	$21,000	$157,000	$2,475	$4,675	$0

Table E-4
Program Nominal Annual Costs (SCH)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
SCH	2020	$210,550	$46,000	$15,000	$60,000	$50,750	$10,000	$10,000	$3,000	$15,000	$375	$425	$0
SCH	2021	$509,050	$103,500	$37,500	$120,000	$181,250	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2022	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2023	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2024	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2025	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2026	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2027	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2028	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2029	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	2030	$617,800	$103,500	$37,500	$120,000	$290,000	$10,000	$19,000	$6,000	$31,000	$375	$425	$0
SCH	Total	$6,279,800	$1,081,000	$390,000	$1,260,000	$2,842,000	$110,000	$200,000	$63,000	$325,000	$4,125	$4,675	$0

Table E-5
Program Nominal Annual Costs (COT)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
COT	2020	$341,175	$28,750	$100,000	$15,000	$14,500	$40,000	$50,000	$30,000	$60,000	$1,275	$425	$1,225
COT	2021	$874,275	$109,250	$200,000	$90,000	$72,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2022	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2023	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2024	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2025	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2026	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2027	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2028	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2029	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	2030	$1,019,275	$109,250	$200,000	$90,000	$217,500	$90,000	$110,000	$62,000	$125,000	$2,700	$4,250	$8,575
COT	Total	$10,388,925	$1,121,250	$2,100,000	$915,000	$2,044,500	$940,000	$1,150,000	$650,000	$1,310,000	$28,275	$42,925	$86,975

Table E-6
Program Nominal Annual Costs (PIN)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PIN	2020	$216,025	$28,750	$75,000	$3,000	$7,250	$70,000	$10,000	$10,000	$10,000	$375	$425	$1,225
PIN	2021	$477,700	$57,500	$162,500	$15,000	$14,500	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2022	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2023	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2024	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2025	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2026	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2027	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2028	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2029	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	2030	$499,450	$57,500	$162,500	$15,000	$36,250	$160,000	$20,000	$20,000	$22,000	$825	$1,700	$3,675
PIN	Total	$5,188,775	$603,750	$1,700,000	$153,000	$348,000	$1,670,000	$210,000	$210,000	$230,000	$8,625	$17,425	$37,975

Table E-7
Program Nominal Annual Costs (STP)

WDPA	Year	Annual Program Budget ($/Yr)	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
STP	2020	$178,525	$28,750	$62,500	$3,000	$7,250	$50,000	$10,000	$5,000	$10,000	$375	$425	$1,225
STP	2021	$365,475	$57,500	$125,000	$15,000	$14,500	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2022	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2023	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2024	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2025	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2026	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2027	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2028	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2029	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	2030	$387,225	$57,500	$125,000	$15,000	$36,250	$90,000	$27,000	$10,000	$22,000	$750	$1,275	$2,450
STP	Total	$4,029,025	$603,750	$1,312,500	$153,000	$348,000	$950,000	$280,000	$105,000	$230,000	$7,875	$13,175	$25,725

Table E-8
Alternative Program Present Value Annual Costs (PAS)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PAS	2020	$236,037	$35,270	$82,572	$28,310	$46,523	$28,310	$5,662	$1,887	$5,662	$283	$401	$1,156
PAS	2021	$524,803	$80,610	$175,238	$84,114	$101,638	$56,076	$9,346	$3,738	$12,150	$350	$397	$1,145
PAS	2022	$620,418	$79,834	$173,553	$83,305	$201,322	$55,537	$9,256	$3,702	$12,033	$347	$393	$1,134
PAS	2023	$614,452	$79,067	$171,884	$82,504	$199,386	$55,003	$9,167	$3,667	$11,917	$344	$390	$1,123
PAS	2024	$608,544	$78,307	$170,232	$81,711	$197,469	$54,474	$9,079	$3,632	$11,803	$340	$386	$1,112
PAS	2025	$602,692	$77,554	$168,595	$80,925	$195,570	$53,950	$8,992	$3,597	$11,689	$337	$382	$1,101
PAS	2026	$596,897	$76,808	$166,974	$80,147	$193,689	$53,432	$8,905	$3,562	$11,577	$334	$378	$1,091
PAS	2027	$591,158	$76,069	$165,368	$79,377	$191,827	$52,918	$8,820	$3,528	$11,466	$331	$375	$1,080
PAS	2028	$585,474	$75,338	$163,778	$78,613	$189,983	$52,409	$8,735	$3,494	$11,355	$328	$371	$1,070
PAS	2029	$579,844	$74,613	$162,203	$77,858	$188,156	$51,905	$8,651	$3,460	$11,246	$324	$368	$1,060
PAS	2030	$574,269	$73,896	$160,644	$77,109	$186,347	$51,406	$8,568	$3,427	$11,138	$321	$364	$1,050
PAS	Total	$6,134,588	$807,365	$1,761,040	$833,975	$1,891,909	$565,420	$95,180	$37,695	$122,036	$3,640	$4,206	$12,122
% of Total PV Cost		100%	13.16%	28.71%	13.59%	30.84%	9.22%	1.55%	0.61%	1.99%	0.06%	0.07%	0.20%

Table E-9
Alternative Program Present Value Annual Costs (NPR)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NPR	2020	$23,120	$2,713	$11,796	$566	$1,368	$3,775	$944	$944	$944	$71	$0	$0
NPR	2021	$46,263	$5,374	$23,365	$1,402	$2,033	$9,346	$1,869	$935	$1,869	$70	$0	$0
NPR	2022	$47,160	$5,322	$23,140	$1,388	$3,355	$9,256	$1,851	$926	$1,851	$69	$0	$0
NPR	2023	$46,707	$5,271	$22,918	$1,375	$3,323	$9,167	$1,833	$917	$1,833	$69	$0	$0
NPR	2024	$46,258	$5,220	$22,698	$1,362	$3,291	$9,079	$1,816	$908	$1,816	$68	$0	$0
NPR	2025	$45,813	$5,170	$22,479	$1,349	$3,259	$8,992	$1,798	$899	$1,798	$67	$0	$0
NPR	2026	$45,372	$5,121	$22,263	$1,336	$3,228	$8,905	$1,781	$891	$1,781	$67	$0	$0
NPR	2027	$44,936	$5,071	$22,049	$1,323	$3,197	$8,820	$1,764	$882	$1,764	$66	$0	$0
NPR	2028	$44,504	$5,023	$21,837	$1,310	$3,166	$8,735	$1,747	$873	$1,747	$66	$0	$0
NPR	2029	$44,076	$4,974	$21,627	$1,298	$3,136	$8,651	$1,730	$865	$1,730	$65	$0	$0
NPR	2030	$43,652	$4,926	$21,419	$1,285	$3,106	$8,568	$1,714	$857	$1,714	$64	$0	$0
NPR	Total	$477,861	$54,186	$235,592	$13,994	$32,464	$93,293	$18,847	$9,896	$18,847	$742	$0	$0
% of Total PV Cost		100%	11.34%	49.30%	2.93%	6.79%	19.52%	3.94%	2.07%	3.94%	0.16%	0.00%	0.00%

Table E-10
Alternative Program Present Value Annual Costs (NWH)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NWH	2020	$61,834	$13,565	$9,437	$8,493	$13,683	$5,662	$2,831	$944	$6,606	$212	$401	$0
NWH	2021	$156,453	$37,618	$23,365	$22,430	$40,655	$9,346	$6,542	$1,869	$14,019	$210	$397	$0
NWH	2022	$168,370	$37,256	$23,140	$22,215	$53,686	$9,256	$6,479	$1,851	$13,884	$208	$393	$0
NWH	2023	$166,751	$36,898	$22,918	$22,001	$53,170	$9,167	$6,417	$1,833	$13,751	$206	$390	$0
NWH	2024	$165,147	$36,543	$22,698	$21,790	$52,658	$9,079	$6,355	$1,816	$13,619	$204	$386	$0
NWH	2025	$163,559	$36,192	$22,479	$21,580	$52,152	$8,992	$6,294	$1,798	$13,488	$202	$382	$0
NWH	2026	$161,987	$35,844	$22,263	$21,373	$51,651	$8,905	$6,234	$1,781	$13,358	$200	$378	$0
NWH	2027	$160,429	$35,499	$22,049	$21,167	$51,154	$8,820	$6,174	$1,764	$13,229	$198	$375	$0
NWH	2028	$158,887	$35,158	$21,837	$20,964	$50,662	$8,735	$6,114	$1,747	$13,102	$197	$371	$0
NWH	2029	$157,359	$34,820	$21,627	$20,762	$50,175	$8,651	$6,056	$1,730	$12,976	$195	$368	$0
NWH	2030	$155,846	$34,485	$21,419	$20,562	$49,692	$8,568	$5,997	$1,714	$12,851	$193	$364	$0
NWH	Total	$1,676,621	$373,877	$233,233	$223,337	$519,338	$95,180	$65,494	$18,847	$140,883	$2,226	$4,206	$0
% of Total PV Cost			22.30%	13.91%	13.32%	30.98%	5.68%	3.91%	1.12%	8.40%	0.13%	0.25%	0.00%

Table E-11
Alternative Program Present Value Annual Costs (SCH)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
SCH	2020	$198,691	$43,409	$14,155	$56,621	$47,892	$9,437	$9,437	$2,831	$14,155	$354	$401	$0
SCH	2021	$475,760	$96,731	$35,048	$112,152	$169,397	$9,346	$17,757	$5,608	$28,973	$350	$397	$0
SCH	2022	$571,846	$95,801	$34,711	$111,074	$268,429	$9,256	$17,587	$5,554	$28,694	$347	$393	$0
SCH	2023	$566,347	$94,880	$34,377	$110,006	$265,848	$9,167	$17,418	$5,500	$28,418	$344	$390	$0
SCH	2024	$560,902	$93,968	$34,046	$108,948	$263,292	$9,079	$17,250	$5,447	$28,145	$340	$386	$0
SCH	2025	$555,508	$93,064	$33,719	$107,901	$260,760	$8,992	$17,084	$5,395	$27,874	$337	$382	$0
SCH	2026	$550,167	$92,169	$33,395	$106,863	$258,253	$8,905	$16,920	$5,343	$27,606	$334	$378	$0
SCH	2027	$544,877	$91,283	$33,074	$105,836	$255,769	$8,820	$16,757	$5,292	$27,341	$331	$375	$0
SCH	2028	$539,638	$90,405	$32,756	$104,818	$253,310	$8,735	$16,596	$5,241	$27,078	$328	$371	$0
SCH	2029	$534,449	$89,536	$32,441	$103,810	$250,874	$8,651	$16,437	$5,191	$26,818	$324	$368	$0
SCH	2030	$529,310	$88,675	$32,129	$102,812	$248,462	$8,568	$16,279	$5,141	$26,560	$321	$364	$0
SCH	Total	$5,627,495	$969,924	$349,849	$1,130,840	$2,542,285	$98,955	$179,522	$56,542	$291,662	$3,711	$4,206	$0
% of Total PV Cost			17.24%	6.22%	20.09%	45.18%	1.76%	3.19%	1.00%	5.18%	0.07%	0.07%	0.00%

Table E-12
Alternative Program Present Value Annual Costs (COT)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
COT	2020	$321,959	$27,131	$94,368	$14,155	$13,683	$37,747	$47,184	$28,310	$56,621	$1,203	$401	$1,156
COT	2021	$817,100	$102,105	$186,921	$84,114	$67,759	$84,114	$102,806	$57,945	$116,825	$2,523	$3,972	$8,014
COT	2022	$943,458	$101,124	$185,123	$83,305	$201,322	$83,305	$101,818	$57,388	$115,702	$2,499	$3,934	$7,937
COT	2023	$934,386	$100,151	$183,343	$82,504	$199,386	$82,504	$100,839	$56,836	$114,590	$2,475	$3,896	$7,861
COT	2024	$925,402	$99,188	$181,580	$81,711	$197,469	$81,711	$99,869	$56,290	$113,488	$2,451	$3,859	$7,785
COT	2025	$916,503	$98,235	$179,834	$80,925	$195,570	$80,925	$98,909	$55,749	$112,396	$2,428	$3,821	$7,710
COT	2026	$907,691	$97,290	$178,105	$80,147	$193,689	$80,147	$97,958	$55,213	$111,316	$2,404	$3,785	$7,636
COT	2027	$898,963	$96,354	$176,393	$79,377	$191,827	$79,377	$97,016	$54,682	$110,245	$2,381	$3,748	$7,563
COT	2028	$890,319	$95,428	$174,697	$78,613	$189,983	$78,613	$96,083	$54,156	$109,185	$2,358	$3,712	$7,490
COT	2029	$881,758	$94,510	$173,017	$77,858	$188,156	$77,858	$95,159	$53,635	$108,136	$2,336	$3,677	$7,418
COT	2030	$873,280	$93,602	$171,353	$77,109	$186,347	$77,109	$94,244	$53,119	$107,096	$2,313	$3,641	$7,347
COT	Total	$9,310,820	$1,005,118	$1,884,734	$819,820	$1,825,189	$843,412	$1,031,885	$583,324	$1,175,600	$25,373	$38,446	$77,918
% of Total PV Cost				10.80%	20.24%	8.81%	19.60%	9.06%	11.08%	6.27%	12.63%	0.27%	0.84%

Table E-13
Alternative Program Present Value Annual Costs (PIN)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PIN	2020	$203,858	$27,131	$70,776	$2,831	$6,842	$66,057	$9,437	$9,437	$9,437	$354	$401	$3,369
PIN	2021	$446,460	$53,740	$151,873	$14,019	$13,552	$149,536	$18,692	$18,692	$20,561	$771	$1,589	$3,337
PIN	2022	$462,299	$53,223	$150,413	$13,884	$33,554	$148,099	$18,512	$18,512	$20,364	$764	$1,574	$3,304
PIN	2023	$457,854	$52,711	$148,966	$13,751	$33,231	$146,675	$18,334	$18,334	$20,168	$756	$1,558	$3,273
PIN	2024	$453,452	$52,204	$147,534	$13,619	$32,911	$145,264	$18,158	$18,158	$19,974	$749	$1,543	$3,241
PIN	2025	$449,091	$51,702	$146,115	$13,488	$32,595	$143,868	$17,983	$17,983	$19,782	$742	$1,529	$3,210
PIN	2026	$444,773	$51,205	$144,710	$13,358	$32,282	$142,484	$17,811	$17,811	$19,592	$735	$1,514	$3,179
PIN	2027	$440,497	$50,713	$143,319	$13,229	$31,971	$141,114	$17,639	$17,639	$19,403	$728	$1,499	$3,149
PIN	2028	$436,261	$50,225	$141,941	$13,102	$31,664	$139,757	$17,470	$17,470	$19,217	$721	$1,485	$34,054
PIN	2029	$432,066	$49,742	$140,576	$12,976	$31,359	$138,413	$17,302	$17,302	$19,032	$714	$1,471	0.73%
PIN	2030	$427,912	$49,264	$139,224	$12,851	$31,058	$137,083	$17,135	$17,135	$18,849	$707	$1,457	$3,402
PIN	Total	$4,654,523	$541,861	$1,525,448	$137,109	$311,018	$1,498,350	$188,473	$188,473	$206,377	$7,739	$15,619	$3,369
% of Total PV Cost			11.64%	32.77%	2.95%	6.68%	32.19%	4.05%	4.05%	4.43%	0.17%	0.34%	$3,337

Table E-14
Alternative Program Present Value Annual Costs (STP)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET/SMS Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
STP	2020	$168,470	$27,131	$58,980	$2,831	$6,842	$47,184	$9,437	$4,718	$9,437	$354	$401	$1,156
STP	2021	$341,574	$53,740	$116,825	$14,019	$13,552	$84,114	$25,234	$9,346	$20,561	$701	$1,192	$2,290
STP	2022	$358,422	$53,223	$115,702	$13,884	$33,554	$83,305	$24,992	$9,256	$20,364	$694	$1,180	$2,268
STP	2023	$354,975	$52,711	$114,590	$13,751	$33,231	$82,504	$24,751	$9,167	$20,168	$688	$1,169	$2,246
STP	2024	$351,562	$52,204	$113,488	$13,619	$32,911	$81,711	$24,513	$9,079	$19,974	$681	$1,158	$2,224
STP	2025	$348,182	$51,702	$112,396	$13,488	$32,595	$80,925	$24,278	$8,992	$19,782	$674	$1,146	$2,203
STP	2026	$344,834	$51,205	$111,316	$13,358	$32,282	$80,147	$24,044	$8,905	$19,592	$668	$1,135	$2,182
STP	2027	$341,518	$50,713	$110,245	$13,229	$31,971	$79,377	$23,813	$8,820	$19,403	$661	$1,125	$2,161
STP	2028	$338,234	$50,225	$109,185	$13,102	$31,664	$78,613	$23,584	$8,735	$19,217	$655	$1,114	$2,140
STP	2029	$334,982	$49,742	$108,136	$12,976	$31,359	$77,858	$23,357	$8,651	$19,032	$649	$1,103	$2,119
STP	2030	$331,761	$49,264	$107,096	$12,851	$31,058	$77,109	$23,133	$8,568	$18,849	$643	$1,092	$2,099
STP	Total	$3,614,515	$541,861	$1,177,959	$137,109	$311,018	$852,849	$251,136	$94,237	$206,377	$7,068	$11,815	$23,088
% of Total PV Cost			14.99%	32.59%	3.79%	8.60%	23.60%	6.95%	2.61%	5.71%	0.20%	0.33%	0.64%

Table E-15
Alternative Program Present Value Cumulative Annual Costs (PAS)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PAS	2020	$236,037	$35,270	$82,572	$28,310	$46,523	$28,310	$5,662	$1,887	$5,662	$283	$401	$1,156
PAS	2021	$760,840	$115,879	$257,810	$112,425	$148,161	$84,386	$15,008	$5,626	$17,812	$634	$798	$2,301
PAS	2022	$1,381,258	$195,714	$431,363	$195,730	$349,483	$139,923	$24,264	$9,328	$29,845	$981	$1,192	$3,435
PAS	2023	$1,995,710	$274,781	$603,247	$278,235	$548,869	$194,926	$33,431	$12,995	$41,762	$1,324	$1,581	$4,558
PAS	2024	$2,604,254	$353,087	$773,479	$359,946	$746,337	$249,401	$42,510	$16,627	$53,565	$1,665	$1,967	$5,670
PAS	2025	$3,206,946	$430,641	$942,074	$440,871	$941,907	$303,351	$51,502	$20,223	$65,254	$2,002	$2,349	$6,771
PAS	2026	$3,803,843	$507,449	$1,109,047	$521,019	$1,135,597	$356,782	$60,407	$23,785	$76,831	$2,336	$2,728	$7,862
PAS	2027	$4,395,001	$583,518	$1,274,415	$600,395	$1,327,424	$409,700	$69,227	$27,313	$88,297	$2,667	$3,103	$8,943
PAS	2028	$4,980,475	$658,856	$1,438,193	$679,009	$1,517,406	$462,109	$77,962	$30,807	$99,652	$2,994	$3,474	$10,013
PAS	2029	$5,560,319	$733,469	$1,600,397	$756,866	$1,705,562	$514,014	$86,613	$34,268	$110,898	$3,319	$3,841	$11,072
PAS	2030	$6,134,588	$807,365	$1,761,040	$833,975	$1,891,909	$565,420	$95,180	$37,695	$122,036	$3,640	$4,206	$12,122

Table E-16
Alternative Program Present Value Cumulative Annual Costs (NPR)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NPR	2020	$23,120	$2,713	$11,796	$566	$1,368	$3,775	$944	$944	$944	$71	$0	$0
NPR	2021	$69,383	$8,087	$35,161	$1,968	$3,401	$13,121	$2,813	$1,878	$2,813	$141	$0	$0
NPR	2022	$116,543	$13,409	$58,301	$3,357	$6,756	$22,377	$4,664	$2,804	$4,664	$210	$0	$0
NPR	2023	$163,250	$18,680	$81,219	$4,732	$10,080	$31,544	$6,498	$3,721	$6,498	$279	$0	$0
NPR	2024	$209,507	$23,901	$103,917	$6,093	$13,371	$40,623	$8,313	$4,629	$8,313	$347	$0	$0
NPR	2025	$255,320	$29,071	$126,396	$7,442	$16,630	$49,615	$10,112	$5,528	$10,112	$415	$0	$0
NPR	2026	$300,692	$34,192	$148,659	$8,778	$19,858	$58,520	$11,893	$6,418	$11,893	$481	$0	$0
NPR	2027	$345,629	$39,263	$170,708	$10,101	$23,055	$67,340	$13,657	$7,300	$13,657	$548	$0	$0
NPR	2028	$390,132	$44,285	$192,546	$11,411	$26,222	$76,075	$15,404	$8,174	$15,404	$613	$0	$0
NPR	2029	$434,209	$49,260	$214,173	$12,709	$29,358	$84,725	$17,134	$9,039	$17,134	$678	$0	$0
NPR	2030	$477,861	$54,186	$235,592	$13,994	$32,464	$93,293	$18,847	$9,896	$18,847	$742	$0	$0

Table E-17
Alternative Program Present Value Cumulative Annual Costs (NWH)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
NWH	2020	$61,834	$13,565	$9,437	$8,493	$13,683	$5,662	$2,831	$944	$6,606	$212	$401	$0
NWH	2021	$218,287	$51,183	$32,802	$30,924	$54,339	$15,008	$9,373	$2,813	$20,625	$423	$798	$0
NWH	2022	$386,657	$88,439	$55,942	$53,138	$108,024	$24,264	$15,853	$4,664	$34,509	$631	$1,192	$0
NWH	2023	$553,407	$125,337	$78,860	$75,140	$161,194	$33,431	$22,270	$6,498	$48,260	$837	$1,581	$0
NWH	2024	$718,555	$161,880	$101,558	$96,929	$213,852	$42,510	$28,625	$8,313	$61,878	$1,041	$1,967	$0
NWH	2025	$882,114	$198,072	$124,037	$118,509	$266,004	$51,502	$34,919	$10,112	$75,366	$1,244	$2,349	$0
NWH	2026	$1,044,101	$233,915	$146,300	$139,882	$317,655	$60,407	$41,153	$11,893	$88,724	$1,444	$2,728	$0
NWH	2027	$1,204,530	$269,414	$168,349	$161,049	$368,809	$69,227	$47,327	$13,657	$101,953	$1,643	$3,103	$0
NWH	2028	$1,363,416	$304,572	$190,186	$182,013	$419,471	$77,962	$53,441	$15,404	$115,055	$1,839	$3,474	$0
NWH	2029	$1,520,775	$339,392	$211,813	$202,775	$469,645	$86,613	$59,496	$17,134	$128,032	$2,034	$3,841	$0
NWH	2030	$1,676,621	$373,877	$233,233	$223,337	$519,338	$95,180	$65,494	$18,847	$140,883	$2,226	$4,206	$0

Table E-18
Alternative Program Present Value Cumulative Annual Costs (SCH)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
SCH	2020	$198,691	$43,409	$14,155	$56,621	$47,892	$9,437	$9,437	$2,831	$14,155	$354	$401	$0
SCH	2021	$674,451	$140,141	$49,203	$168,773	$217,288	$18,783	$27,194	$8,439	$43,128	$704	$798	$0
SCH	2022	$1,246,297	$235,942	$83,913	$279,847	$485,717	$28,039	$44,781	$13,992	$71,822	$1,051	$1,192	$0
SCH	2023	$1,812,644	$330,822	$118,290	$389,853	$751,565	$37,206	$62,199	$19,493	$100,240	$1,395	$1,581	$0
SCH	2024	$2,373,546	$424,790	$152,337	$498,801	$1,014,856	$46,285	$79,449	$24,940	$128,385	$1,736	$1,967	$0
SCH	2025	$2,929,054	$517,854	$186,056	$606,702	$1,275,616	$55,277	$96,533	$30,335	$156,259	$2,073	$2,349	$0
SCH	2026	$3,479,221	$610,024	$219,450	$713,565	$1,533,869	$64,182	$113,453	$35,678	$183,866	$2,407	$2,728	$0
SCH	2027	$4,024,098	$701,307	$252,524	$819,400	$1,789,638	$73,002	$130,210	$40,970	$211,207	$2,738	$3,103	$0
SCH	2028	$4,563,736	$791,712	$285,279	$924,218	$2,042,948	$81,737	$146,806	$46,211	$238,285	$3,065	$3,474	$0
SCH	2029	$5,098,185	$881,248	$317,720	$1,028,029	$2,293,823	$90,387	$163,243	$51,401	$265,102	$3,390	$3,841	$0
SCH	2030	$5,627,495	$969,924	$349,849	$1,130,840	$2,542,285	$98,955	$179,522	$56,542	$291,662	$3,711	$4,206	$0

Table E-19
Alternative Program Present Value Cumulative Annual Costs (COT)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
COT	2020	$321,959	$27,131	$94,368	$14,155	$13,683	$37,747	$47,184	$28,310	$56,621	$1,203	$401	$1,156
COT	2021	$1,139,059	$129,236	$281,288	$98,269	$81,442	$121,861	$149,990	$86,256	$173,446	$3,727	$4,373	$9,170
COT	2022	$2,082,517	$230,360	$466,412	$181,575	$282,764	$205,167	$251,808	$143,644	$289,148	$6,226	$8,307	$17,107
COT	2023	$3,016,903	$330,511	$649,755	$264,079	$482,149	$287,671	$352,647	$200,480	$403,738	$8,701	$12,203	$24,968
COT	2024	$3,942,304	$429,699	$831,335	$345,791	$679,618	$369,382	$452,516	$256,770	$517,225	$11,152	$16,062	$32,753
COT	2025	$4,858,808	$527,934	$1,011,170	$426,716	$875,188	$450,308	$551,425	$312,519	$629,622	$13,580	$19,883	$40,464
COT	2026	$5,766,499	$625,224	$1,189,275	$506,863	$1,068,877	$530,455	$649,383	$367,732	$740,938	$15,984	$23,668	$48,100
COT	2027	$6,665,462	$721,578	$1,365,667	$586,240	$1,260,704	$609,832	$746,399	$422,413	$851,183	$18,366	$27,416	$55,663
COT	2028	$7,555,781	$817,006	$1,540,364	$664,854	$1,450,687	$688,445	$842,482	$476,569	$960,368	$20,724	$31,128	$63,153
COT	2029	$8,437,540	$911,517	$1,713,381	$742,711	$1,638,843	$766,303	$937,641	$530,204	$1,068,504	$23,060	$34,805	$70,571
COT	2030	$9,310,820	$1,005,118	$1,884,734	$819,820	$1,825,189	$843,412	$1,031,885	$583,324	$1,175,600	$25,373	$38,446	$77,918

Table E-20
Alternative Program Present Value Cumulative Annual Costs (PIN)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
PIN	2020	$203,858	$27,131	$70,776	$2,831	$6,842	$66,057	$9,437	$9,437	$9,437	$354	$401	$1,156
PIN	2021	$650,318	$80,870	$222,649	$16,850	$20,393	$215,594	$28,129	$28,129	$29,998	$1,125	$1,990	$4,591
PIN	2022	$1,112,617	$134,093	$373,061	$30,734	$53,947	$363,693	$46,641	$46,641	$50,362	$1,889	$3,563	$7,992
PIN	2023	$1,570,471	$186,805	$522,028	$44,485	$87,178	$510,367	$64,975	$64,975	$70,529	$2,645	$5,122	$11,361
PIN	2024	$2,023,922	$239,009	$669,562	$58,104	$120,089	$655,631	$83,134	$83,134	$90,503	$3,394	$6,665	$14,698
PIN	2025	$2,473,014	$290,711	$815,677	$71,591	$152,684	$799,499	$101,117	$101,117	$110,285	$4,136	$8,194	$18,002
PIN	2026	$2,917,787	$341,917	$960,388	$84,949	$184,966	$941,983	$118,927	$118,927	$129,877	$4,870	$9,708	$21,275
PIN	2027	$3,358,284	$392,629	$1,103,707	$98,179	$216,937	$1,083,097	$136,567	$136,567	$149,280	$5,598	$11,207	$24,516
PIN	2028	$3,794,545	$442,855	$1,245,648	$111,281	$248,601	$1,222,854	$154,036	$154,036	$168,496	$6,319	$12,692	$27,726
PIN	2029	$4,226,611	$492,597	$1,386,224	$124,257	$279,960	$1,361,268	$171,338	$171,338	$187,528	$7,032	$14,163	$30,905
PIN	2030	$4,654,523	$541,861	$1,525,448	$137,109	$311,018	$1,498,350	$188,473	$188,473	$206,377	$7,739	$15,619	$34,054

Table E-21
Alternative Program Present Value Cumulative Annual Costs (STP)

WDPA	Year	Total PV Costs	SF				MF	NR					
			Alternative Irrigation Source	SF HET	ET Irrigation Controller	FWS / FFL	MF HET	HETs (Valve)	HETs (Tank)	HEUs (1/2 Gal.)	PRSV	Dishwasher (Conveyor)	Cooling Tower
STP	2020	$168,470	$27,131	$58,980	$2,831	$6,842	$47,184	$9,437	$4,718	$9,437	$354	$401	$1,156
STP	2021	$510,044	$80,870	$175,805	$16,850	$20,393	$131,298	$34,671	$14,064	$29,998	$1,055	$1,593	$3,446
STP	2022	$868,466	$134,093	$291,507	$30,734	$53,947	$214,604	$59,663	$23,321	$50,362	$1,749	$2,773	$5,714
STP	2023	$1,223,441	$186,805	$406,097	$44,485	$87,178	$297,108	$84,414	$32,488	$70,529	$2,437	$3,942	$7,959
STP	2024	$1,575,004	$239,009	$519,585	$58,104	$120,089	$378,819	$108,927	$41,567	$90,503	$3,118	$5,099	$10,184
STP	2025	$1,923,185	$290,711	$631,981	$71,591	$152,684	$459,745	$133,205	$50,558	$110,285	$3,792	$6,246	$12,387
STP	2026	$2,268,019	$341,917	$743,297	$84,949	$184,966	$539,892	$157,249	$59,464	$129,877	$4,460	$7,381	$14,569
STP	2027	$2,609,538	$392,629	$853,542	$98,179	$216,937	$619,269	$181,062	$68,283	$149,280	$5,121	$8,506	$16,729
STP	2028	$2,947,772	$442,855	$962,728	$111,281	$248,601	$697,882	$204,646	$77,018	$168,496	$5,776	$9,619	$18,869
STP	2029	$3,282,754	$492,597	$1,070,863	$124,257	$279,960	$775,740	$228,004	$85,669	$187,528	$6,425	$10,722	$20,989
STP	2030	$3,614,515	$541,861	$1,177,959	$137,109	$311,018	$852,849	$251,136	$94,237	$206,377	$7,068	$11,815	$23,088