THE CITY OF KEY WEST
Post Office Box 1409 Key West, FL 33041-1409 (305) 809-3700

MEMORANDUM

To: Raj Ramsingh, Chief Building Official

From: Alison Higgins, Sustainability Coordinator
Katie Halloran, Planning Director

CC: Patti McLaughlin, City Manager
Todd Stoughton, Assistant City Manager
Shawn Smith, City Attorney

RE: Analysis of Miami Dade Water Efficiency Recommended Fixtures

---

Background:

The City of Key West seeks to ensure the resilience of our community by reducing our dependance on natural resources. These actions prolong the life of those resources for our households and businesses and dampens the effects of the inevitable instability of those resources.

The Key West Water Supply Plan spans a 10-year planning period and is updated every 5 years following updates to the South Florida Water District Lower East Coast Water Supply Plan. Every 5 years the City has strived to reduce per capita water consumption, mostly through technological means.

This update is no different. The City seeks to emulate and improve upon Miami Dade County's Water Use Efficiency Codes, which have been in effect for over a decade. The Miami Dade Code implements required water-use efficiency standards across 10 types of water fixtures, both residential and commercial during new construction. The City seeks to expand these standards to all construction, including small remodeling projects. Figure 1 shows

As requested by the Chief Building Official, this memo is a technical review of the specific fixtures and standards, relating to their availability and price. The memo also researches the residential short- and long-term impacts versus doing nothing.

Fixture Standards, Availability and Price

Table 1 details Residential options. It shows the difference in maximum water uses, how many fixtures meeting either the minimum flow or US EPA WaterSense or EnergyStar certification are available in that category, how many of those conservation products are available at local stores, and the difference in costs between conservation and non-conservation products.

Table 2 details Commercial options. It shows the same details as Table 1.

In Summary: For Residential buildings, all conservation fixtures were available in our largest local hardware store, offering at least 5 and at most 20 options on the shelf, 5-48 options for next day delivery and 20-1,428 options available to order. In all cases, prices for the conservation option were as low as non-conservation options. In some cases, conservation was less expensive than most non-conservation options.

For Commercial buildings, proposed upgrades to toilets, showerheads and kitchen faucets are the same as residential. New items include urinals, metered public bathroom faucets, regular bathroom faucets, and commercial dishwashers and clothes washers. While our local hardware store did label some dishwashers and clothes washers as "commercial", these items were not of the same caliber as those on commercial websites or the Commercial rated Energy Star appliances. Therefore, these appliances, as well as metered faucets were not rated as to their local availability, but rather for their availability overall.

Conservation Urinals use half of what code allows and are well represented for order at our local hardware store, weighing in at over half of fixtures available and equally affordable. Conservation dishwashers easily competed in availability and price with non-conservation options. Conservation clothes washers only make a difference when trading a top loading version for a front-loading version, both of which are equally available. This is why the policy recommends commercial clothes washers be front loading only.

Water & Cost Savings:

Table 3 details potential savings for individual households. Using recent census and water use data, an average household in Key West (2 toilets, 2 bathroom sinks, 1 kitchen sink, 1 clothes washer and 1 dishwasher would conservatively save 13,750 gallons of water and $160 in water bills annually if they converted all listed fixtures and appliances to conservation.

These savings would be far greater if the household fixtures were older than current code, which is likely, since 73% of all our housing was built by 1970. Toilets have the largest conservative effect on this estimation, as gallons per flush range widely depending on how old the toilet is. For example, replacement of a 1980's toilet (3.5 gallons per flush) could save 9,116 gallons per year ($106 annually) instead of the 1,314 used for the replacement from current code.

Policy Effects:

A similar conservation policy was put in place by Miami Dade County over a decade ago, except the regulation only pertained to brand new construction, not remodels. This Key West conservation policy includes remodels because new construction occurs infrequently and would therefore have little effect upon our conservation goals as related to our aquifer health.

Table 4 details the effects of this policy on the City's water use as a whole over time. Data from the City's permitting database, Trakit, showed that an average of 114 bathrooms and 49 kitchens get renovated every year residentially. Overall, the policy will save a conservative average of 192M gallons of water over the next decade. This is conservative because only total remodels are counted. Many people change out a singular fixture without pulling a permit for it. Therefore, the community saturation estimates are likely conservative as well.

Big Picture:

This policy is a big step in adaptation to climate change. Using less of our limited resource saves us money, but also slows saltwater intrusion and the plume from Turkey Point. When we do have to find alternate sources of water, it also allows us to create less than we use today. The brackish water currently blended into our drinking water costs 7 times more per gallon to make into potable water. Using less of this alternate source saves the community money.

Conclusion:

The conservation fixtures save a minimum of 25% and a maximum of 64% when swapped out with the current building code maximum fixtures. It is the finding of this memo that none of the proposed water efficiency standards create a hardship and in fact, will ultimately benefit the building owner and community as a whole.

Figure 1. Indoor use (gallons per capita daily & percent) by fixture.

Source: Water Research Foundation, Residential End Uses of Water, Version 2, 2016

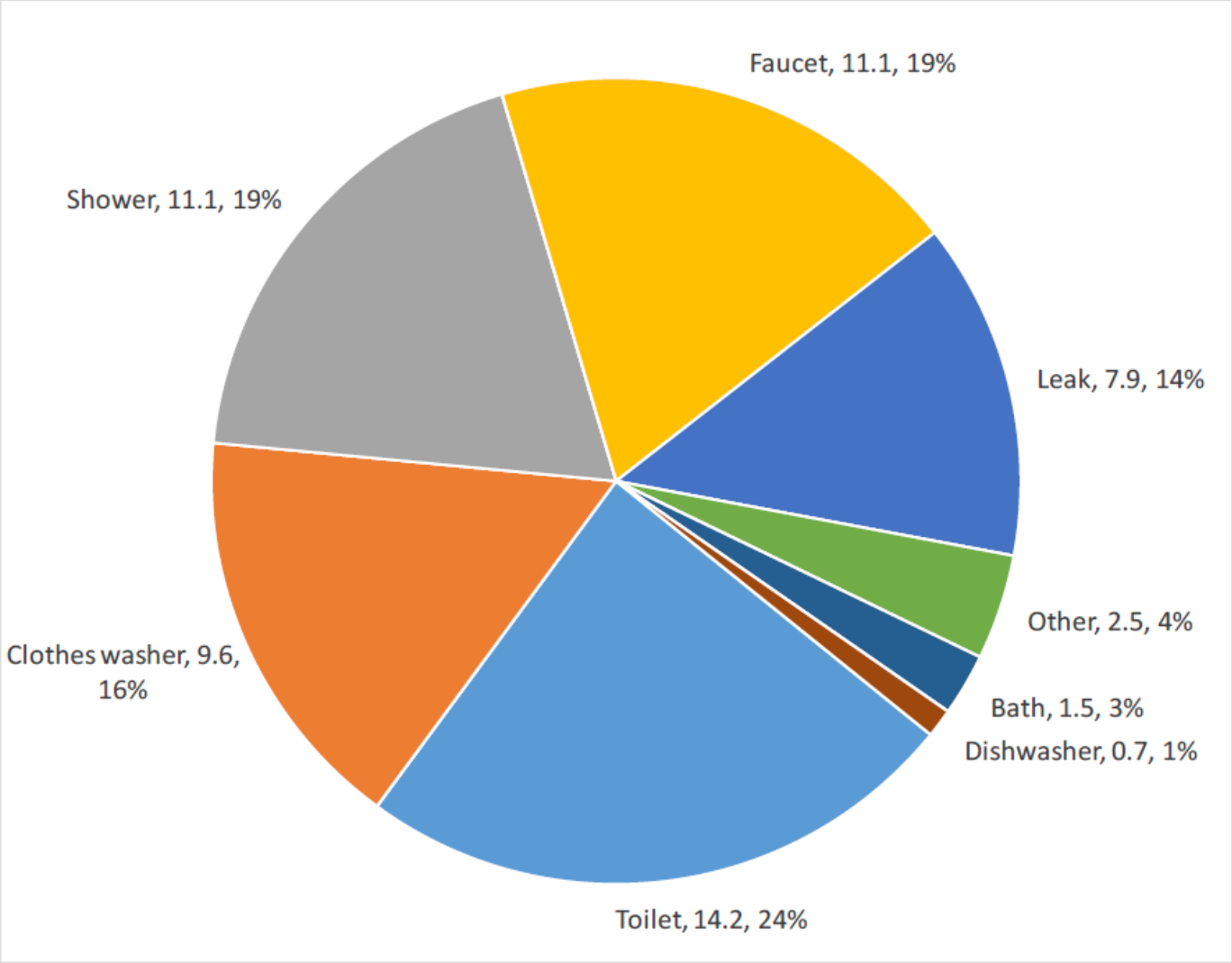

Table 1. Proposed Residential Indoor Water Use Requirements

Upgrade	Maximum Water Use & Savings	Current Code Maximum	WaterSense Certified? (# products)	Local Availability	Price Range (Upgrade / Current)	Notes
High Efficiency Toilet (HET)	1.28 gallons/flush (25% savings)	1.6	Yes (2,779)	In Store: 20 Next Day: 19 509 listed	<$100: 5 / 0 <$200: 39 / 13	Includes single flush and dual flush models. No conversion kits.
Showerheads	1.5 gallons/minute (40% savings)	2.5	Yes (1,404)	In Store: 5 NDD: 5 67 listed	<$100: 8 / 19 <$200: 13 / 105	Removable handheld models are included. Emergency Showers/ Eyewash stations are exempt.
Bathroom Faucet	1.5 gallons/minute (32% savings)	2.2	Yes (18,862)	In Store: 19 NDD: 25 1,428 Listed	<$100: 79 / 1 <$200: 697 / 3	At 60 psi
Kitchen Faucet	1.5 gallons/minute (40% savings)	2.5	None	In Store: 18 NDD: 48 399 Listed	<$100: 42 / 419 <$200: 39 /1,218	At 60 psi. In-flow aerators are sufficient.
Clothes Washers	3.2 WF* Front Load (32% savings) 4.3 WF Top Loading (34% savings)	4.7 WF Front 6.5 WF Top	Energy Star (182)	In Store: 5 NDD: N/A 30 Listed	<$800: 3 / 63 <$1000: 14 / 91	19 Front & 11 Top Load Models.
Dishwashers	3.5 gallons / cycle (42% savings)	6 gallons / cycle	EnergyStar (144)	In Store: 16 NDD: N/A 62 Listed	<$500: 11 / 16 <$700: 22 / 45	

**WF = gallons per cycle per cubic foot*

Table 2. Proposed Commercial Indoor Water Use Requirements

Upgrade	Maximum Water Use & Savings	Current Code Maximum	WaterSense Certified? (# products)	Local Availability	Price Range (Upgrade / Current)	Notes
High Efficiency Toilet (HET)	Same as residential					
Showerheads	Same as residential					
Kitchen Faucet	Same as residential					
Urinals	0.5 gallons/flush (50% savings)	1.0 gallons/flush	Yes (769)	Waterless (3) Flushing (6)	<$200: 3 / 4 <$300: 5 / 7	
Dishwashers, including Under the Counter	EnergyStar Certified (1.16 gallons / rack) (32% savings)	1.7*	Energy Star (233)	Webstaurant Store (80)	<$4,000: 1 / 2 <$5,000: 15 / 17	Use EnergyStar Finder to view options
Clothes washers, Front Load Only	4.0 WF* (55% savings)	8.8 WF Top 4.1 WF Front	Energy Star (135)	Appliances Connection: 14 Estar 19 Top 9 Front	<$2,000: 2 / 18 <$3,000: 14 / 20	

* While commercial dishwashers can use up to 2 gallons per rack, maximum found online was 1.7 gpr.
**Water Factor = WF = gallons per cycle per cubic foot

Table 3. Lowest Potential Savings to Households

Fixture / Appliance	Code	Conservation	Water Saved (Gallons)	Cost Savings
Toilets (2)	1.6 gpf*	1.2 gpf	2,628	$ 31
Showerheads (2)	2.5 gpm**	1.5 gpm	8,816	$ 103
Bathroom Faucet (2)	2.2 gpm	1.5 gpm	3,361	$ 39
Kitchen Faucet (1)	2.5 gpm	1.5 gpm	1,655	$ 19
Dishwasher (1)	6 gpl***	3.5 gpl	205	$ 2
Clothes Washer, Top Loading (1) OR	6.5 WF****	4.3 WF	2,808	$ 33
Clothes Washer, Front Loading (1)	4.7 WF	3.2 WF	1,935	$ 23

**gallons per flush; ** gallons per minute; ***gallons per load; ****Water factor (gallons/cycle/cubic feet)*

Table 4. Long Term Policy Effects

Upgrade	# of Retrofits per year	Avg Water Savings Annually, Per Unit	Community Effect, Annually	Community Effect, After 10 Years	Community Saturation, After 10 Years
High Efficiency Toilet (HET)	114	1,314 gallons	149,796 gallons	8.2M gallons	10%
Showerheads	114	4,408 gallons	502,496 gallons	27.6M gallons	10%
Lavatory Faucet	114	1,655 gallons	188,716 gallons	10.3M gallons	10%
Kitchen Faucet	49	1,655 gallons	188,716 gallons	4.4M gallons	5%
Clothes Washers*	840	2,838 gallons	2,384,008 gallons	131.1M gallons	80%
Dishwashers*	845	205 gallons	194,038 gallons	10.6M gallons	90%

*Consumer Reports recommends replacing any appliance more than 8 years old. The average life expectancy of a new washing machine is 11 years and dishwashers is 10. We used 8% of the entire household stock for clothes washers, since 10% would assume every household had its own clothes washer. We used 9% for dishwashers.