Integrating Passive Efficiency into the Forecast: What We Did and What Are the Potential Issues?

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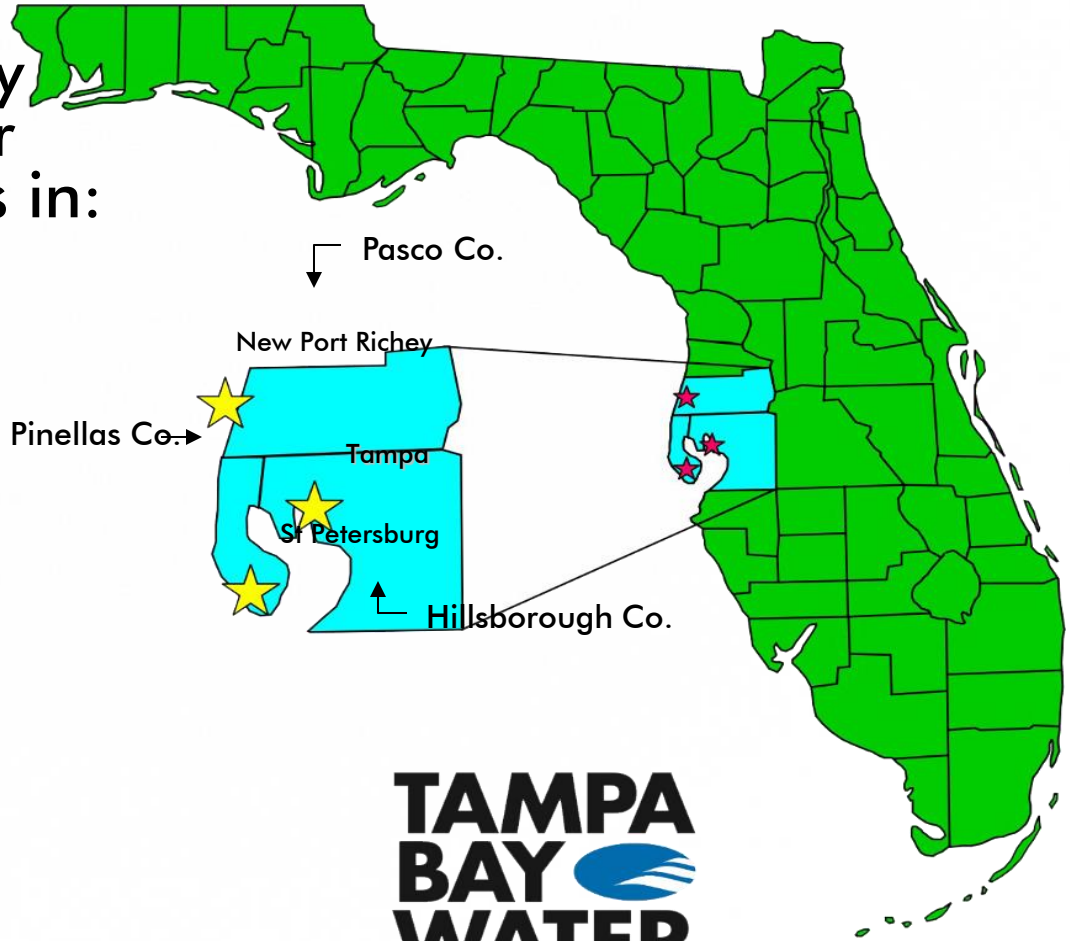
Presentation Goals

- Background
- Goals
- Disaggregation methods used
- Results of our analysis
- Impacts on the demand forecast
- Life of fixtures-penetration rates
- Ongoing analysis of penetration rates
- Recommendations we need to consider
- Other research and potential impacts to demand

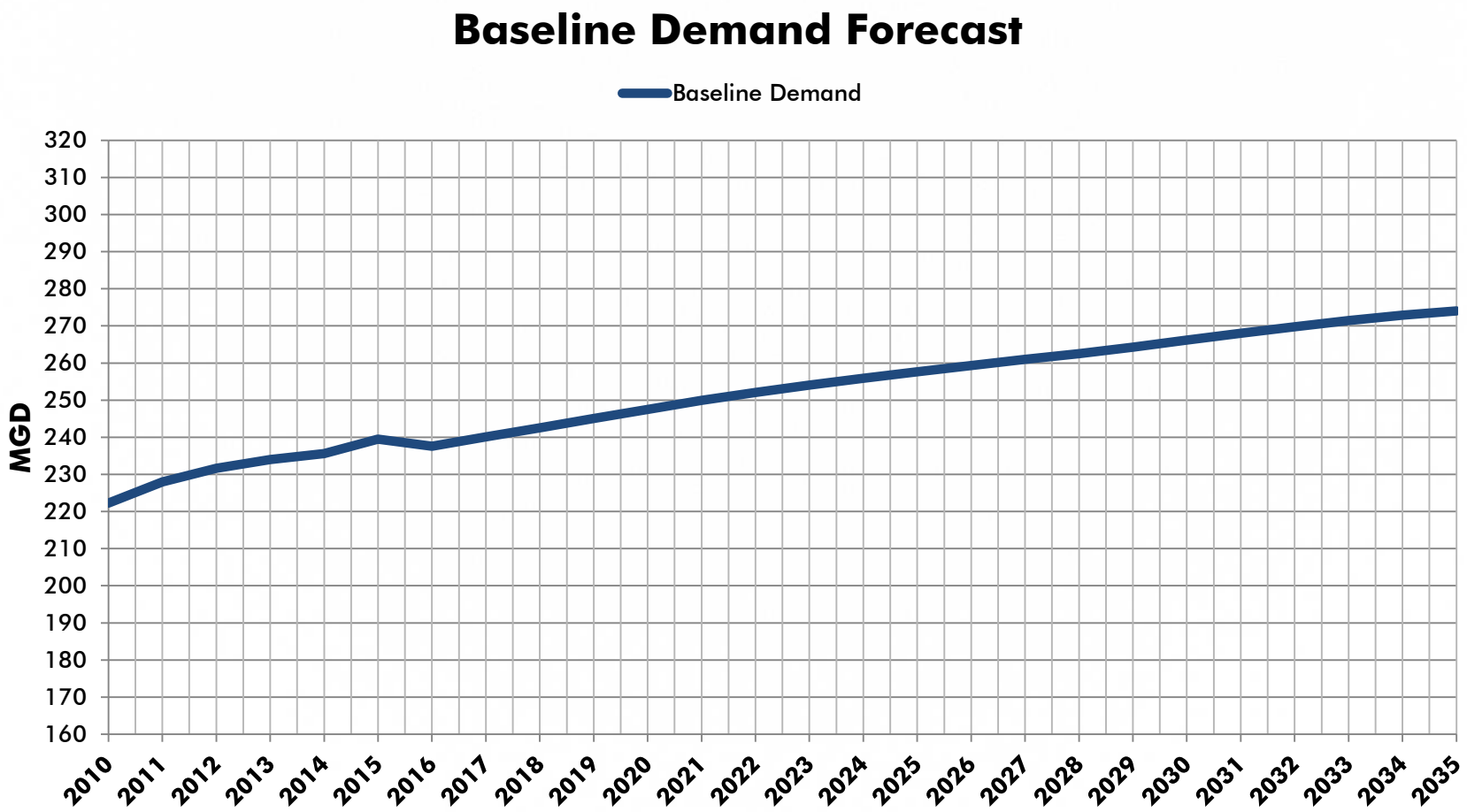
Background

- Regional water supply authority serving over 2.3 million customers in:
  - Pinellas Co.
  - Hillsborough Co.
  - Pasco Co.
  - New Port Richey
  - Tampa
  - St. Petersburg
- Member demand forecasts:
  - 2010: 222 MGD
  - 2035: 274 MGD



TAMPA BAY WATER
Supplying Water To The Region

Where is the Passive Efficiency in the Forecast?



Integrating Demand Management into our Long-Term Supply Plan

GOAL: Make better plans on how to integrate DM with decisions on supply development!

- **Identify and evaluate regional water use efficiency potential**
  - Opportunities to defer need for capital investment / O&M costs
- **Integrate demand management into supply planning process**
  - Compare efficiency and supply projects using the same criteria, including cost

Increased water use efficiency provides regional benefits

- Conserved water = economic benefits
  - 1 mgd saved = $15 - 20M capital cost deferment
  - 1 year deferral of $100M capital project saves agency $5M in interest
- Avoided energy and chemical *operating costs*

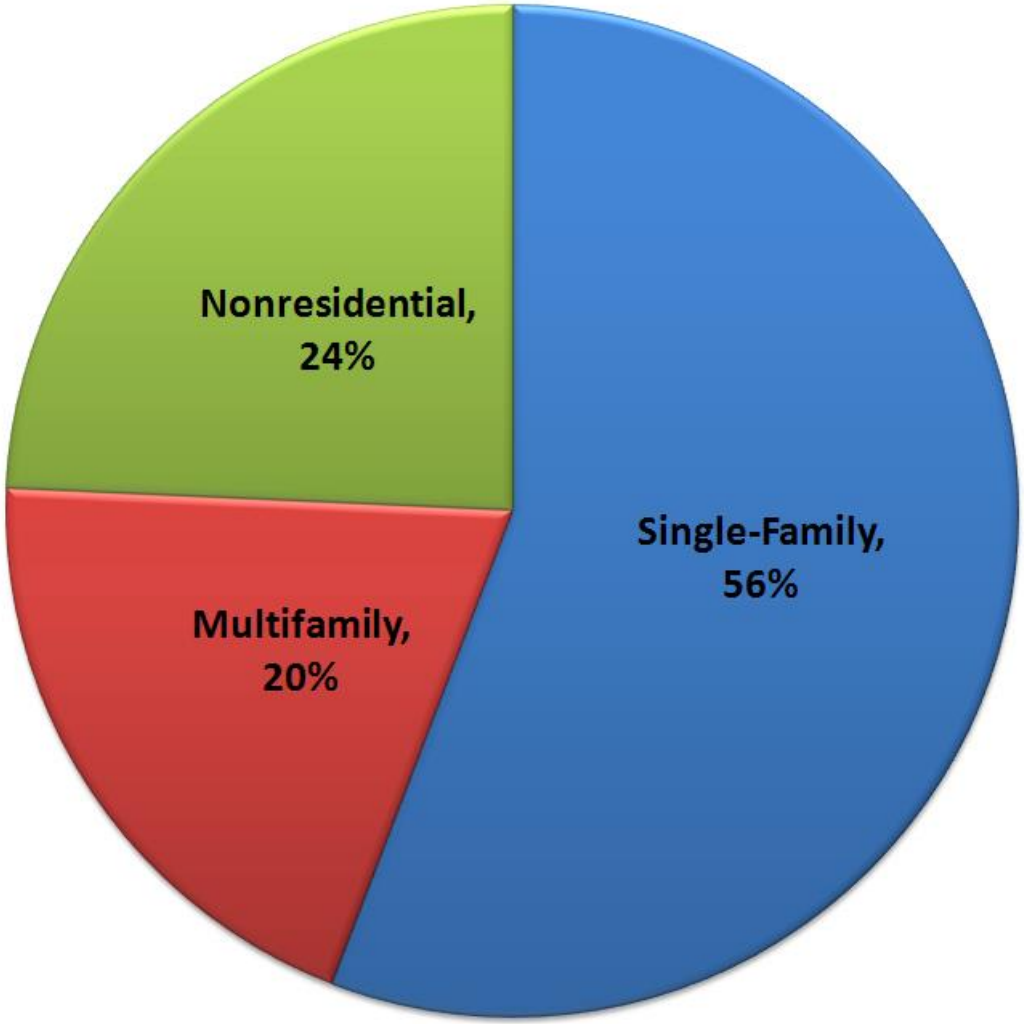
Demand forecast is the basis for evaluating benefits

- Defined future efficiency levels
  - "Passive" efficiency improvements
    - Gains due to regulation + self-retrofit
    - Increasing demand and supply of high efficiency products (Water Sense and Energy Star)
  - "Active" efficiency program measures
    - Incentive based programs (e.g. rebate / giveaway)
    - Requires funding to implement

Integration: Background information on Agency Efforts

- U.S. Energy Policy Act effective (EPAct,1994)
- Agency completed first Demand Management Plan (1997)
  - Dependability of EPAct savings unknown
- Market for water efficient products has evolved post-EPAct
- Cost of future supply options has increased
- 2008 Board approved Demand Management Plan update to be included in 2013 Long-term Water Supply Plan
  - **1st opportunity to include future passive efficiency projections into supply mix**

Regional Water Use

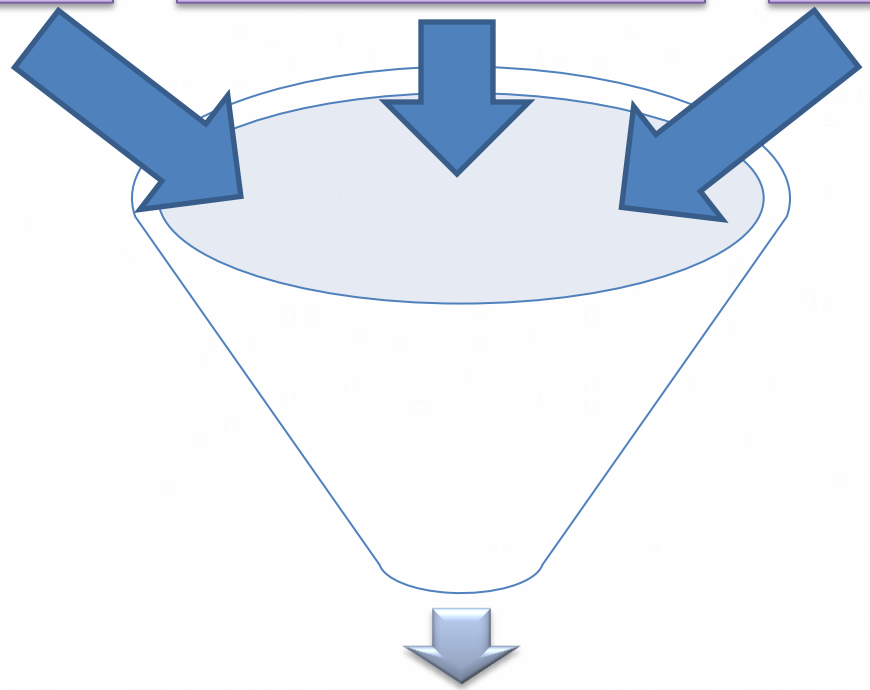


Good Data Sources= Good Information

Tax Appraiser

Member Water Use

Florida Dept. Revenue



Characteristics known to influence water use.

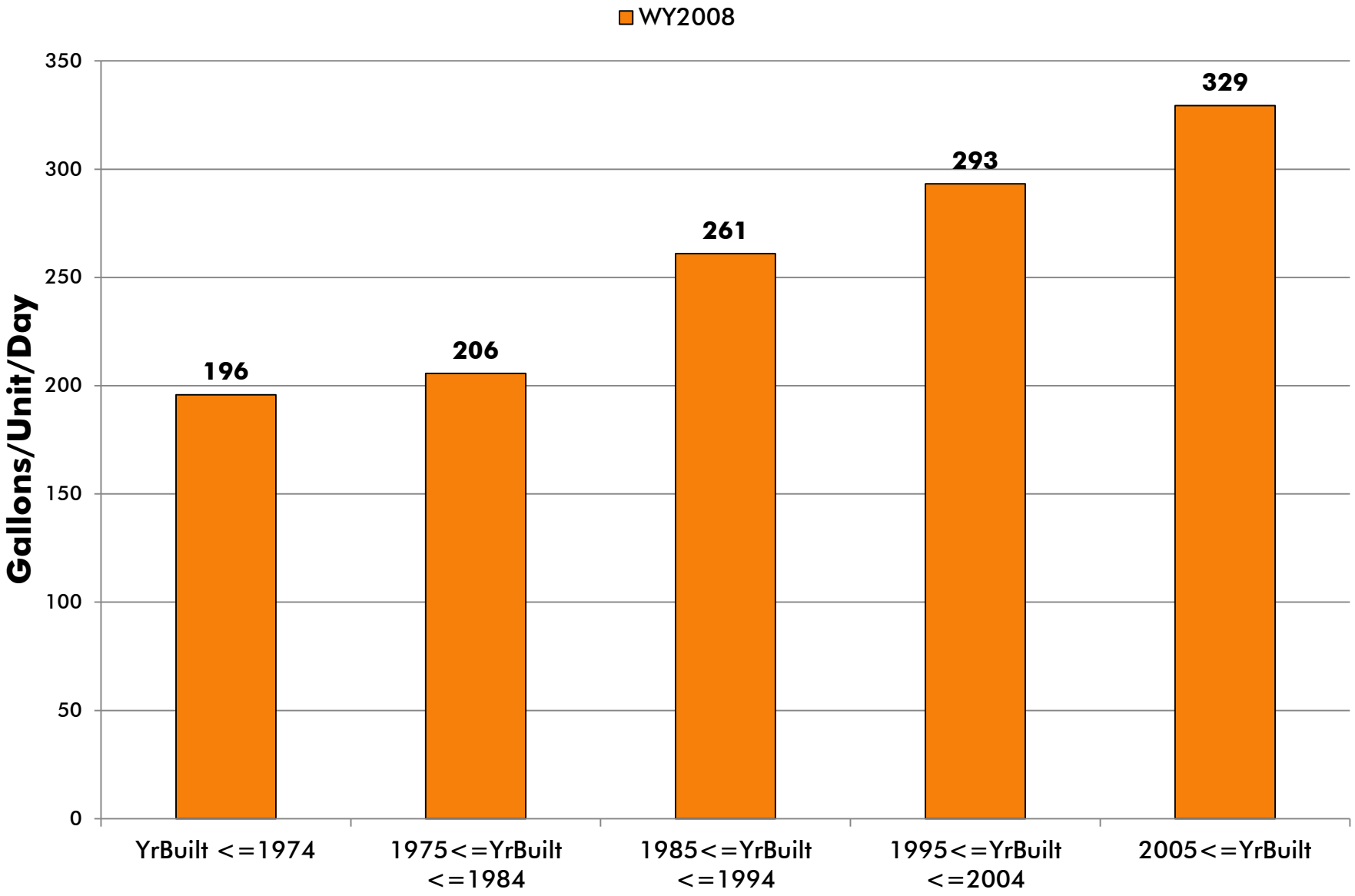
Customer class disaggregation.

Database for water use characterization

How we determined current and future efficiency potential?

- Develop relationship between billing and property appraiser data to estimate:
  - Water fixture age and efficiency in region
  - Market saturation of water efficient technologies
  - Seasonal/Outdoor water use patterns

Regional Single Family Average Gallons/Unit/Day by Year Built



What high efficiency products are in the market?

- **Water Sense Specifications (Final)**
  - **High-Efficiency Toilets**
  - **High-Efficiency Lavatory (Bathroom Sink) Faucets**
  - Flushing Urinals
  - **Showerheads**

- **Water Sense Specifications Notification of Intent**
  - High-Efficiency Pre-Rinse Spray Valves

- **Energy Star Products**
  - **Residential Clotheswashers**
  - **Residential Dishwashers**
  - Commercial Clotheswashers
  - Commercial Dishwashers
  - Ice Machines

Further efficiency potential in indoor plumbing fixtures

Estimated Single-Family Flow Rates				
End Use	**Metric**	**Tampa Bay Water**	**Current Standard**	**High Efficiency**
Toilet	Gallons per flush	**2.39**	**1.6**	**1.28**
Shower	Gallons per minute	2.10	2.5	2.0
Faucet	Gallons per minute	1.01	2.2	1.5
Clothes Washer	Gallons per load	**33.49**	**23**	**15.0**
Dishwasher	Gallons per load	**8.90**	**5.8**	**4.25**

Passive Efficiency Change Potential

- Avoided Cost Modeling Tool Selection / Update
- Estimation of SF, MF and NR Fixture Replacement Potential
- Preliminary assessment of measures /programs

How We Evaluated Measures

Potential Screening Criteria

- **Market maturity**
- **Customer acceptability (survey)**
  - **Blind with linkage back to billing data**
- **Market transformation measure available**
  - **(standard vs. HE)**

SF/MF water closet assumptions

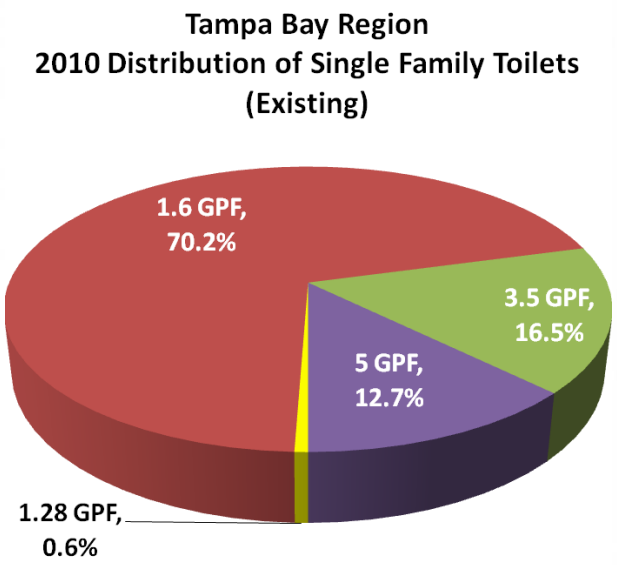
- Natural Rate of Replacement (NRR): 4% (25 years)
- HE Market Share: varies into future (66% by 2035-EPA Water Sense National Savings Model)

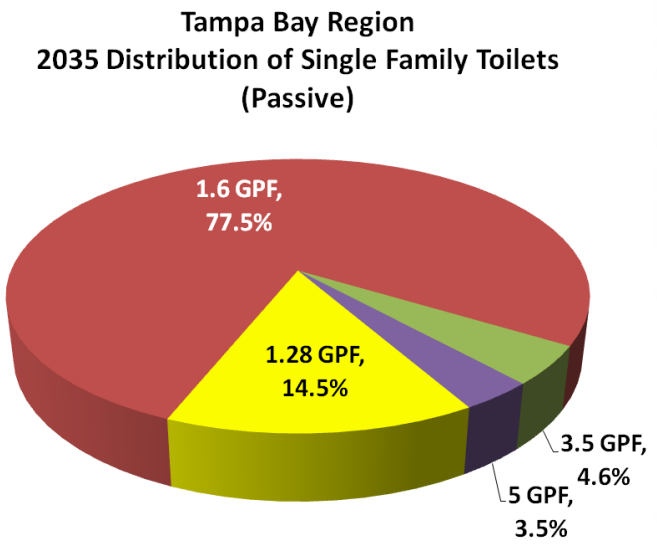
- Estimated distribution of fixture age/efficiency in region based on property appraiser parcel level data and:
  - natural replacements assumptions
  - member government programs
  - market share of HE products

Regional Distribution of Single-Family Fixtures by Housing Age

End Uses	Flow Rate	Pre-1983		1983-1994		1995-2008		All TBW Housing Ages	
		Fixtures	Percent	Fixtures	Percent	Fixtures	Percent	Fixtures	Percent
Toilets	1.28 gpf	2,004	0.5%	792	0.5%	4,913	1.0%	7,709	0.7%
	1.6 gpf	179,420	43.1%	70,946	43.1%	473,793	99.0%	724,159	68.3%
	3.5 gpf	91,141	21.9%	93,053	56.5%	0	0.0%	184,194	17.4%
	5 gpf	144,189	34.6%	0	0.0%	0	0.0%	144,189	13.6%
	Total	416,754	100%	164,791	100%	478,706	100%	1,060,251	100%
Showers	2.0 gpm	374,828	77.1%	141,282	77.1%	316,574	100.0%	832,684	84.5%
	2.5 gpm	79,782	16.4%	41,908	22.9%	0	0.0%	121,690	12.3%
	3.3 gpm	31,402	6.5%	0	0.0%	0	0.0%	31,402	3.2%
	Total	486,012	100%	183,190	100%	316,574	100%	985,776	100%
Faucets	1.0 gpm	628,297	77.1%	216,460	77.1%	469,936	100.0%	1,314,693	84.0%
	1.1 gpm	133,733	16.4%	64,208	22.9%	0	0.0%	197,941	12.6%
	1.2 gpm	52,636	6.5%	0	0.0%	0	0.0%	52,636	3.4%
	Total	814,666	100%	280,668	100%	469,936	100%	1,565,270	100%

Predicted change in fixture efficiency





SF/ MF Clothes Washer Assumptions

	SF	MF Owners	MF Rental
NRR (12 yrs)	8.3%	8.3%	8.3%
% Units w/Washers*	97%	86%	45%
% ES Increase	2.88	2.88	2.88
Loads per Day**	.96	.73	.73
Cubic Feet per Load	2.7	2.7	2.7
Target WF	>6.0	>6.0	>6.0
Active Program WF	4.5	4.5	4.5

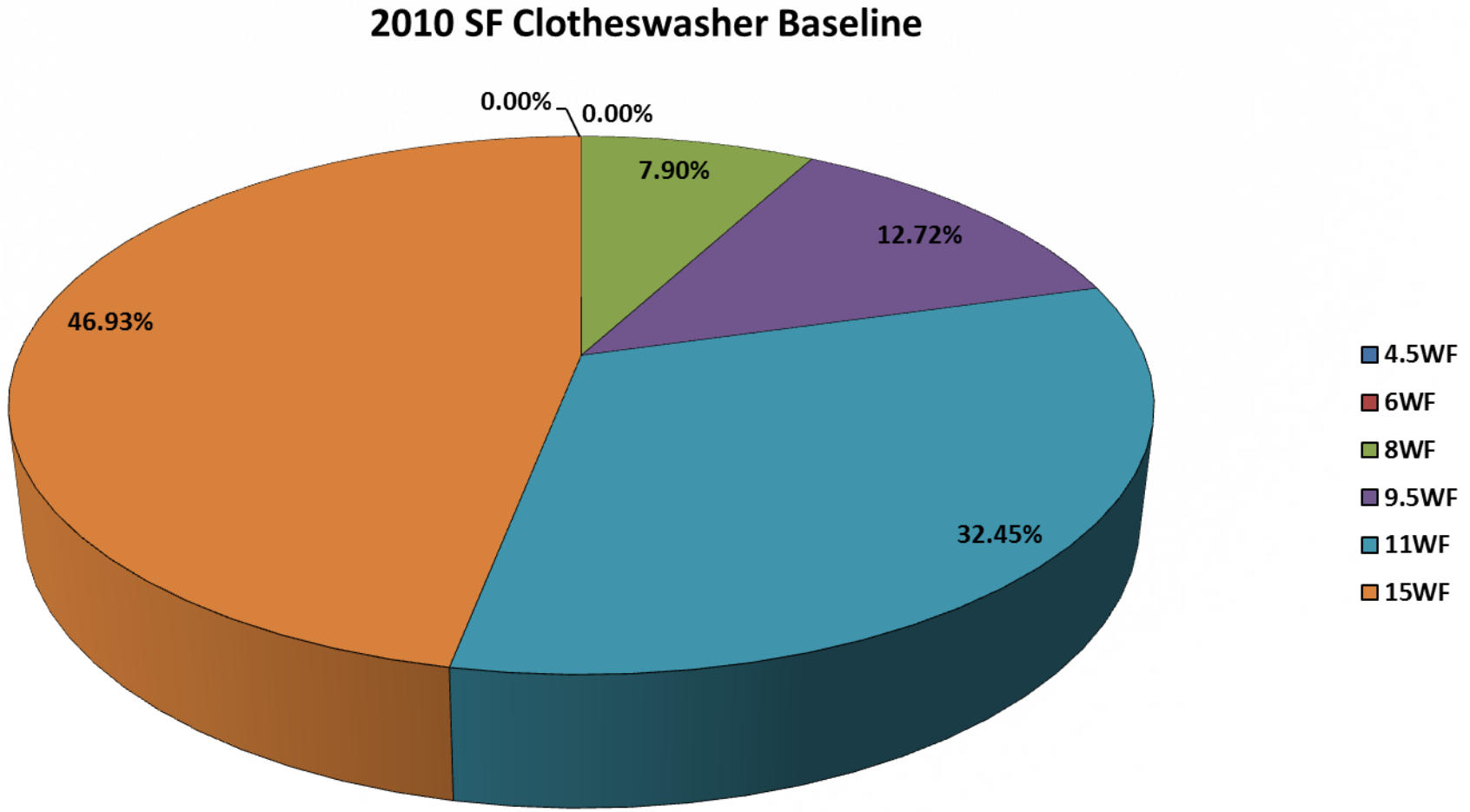
** SF- consistent with TBW survey (AHS indicates 98%)*
** MF - % Units data from American Housing Survey*
*** SF- AWWA Residential End Uses of Water,*
*** MF – Multi-housing Laundry Association, Water Energy Survey, Multifamily Housing In-Apartment Washers vs. Common Area Laundry*

- Survey indicates 20% of customers have Front Loader
- Florida/Energy Star Market Share
  - Available 1997-2008
  - Adjusted to reflect 20% in 2008
  - Grew rate by annual average % increase to 70% penetration
  - Various level of efficiency will be sold at any given time
  - Many TL naturally replaced will exceed target WF

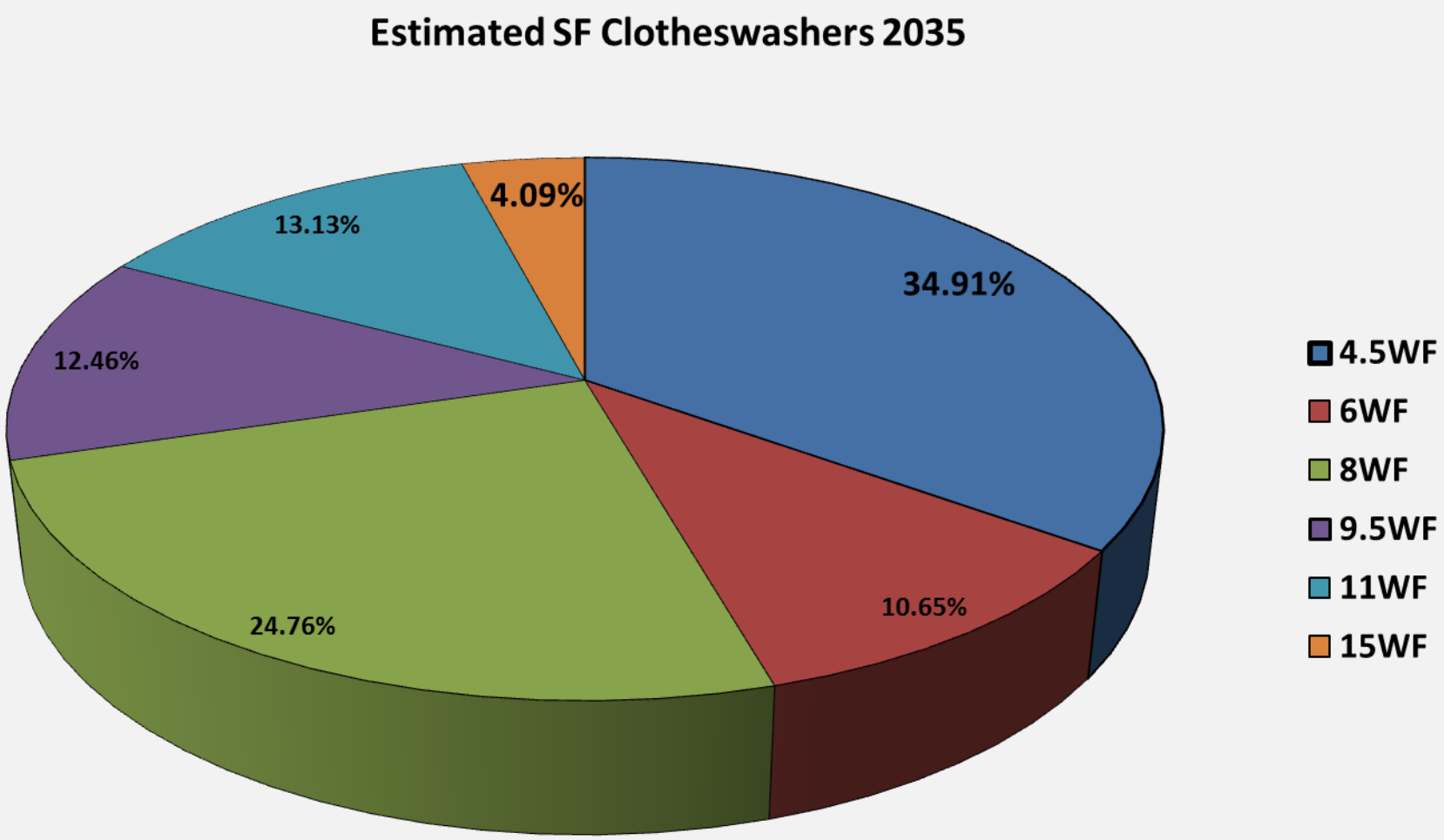
Clothes washer market penetration rates

Year	ES Market Share	ES Market Share Adjusted	Existing TL WF	NEW TL WF (Standard)	ES WF (Below Standard)	ES Market Share % Change
1996	0%					
1997	1%	1%	15	15	11	1.00%
1998	4%	4%	15	15	11	2.88%
1999	6%	7%	15	15	11	2.88%
2000	7%	10%	15	15	11	2.88%
2001	9%	13%	15	11	9.5	2.88%
2002	13%	15%	15	11	9.5	2.88%
2003	20%	18%	15	11	9.5	2.88%
2004	25%	21%	15	11	9.5	2.88%
2005	34%	24%	15	11	9.5	2.88%
2006	36%	27%	15	11	9.5	2.88%
2007	40%	30%	15	11	9.5	2.88%
2008	**44%**	**33%**	**15**	**11**	**8**	**2.88%**
2009		36%	15	11	8	2.88%
2012		44%	15	9.5	6	2.88%
2016		56%	15	8	4.5	2.88%
2020		67%	15	8	4.5	2.88%
2025		70%	15	8	4.5	0.00%
2035		70%	15	8	4.5	0.00%

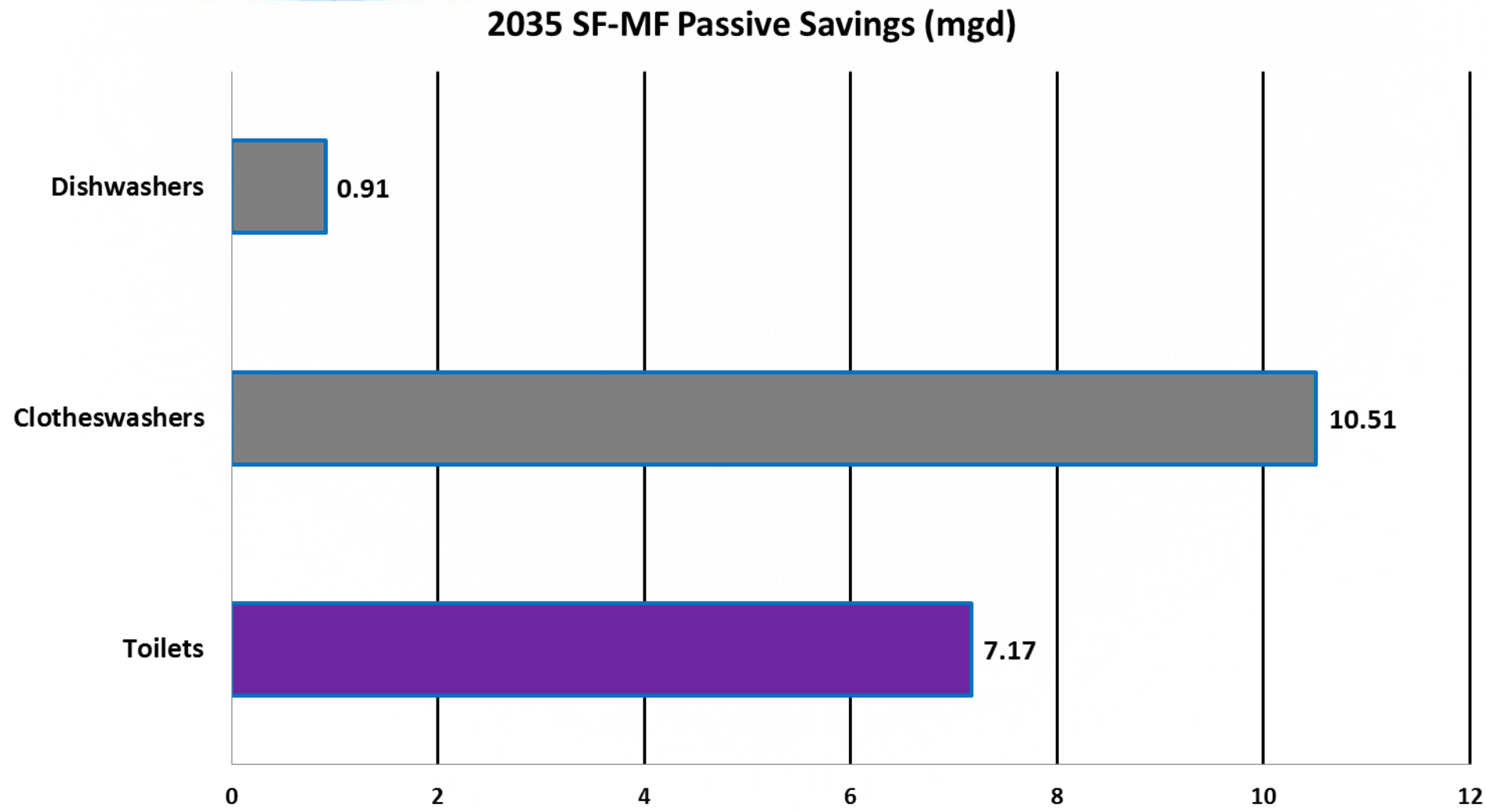
Predicted Changes in Clotheswasher Efficiency-SF



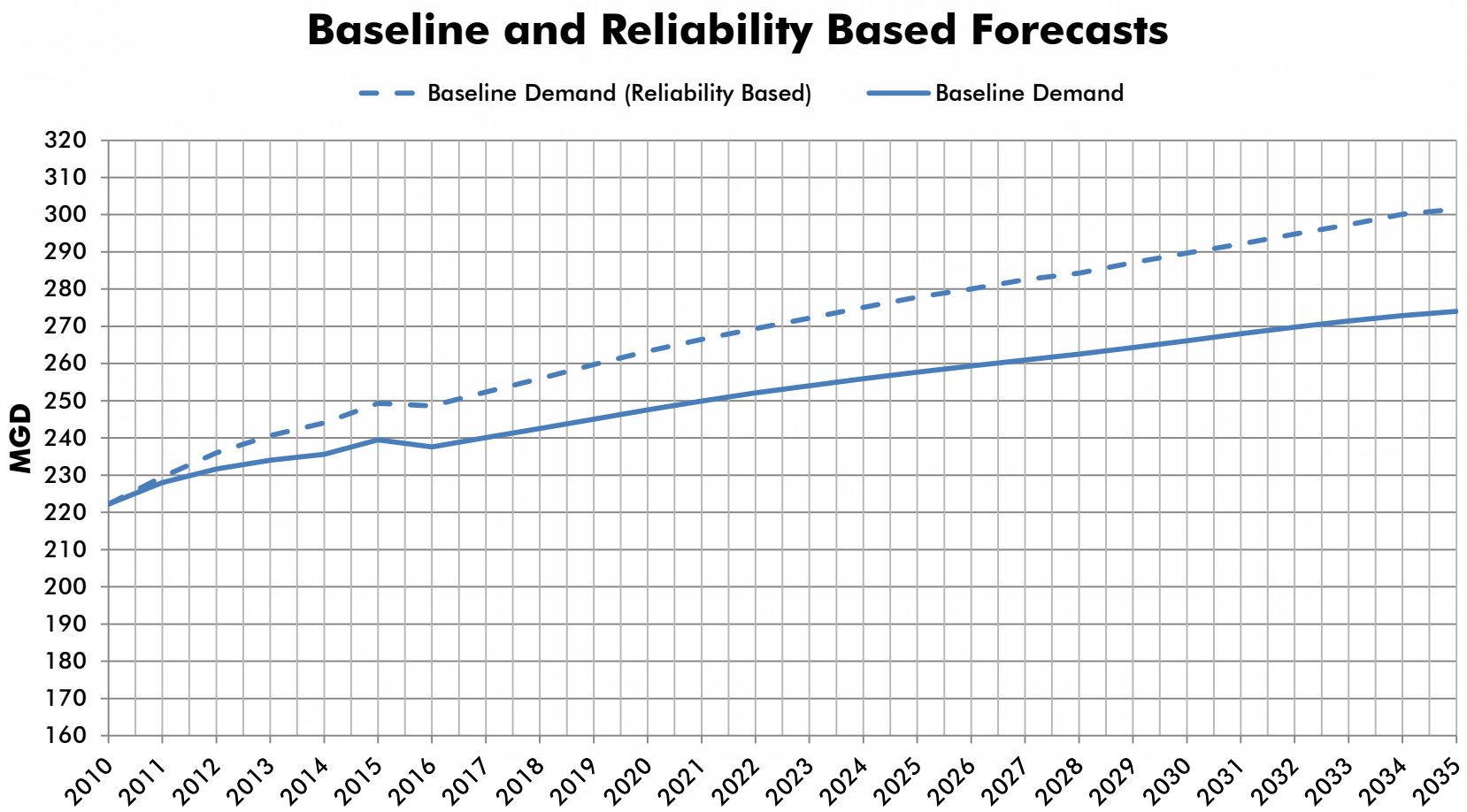
Predicted Changes in Clotheswasher Efficiency-SF



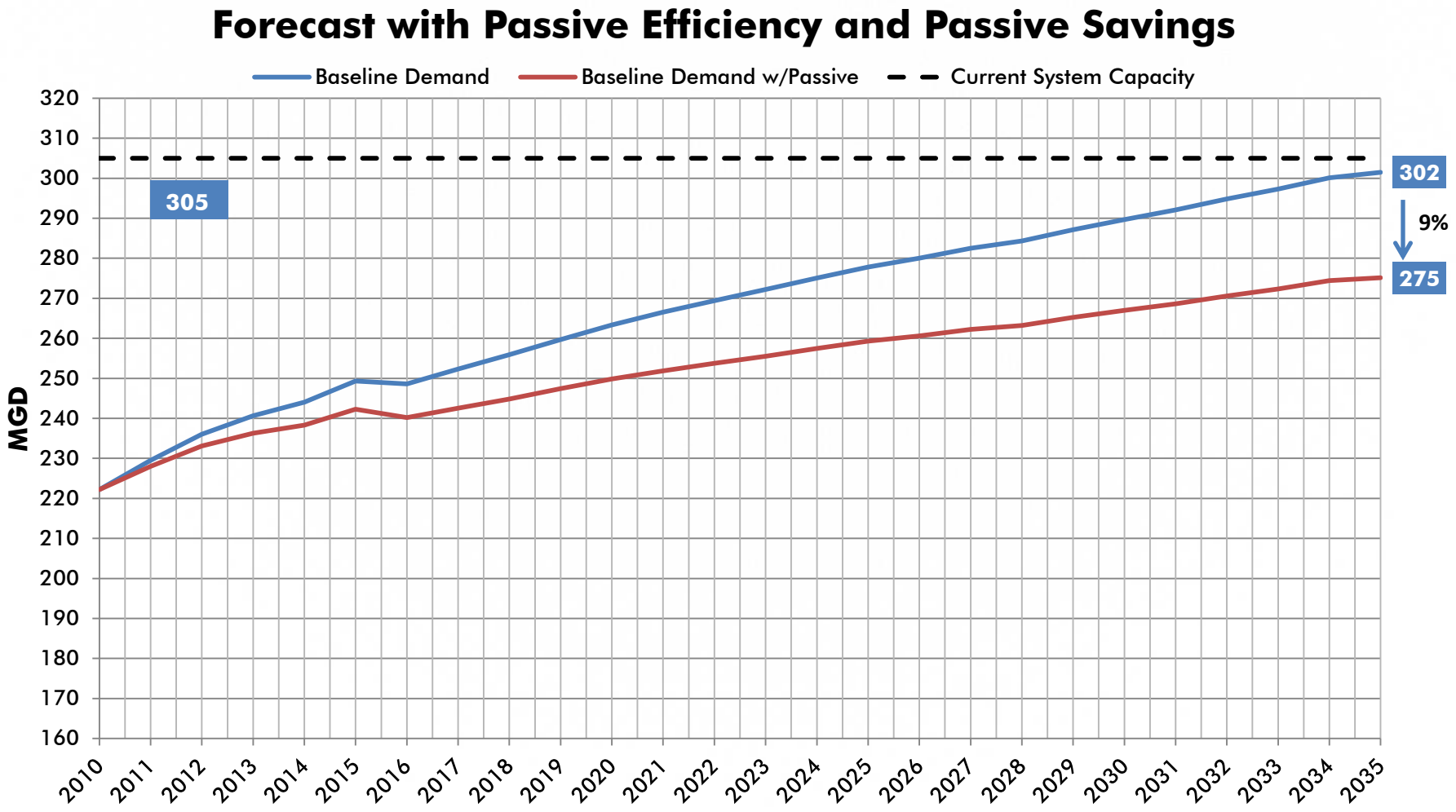
Majority of savings residential



A reliability based forecast was used for avoided cost analysis



Passive efficiency reduces future demand by 9 percent in 2035



Recommendations

- Future efficiency is in the passive market
- Penetration rates are important to accurately forecast water use changes
- Measurement of penetration rates need to occur both locally and nationally
- Locally through use of ongoing survey tools or other metrics (AMI)
- Nationally through research into market based penetration rates for products (WRF #4495)
- Track off grid users, greywater