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Regulatory and Market-Based Efficiency Impacts on Water Supply Planning: What's in Your Future?

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TAMPA BAY WATER
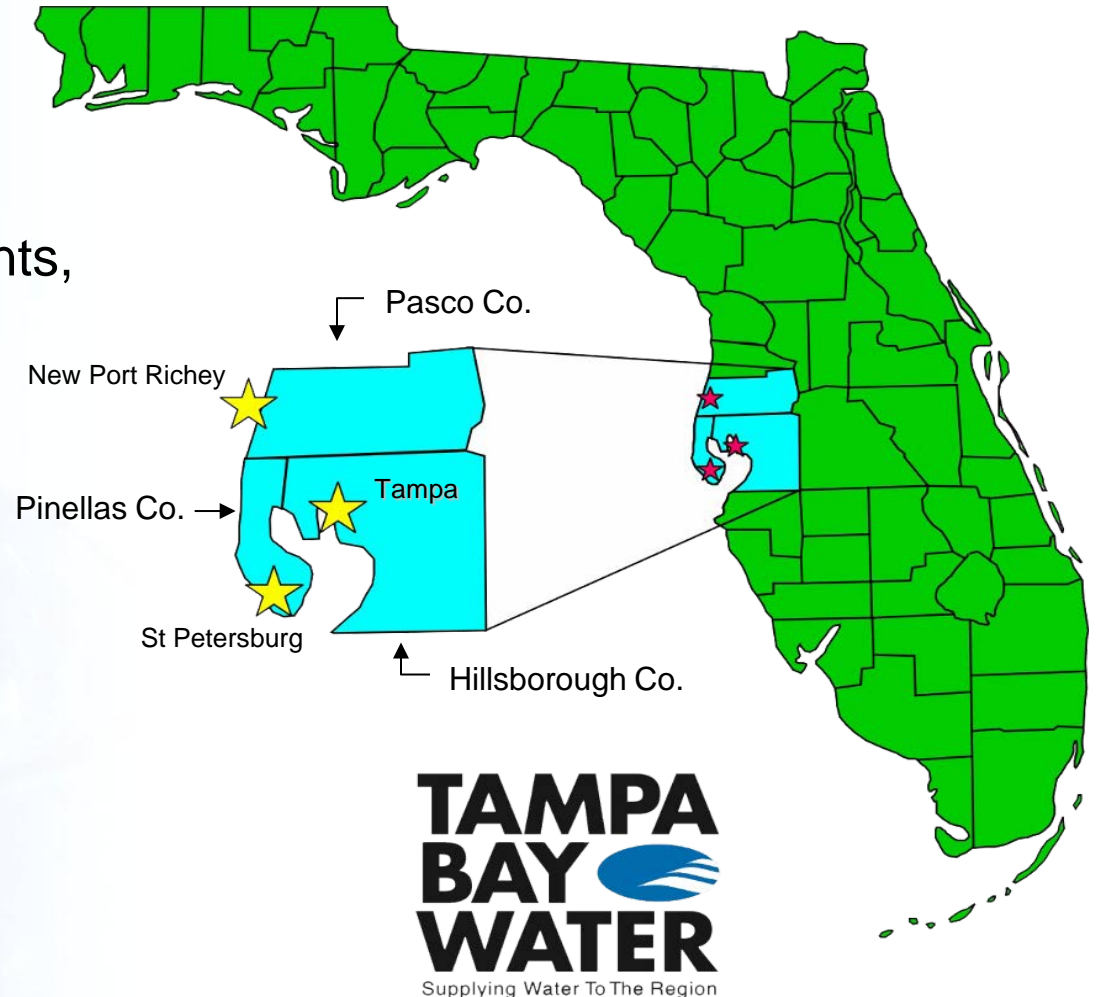Supplying Water To The Region

HAZEN AND SAWYER
Environmental Engineers & Scientists

Presentation Outline

► Background

  ● Agency

  ● Purpose

► Passive efficiency potential analysis

  ● Penetration rates

  ● Average rate of use

► Results

  ● Passive savings

  ● Impacts on long-term demands

► Conclusions

Background, Goals

Agency Background

- ▶ Regional water supply authority serving over 2.3 million customers

- ▶ Six member governments, across three counties

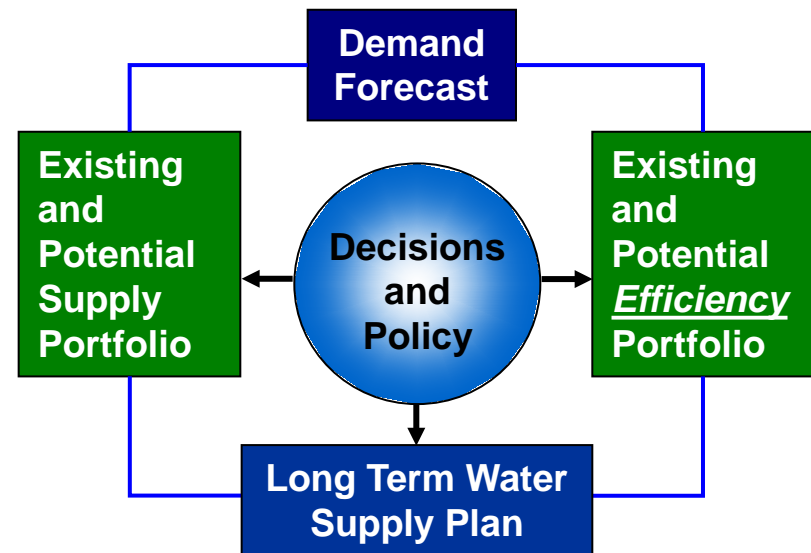- ▶ Member demands:
  - – 2010: 222 MGD
  - – 2035: 274 MGD

Pasco Co.

New Port Richey

Pinellas Co.

Tampa

St Petersburg

Hillsborough Co.

TAMPA BAY WATER

Supplying Water To The Region

Background 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 assess future passive efficiency projections post EPAct

Long-Term Supply Plan to Consider Efficiency

► GOAL: Integrate demand management with decisions on supply planning!

► 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

Demand Forecast

Existing and Potential Supply Portfolio

Decisions and Policy

Existing and Potential *Efficiency* Portfolio
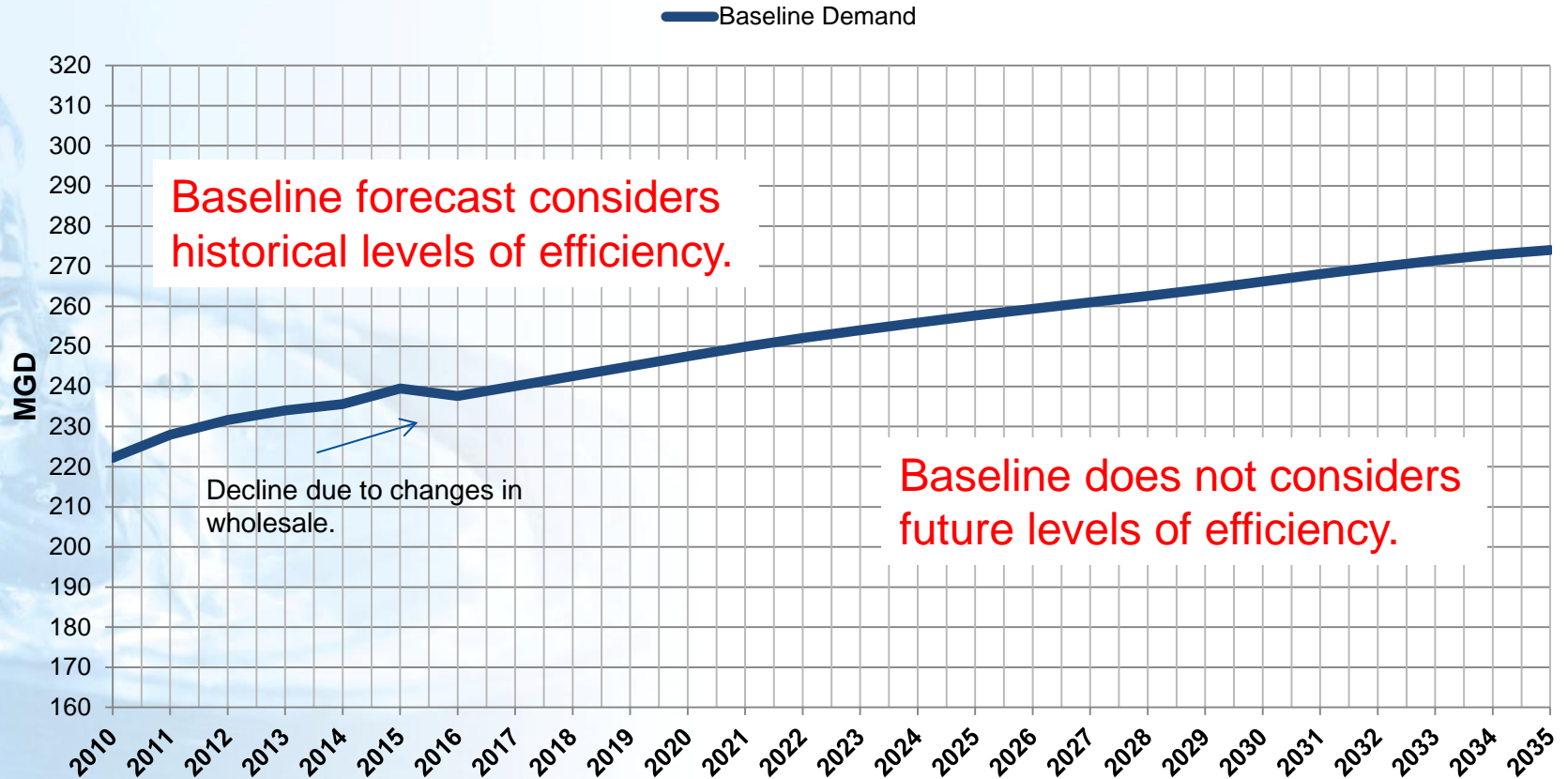
Long Term Water Supply Plan

Increased 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

Baseline Demand Forecast

Baseline forecast considers historical levels of efficiency.

Decline due to changes in wholesale.

Baseline does not considers future levels of efficiency.

Accounting for "passive" efficiency

► Effects of passive efficiency should be expected

- Gains due to regulation + self-retrofit

- Increasing demand and supply of high efficiency products (Water Sense and Energy Star)

► Increases in water efficiency over time can effectively reduce long-term demands for water

► Estimation of passive savings is key to evaluating

- Active conservation savings potential
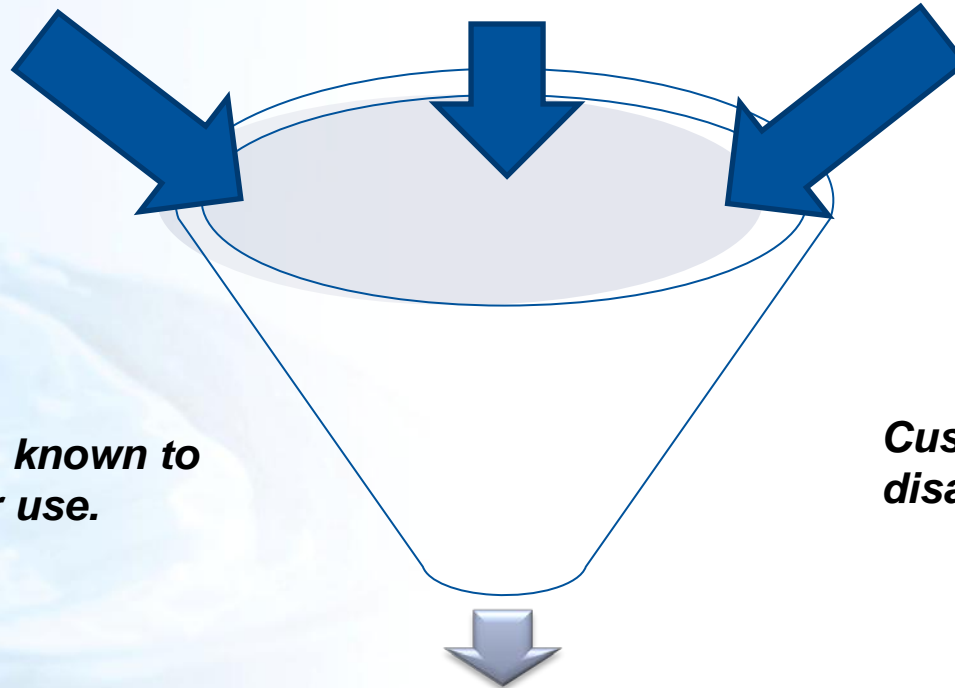
- Water supply alternatives

Passive Efficiency Potential

Good Data Sources = Good Information

Member Water Use / Conservation Data / Single-Family Survey	Property Appraiser / FDOR Property Use Designations	Florida State Government Datasets Seating/Rooms/Students

Characteristics known to influence water use.

Customer class disaggregation.

Database for water use characterization

Basis of Passive Efficiency Potential

► Estimated the distribution of differing water-use intensities across time and technologies

- ● Baseline penetration and end-use average flow rates

  - ▪ Parcel bathroom estimates / age of household

  - ▪ Natural replacement assumptions

  - ▪ Market share of HE products (historical market sales data)

  - ▪ Customer acceptability (survey) / customer rebates

- ● Future penetration and end-use average flow rates

  - ▪ Baseline fixtures/location estimates held constant over forecast

  - ▪ Natural replacement assumptions

  - ▪ Market maturity and transformation from standard to HE

High efficiency products 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 Clothes washers

- Residential Dishwashers

- Commercial Clothes washers

- Commercial Dishwashers

- Ice Machines

Assessing single-family flow rates and further efficiency potential

		Estimated Average 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	33.5	23	15.0
Dishwasher	Gallons per load	8.90	5.8	4.25

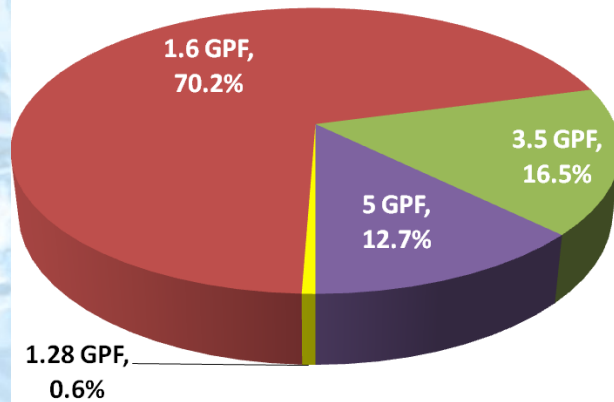# Regional Distribution of Single-Family Fixtures by Housing Age

End Uses	Flow Rate	Pre-1983		1983-1994		1995-2008		All TBW Housing Ages	
		Fixtures	%	Fixtures	%	Fixtures	%	Fixtures	%
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%

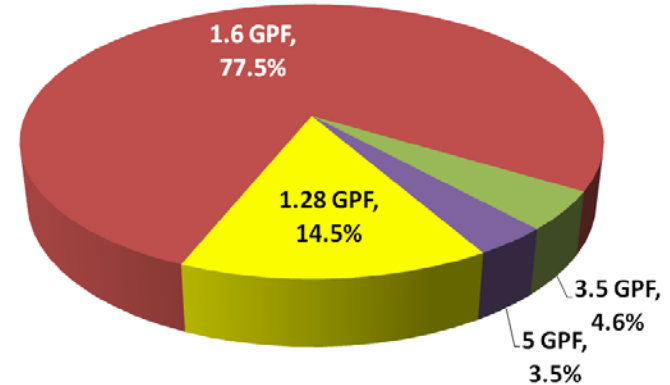**Estimate 70 % of toilets still use 1.6 gpf or less.**

Estimate 30 % of toilets still use more then 3.5 gpf.

Predicted change in toilet efficiency

Tampa Bay Region
2010 Distribution of Single Family Toilets
(Existing)

- 1.6 GPF, 70.2%
- 3.5 GPF, 16.5%
- 5 GPF, 12.7%
- 1.28 GPF, 0.6%

Tampa Bay Region
2035 Distribution of Single Family Toilets
(Passive)

- 1.6 GPF, 77.5%
- 1.28 GPF, 14.5%
- 3.5 GPF, 4.6%
- 5 GPF, 3.5%

► Natural Rate of Replacement (NRR): 4% (25 years)

► HE Market Share varies annually into future

● 66% by 2035 (EPA Water Sense National Savings Model)

► Presence

- SF Survey

- AHS (Tampa, 2007)

► Frequency/size of loads

- REUWS

- Multi-housing Laundry Association (MLA)

- Energy Star Market Impact Study

► Active program WF targets

- Future standards

- CEE

	SF	MF Owners	MF Rental
NRR (12 yrs)	8.3%	8.3%	8.3%
% Units w/Washers	97%	86%	45%
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

Clothes washer market penetration rates

Year	ES Market Share	ES Market Share Adjusted	Low Efficiency WF	Medium Efficiency WF	High Efficiency WF	ES Market Share % Change
1996	0%					
1997	1%	1%	15	15	11	1.00%
2001	9%	13%	15	11	9.5	2.88%
2008	**44%**	**33%**	**15**	**11**	**8.0**	**2.88%**
2012		44%	15	9.5	6.0	2.88%
2016		56%	15	8.0	4.5	2.88%
2025		70%	15	8.0	4.5	0.00%

► Various level of efficiency will be sold at any given time

► Florida/Energy Star Market Share Sales Data (1997-2008)

  ● Survey indicates 20% of customers have Front Loader

  ● Adjusted market share estimates to reflect 20% ownership in 2008

  ● Grew rate by annual average % increase to 70% penetration

► After 2011, majority of products sold have 6.0 WF or less

Predicted change in clothes washer efficiency
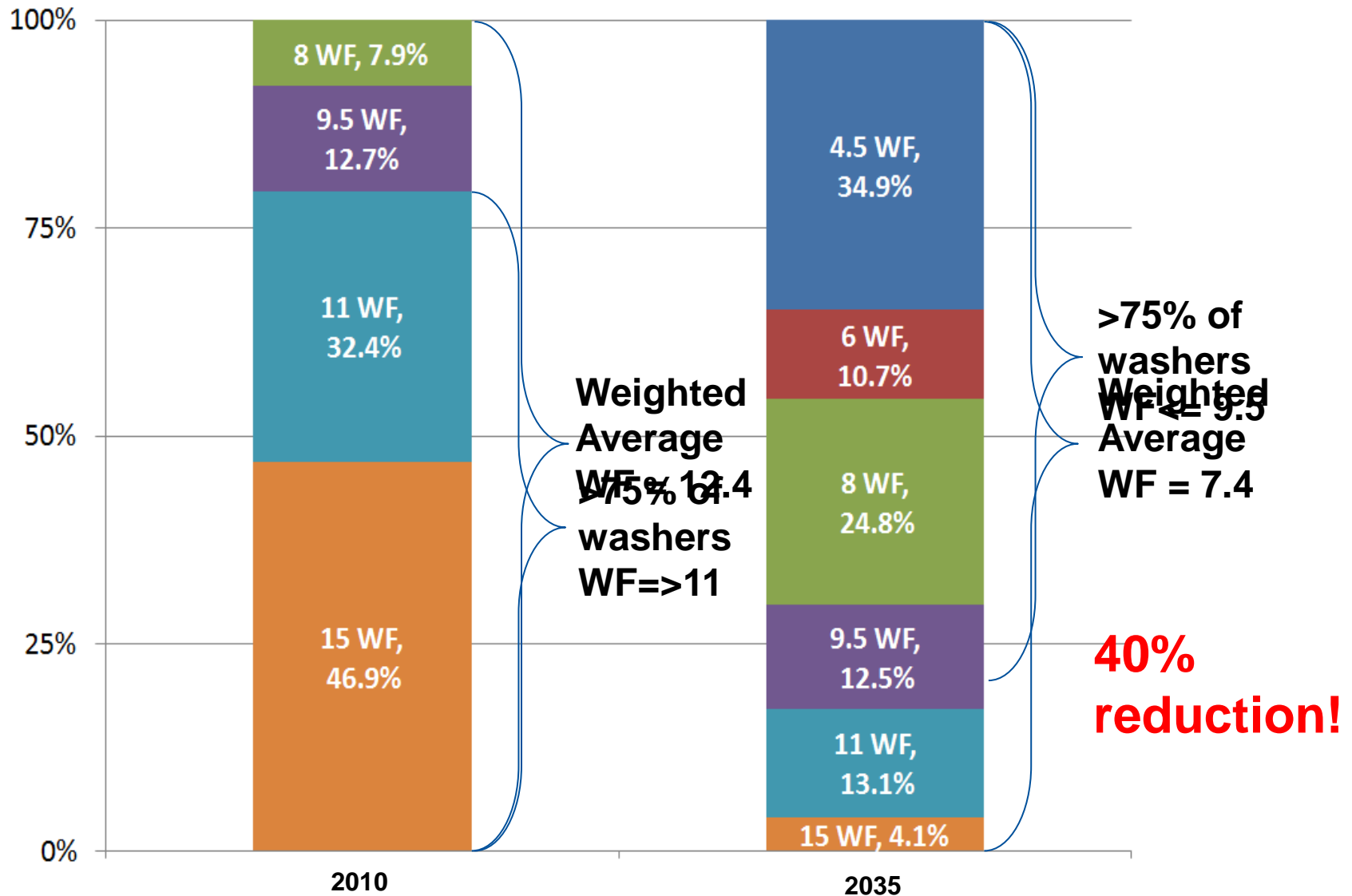
Dishwashers

► Prior to 2001, 7-12 gpl

► 2000-2005, ~7.5 gpl

► 2005 Energy Star market analysis

- 2002 ENERGY STAR market share <40%.

- 2005 ENERGY STAR qualified market share ~ 86%

- 36% increase in three years

- Most inefficient dishwashers used 10 gpl on average

► 2008 weighted average = 8.9 gpl

► 2035 weighted average = 6.5 gpl

- Conservative estimates, lower use probable

Results and Conclusions

Estimated baseline single-family flow rates and efficiency potential

| End Use	Flow Rates			Estimated % Reduction	
	Tampa Bay Water	Current Standard	High Efficiency	w/Standard Benchmark	w/High Efficiency Benchmark
Toilet	2.39	1.6	1.28	-33%	-46%
Clothes Washer	33.5	25.7	15	-23%	-55%
Dishwasher	8.7	6.5	6.0	-25%	-31%

Majority of savings residential

2035 SF-MF Passive Savings (mgd)
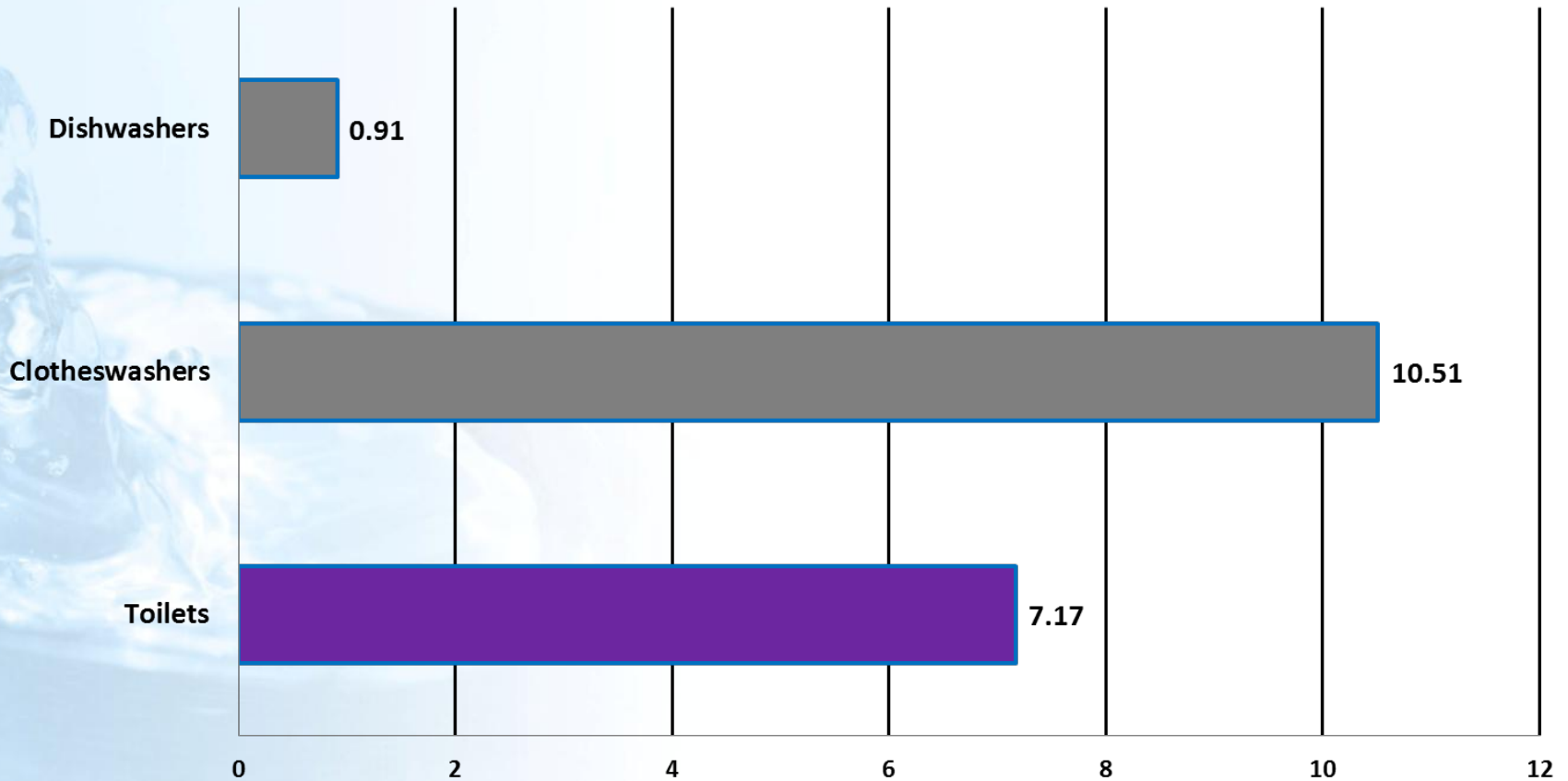
A reliability based forecast was used for avoided cost analysis

Baseline and Reliability Based Forecasts

- - - Baseline Demand (Reliability Based) ——— Baseline Demand
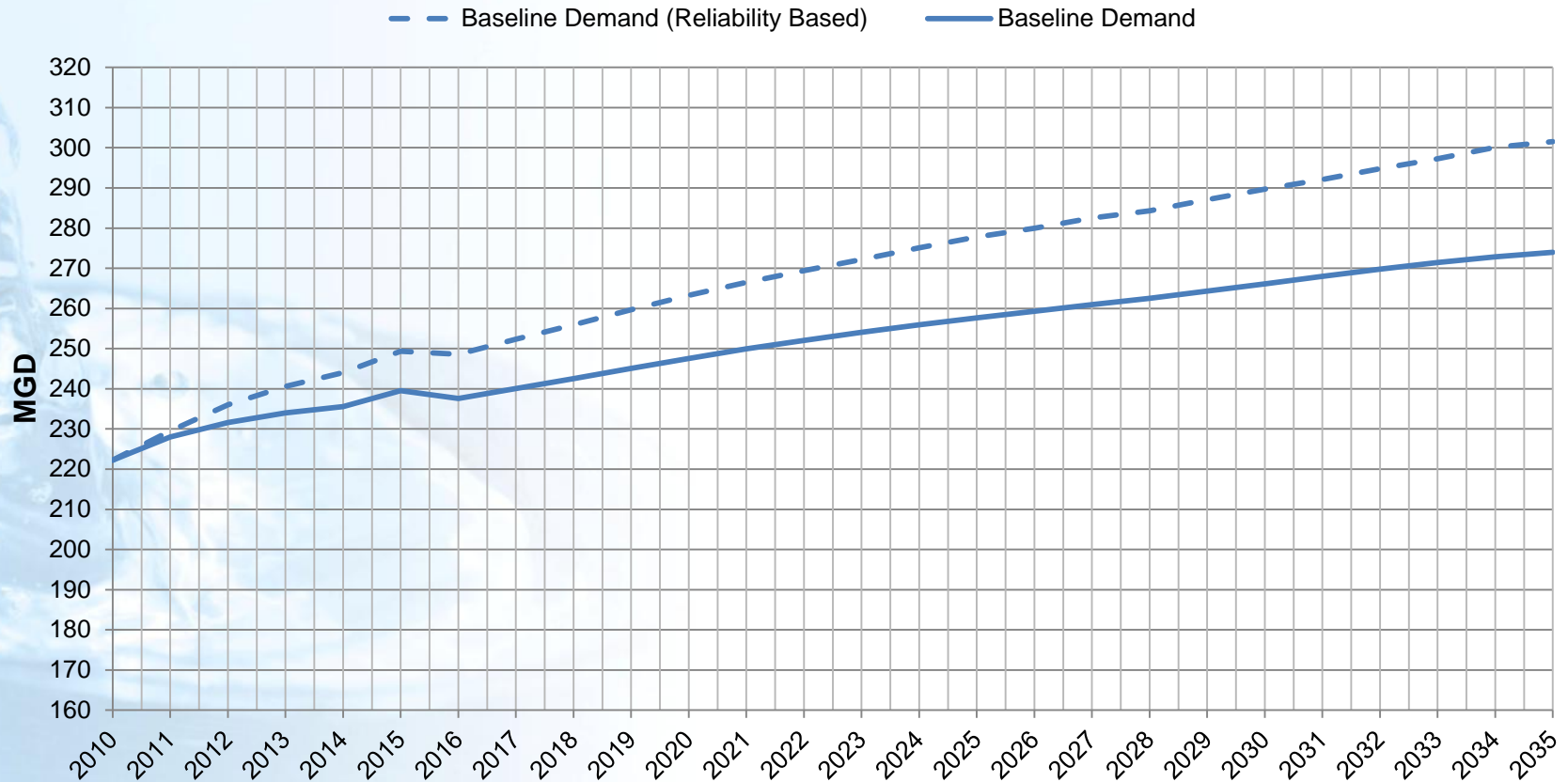
Passive efficiency reduces future demand by 9 percent in 2035

Forecast with Passive Efficiency and Passive Savings
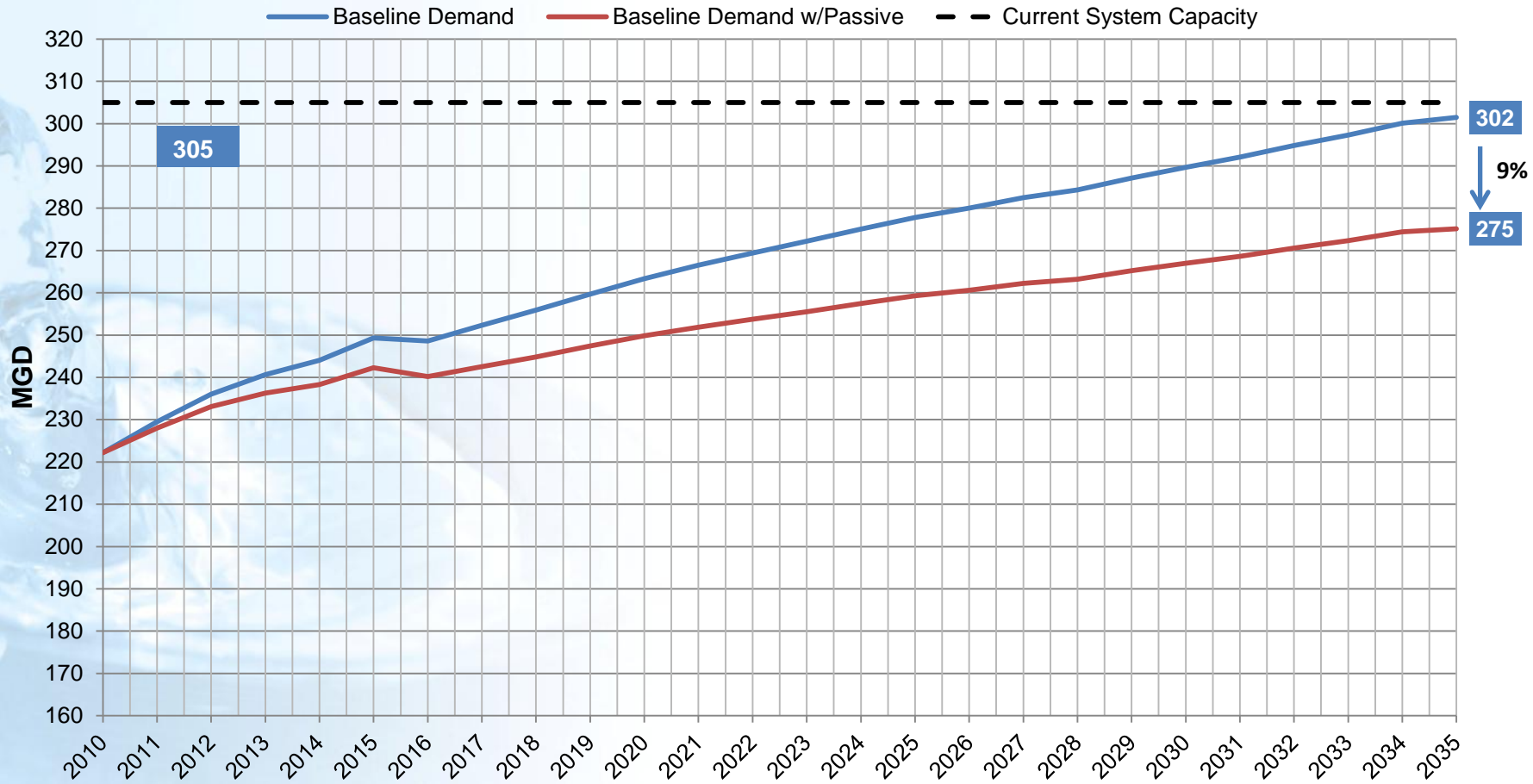
Conclusions

▶ Future efficiency is in the passive market

▶ Penetration rates are important to accurately forecast water use changes

▶ Measurement of penetration rates needs 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)

▶ Passive savings will occur and should be quantified and considered in long-term planning processes

Thank you!

Questions?

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