



American Meteorological Society

Water Utility Resiliency in the Midst of Weather and Climate Uncertainty

January 10, 2018

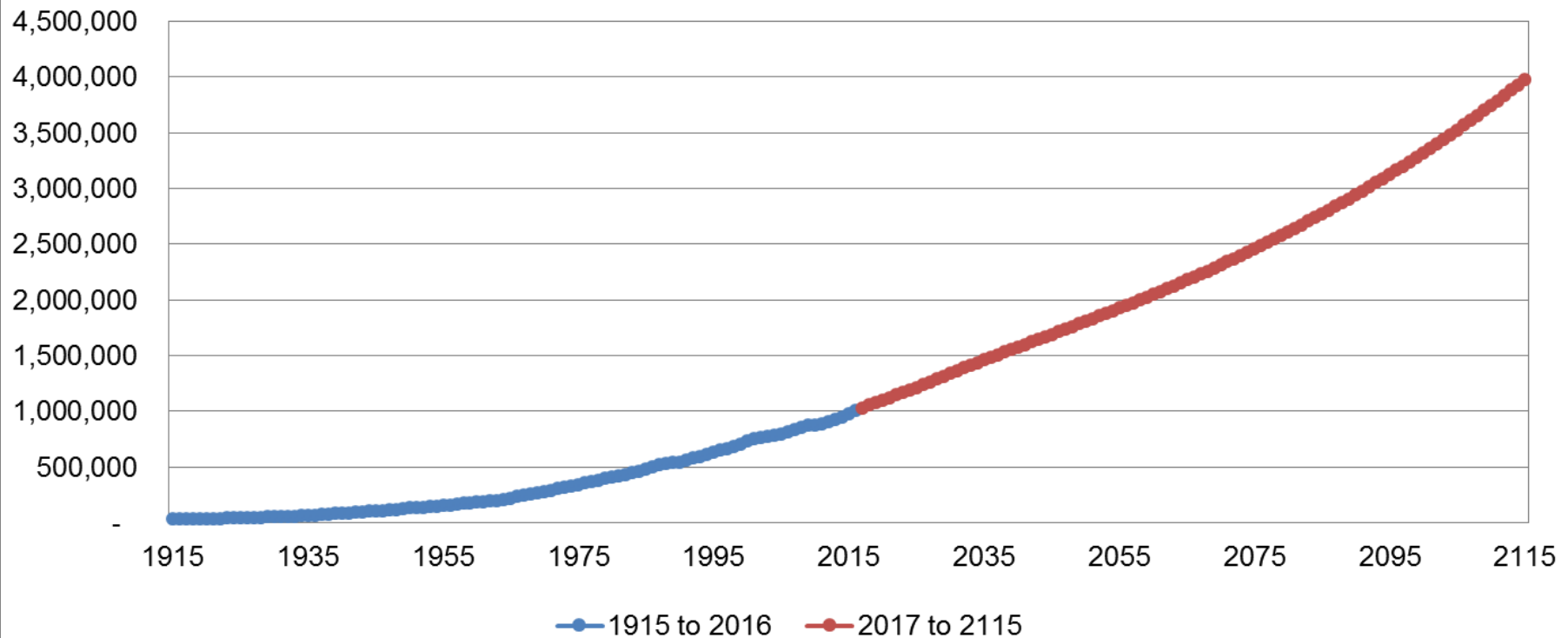


Austin Water

- 1 Million+ Service Population
- 550+ Sq. Mile Service Area
- 1,200 Employees
- \$620 Million Annual Budget
- Water Source – Colorado River
 - State-granted water rights
 - Water supply contracts with the Lower Colorado River Authority (LCRA) Highland Lake Reservoirs



Austin Water Served Population



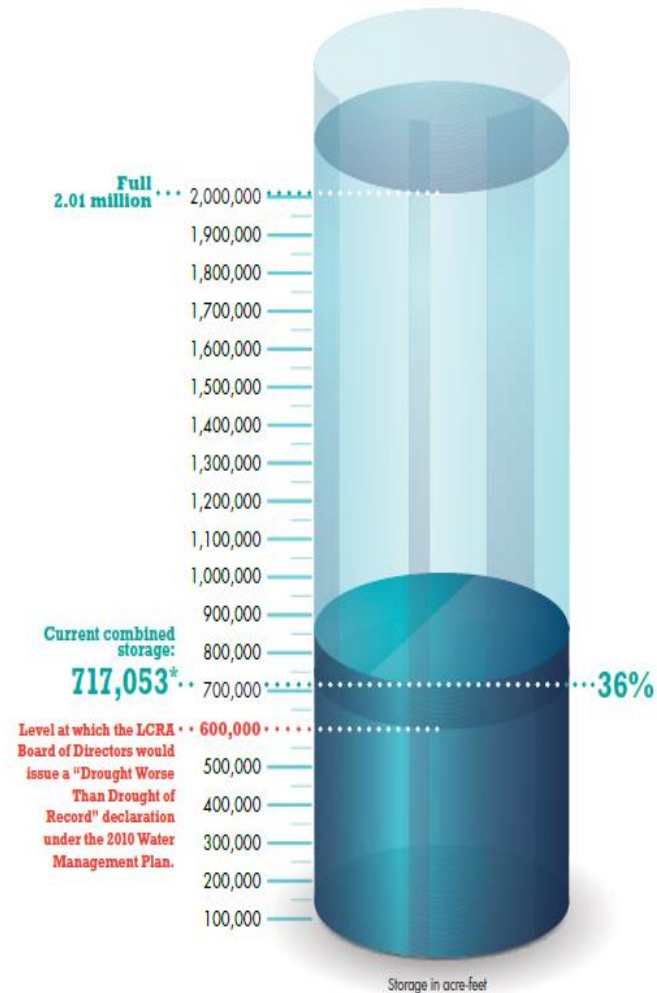
Lake Travis



Still In Drought (7 Y / 84 M / 2555 D)

LCRA, Feb. 18, 2015: "The drought gripping the Highland Lakes is now **the most severe drought** the region has experienced since construction of the lakes began in the 1930s."

HOW FULL ARE LAKES TRAVIS AND BUCHANAN?



Without additional rain in the Highland Lakes watershed, there is a small chance – less than 1 percent – the combined storage of lakes Buchanan and Travis could fall to 600,000 acre-feet in the June-July 2015 time frame.

*as of March 1, 2015

Bastrop Fire 2011



10 Lowest Annual Inflows on Record

Rank	Year	Annual Total in Acre-Feet
1	2011	127,801
2	2014	207,535
3	2013	215,138
4	2008	284,462
5	2006	285,229
6	1963	392,589
7	2012	393,163
8	1983	433,312
9	1999	448,162
10	2009	499,732

Top 5 all-time lowest reservoir inflows have occurred since 2006

8 of the 10 lowest inflow years have all occurred since 1999

A Changing Climate in Austin

Higher temperatures

- Projected temperature increases
- Higher evaporation and increased drought intensity



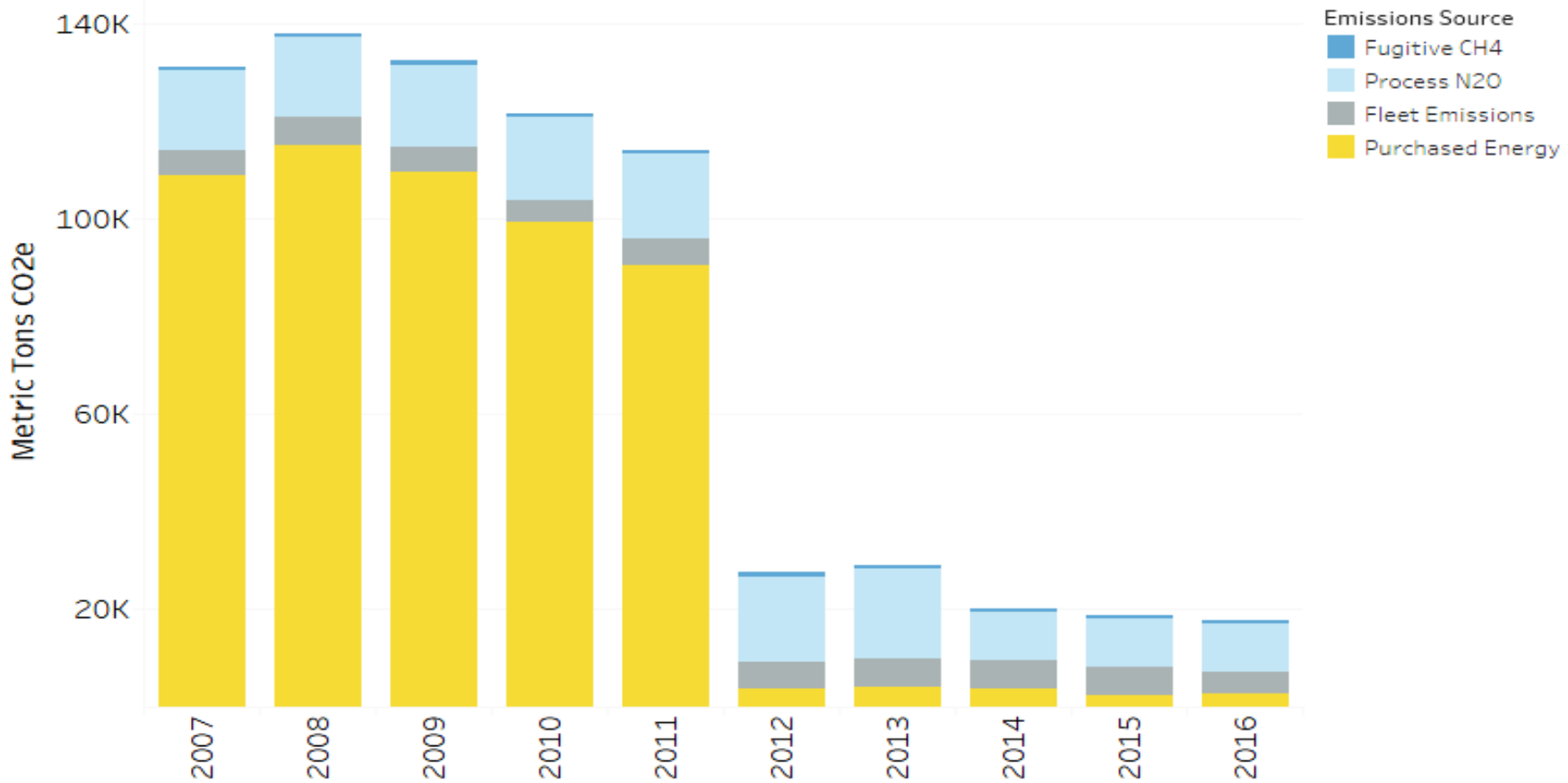
Increases in heavy precipitation

- Projected increases in magnitude and number of heavy rain events



Adaptation Strategies

Emission Tracking and Reduction



City of Austin, Office of Sustainability

Best Practice Conservation & Reuse

Incentives & Rebates



Education



Reclaimed Water

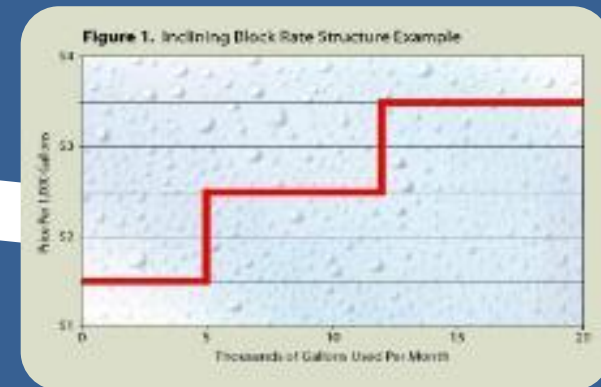


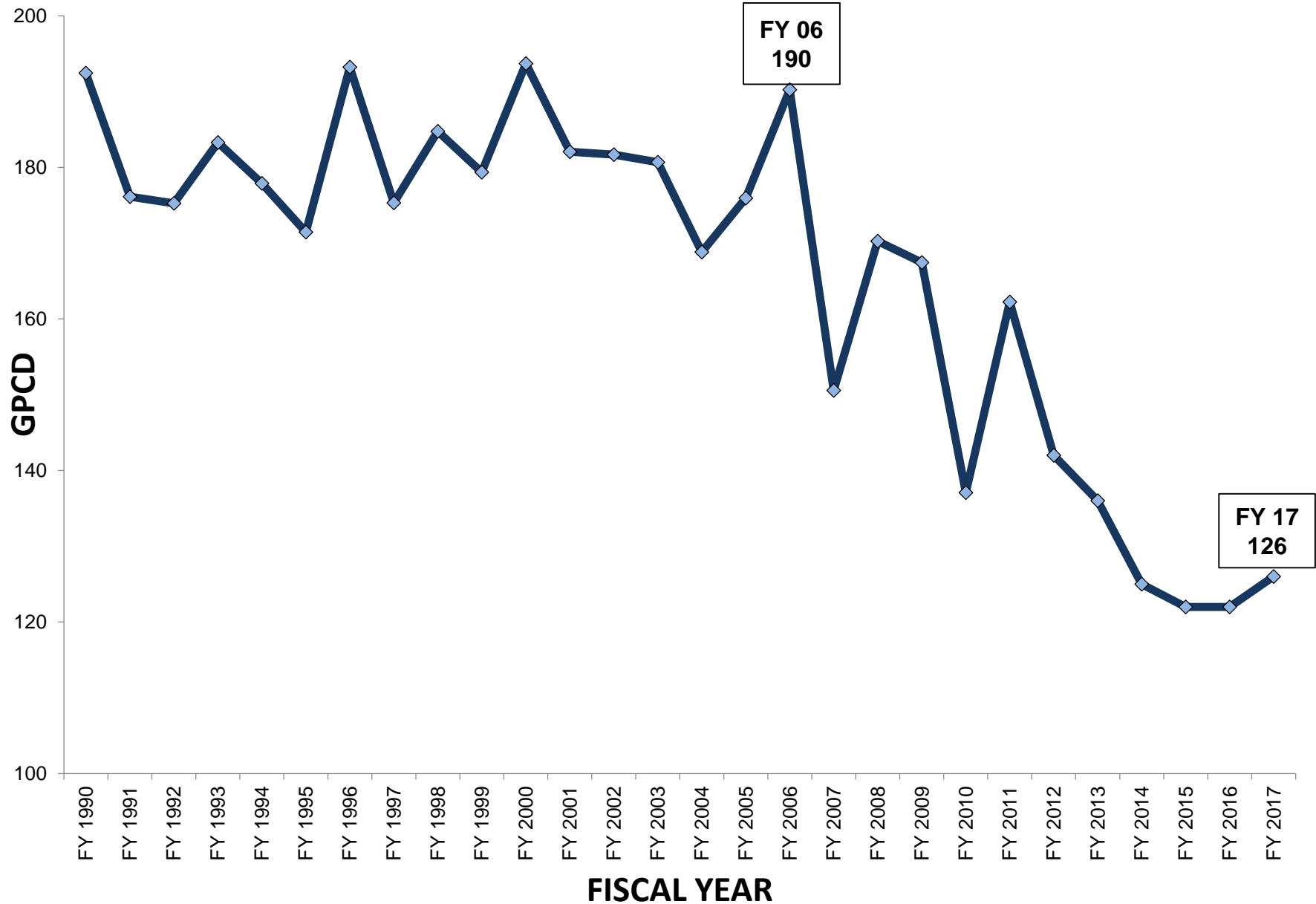
Regulation

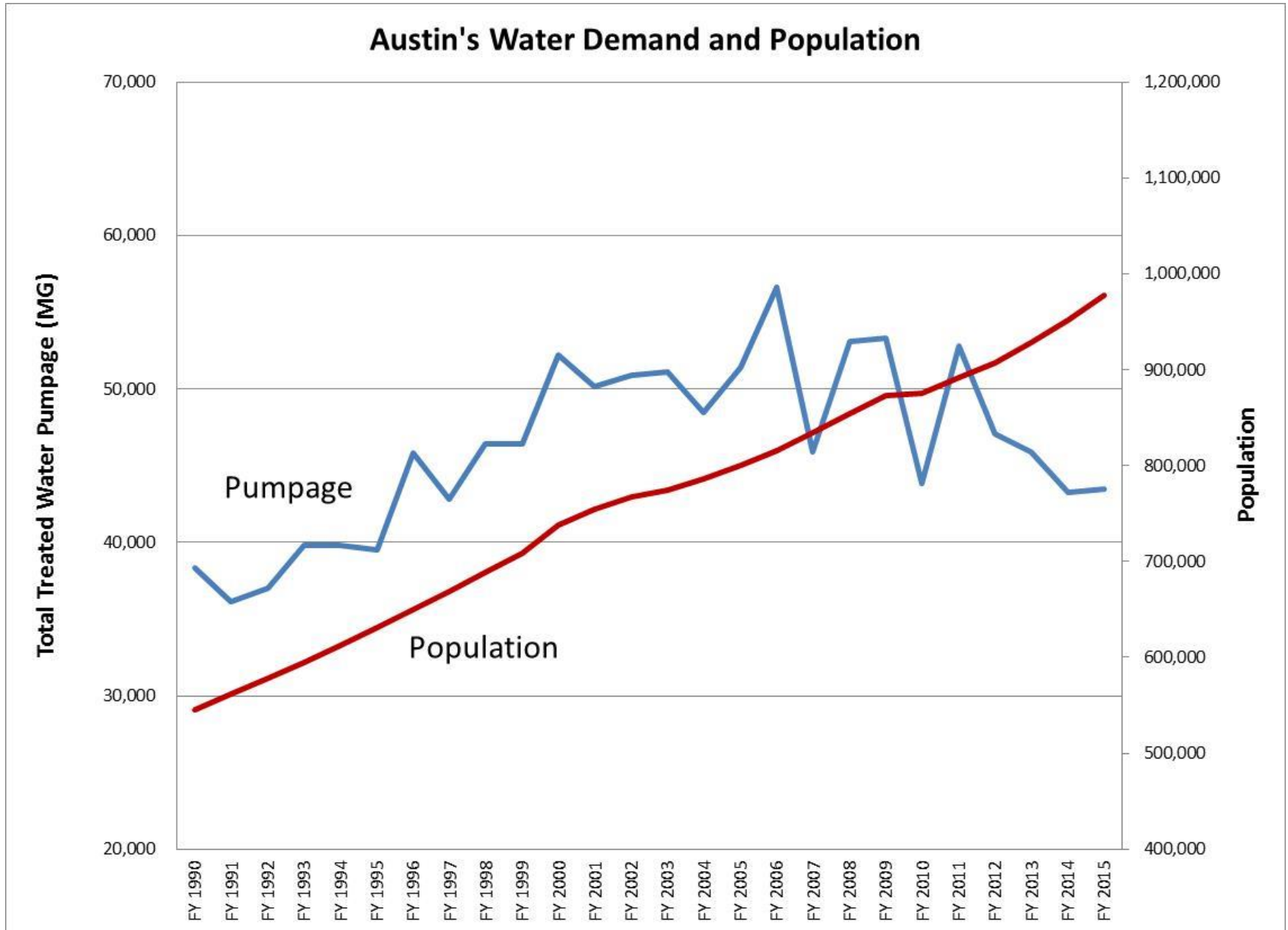
RESIDENTIAL		COMMERCIAL		PUBLIC SCHOOLS	
Hose-End Sprinklers BEFORE 10 AM or AFTER 7 PM	Automatic Irrigation BEFORE 5 AM or AFTER 7 PM	Hose-End Sprinklers BEFORE 10 AM or AFTER 7 PM	Automatic Irrigation BEFORE 5 AM or AFTER 7 PM	Hose-End Sprinklers BEFORE 10 AM or AFTER 7 PM	Automatic Irrigation BEFORE 5 AM or AFTER 7 PM
Even Address Sunday	Even Address Thursday	Even Address Tuesday		Monday	
Odd Address Saturday	Odd Address Wednesday	Odd Address Friday			

STAGE 2 WATER RESTRICTIONS
WATERING ONE DAY PER WEEK

Conservation Pricing

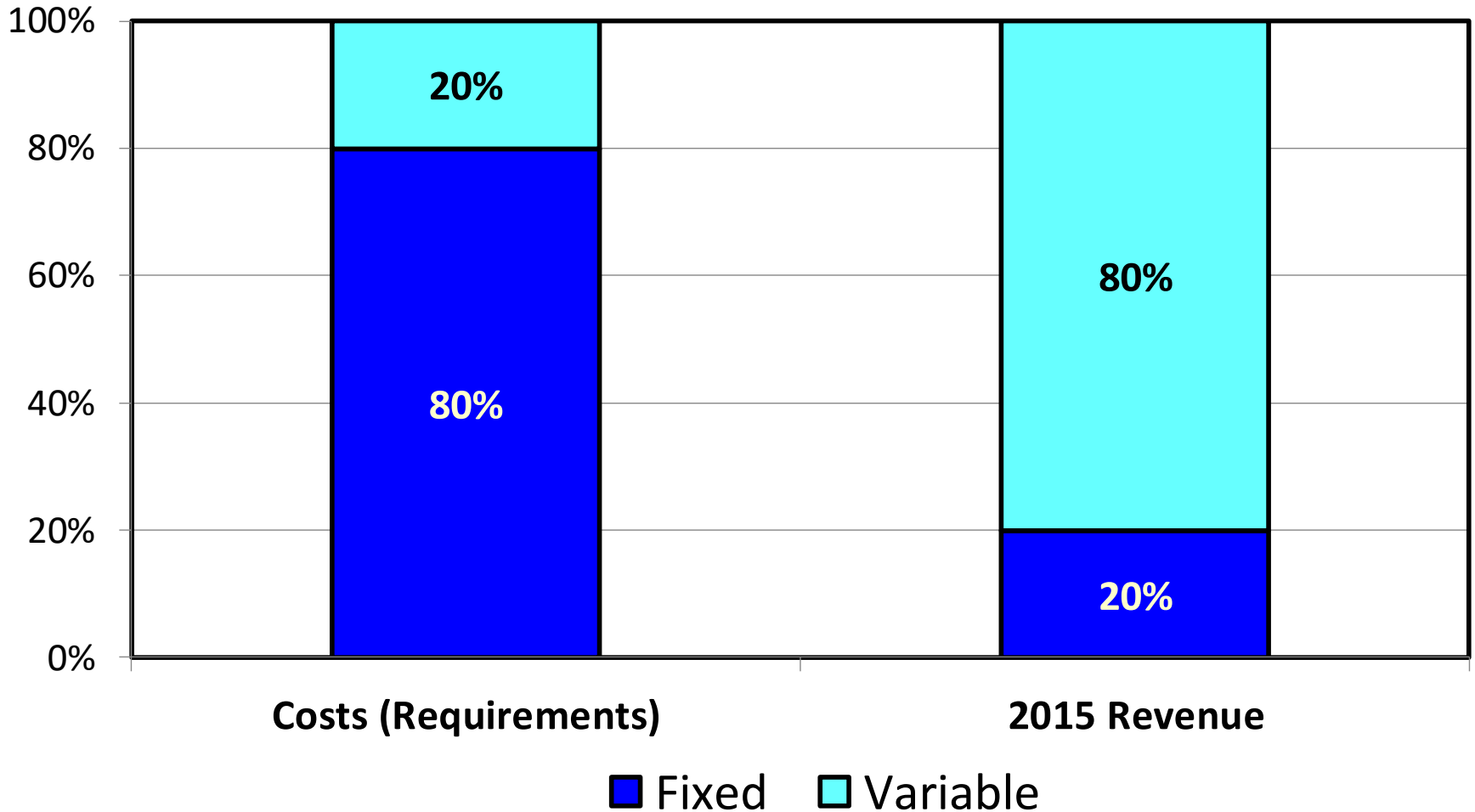






Business Model Adaptation

Fixed Costs & Variable Revenue





Our Bum Steer of the Month? The City of Austin Water Utility.



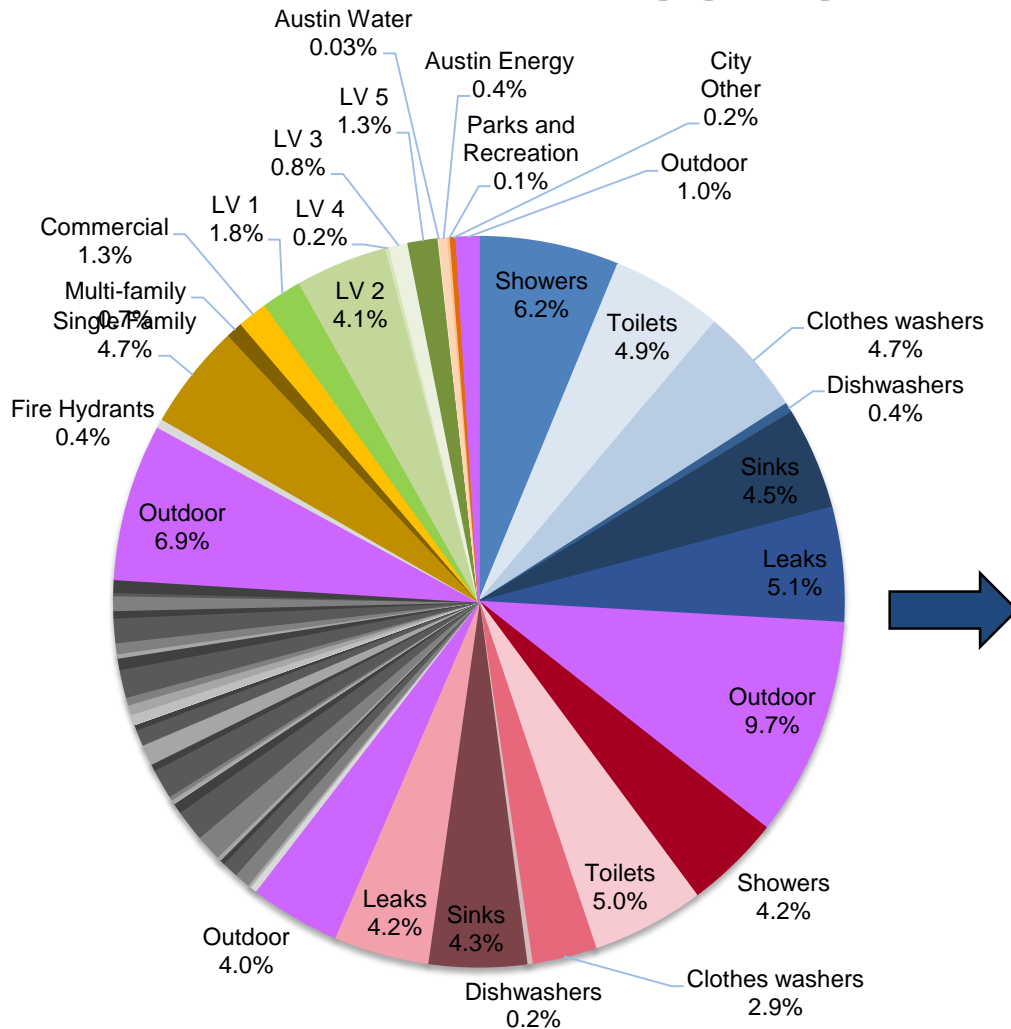
When It Comes to Conservation, They Go For Broke

The City of Austin Water Utility revealed that it is considering imposing a “drought fee” to help it make up for millions of dollars in lost revenue. The shortfall was caused, apparently, by customers’ heeding the utility’s demands to conserve water.

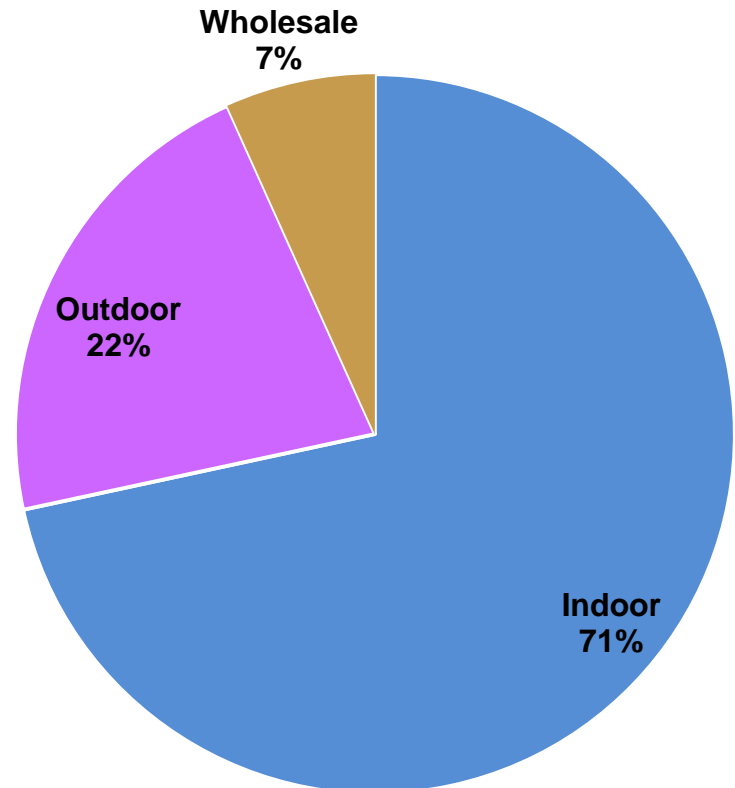
Water Forward

Integrated Water Resource Plan (IWRP)

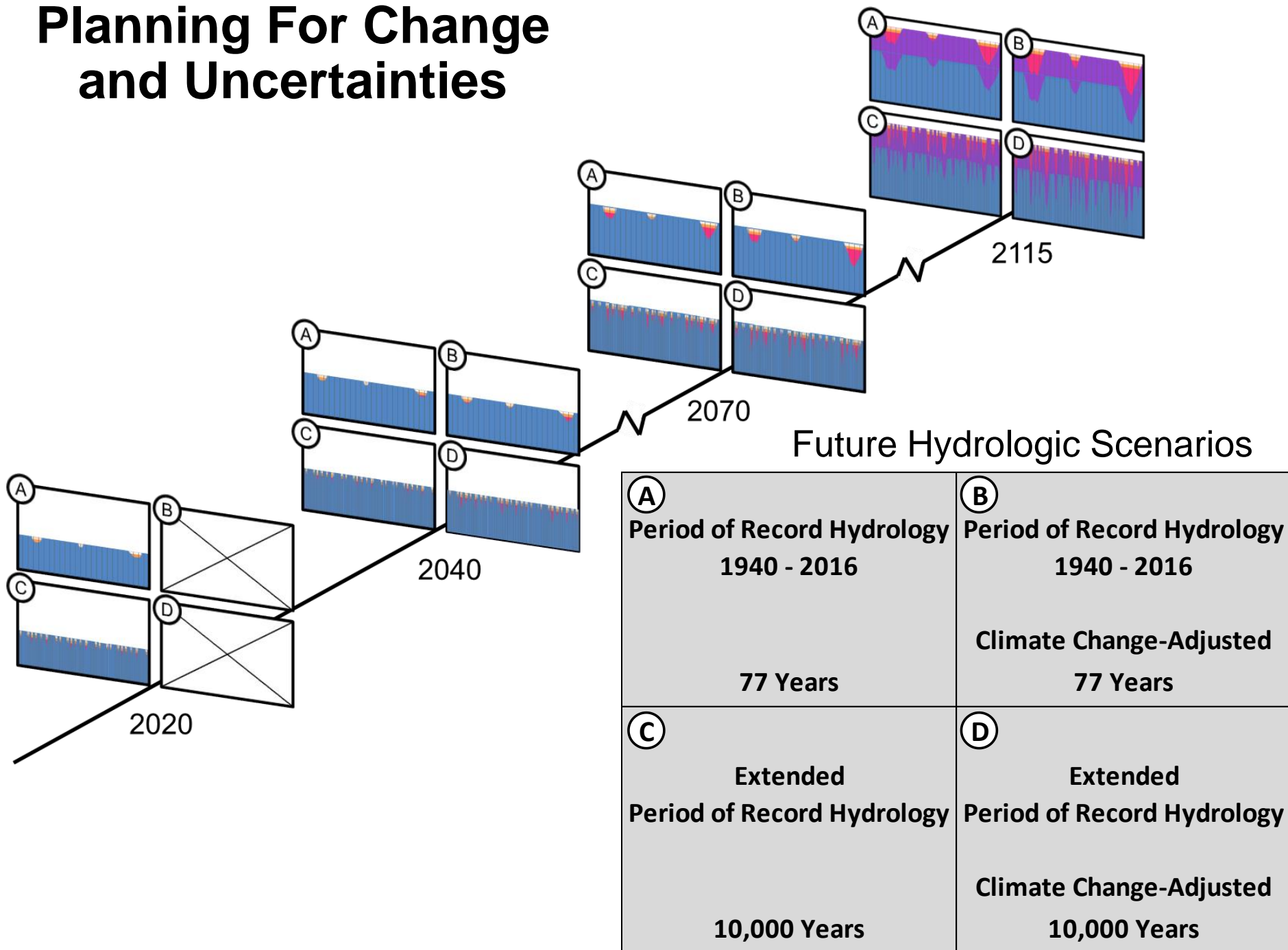
Enhanced Water Use Understanding Disaggregated Demand Model



Another 2% estimated outdoor use
embedded in the Wholesale Sector



Planning For Change and Uncertainties



Water Future Different than Past

- Climate Uncertainty & Water Scarcity
- Rising Costs & Falling Demand
- Water Utility Adaptations
 - Service provider not commodity sales
 - Broad portfolio of integrated demand management & supply options
 - Growing emphasis on decentralized water solutions
- Technology Change & Consumer Expectations
 - Social Media
 - Advanced Meter Infrastructure Technologies

Questions?

Extra Slides

Demand Management Options

Option Name	Yield (AF/yr)	Unit Cost (\$/AF)	Climate Resiliency Indicator
Development-focused Water Use Benchmarking and Budgeting	29,680	\$21	High
Landscape Transformation Ordinance	16,580	\$23	Medium
Water Loss Control Utility Side	13,060	\$3,690	High
Advanced Metering Infrastructure	9,380	\$2,800	High
Landscape Transformation Incentives	1,944	\$96	Medium
CII Ordinances for Cooling Towers and Steam Boilers	1,060	\$71	Medium
Irrigation Efficiency Incentives	570	\$202	Medium

Decentralized Options

Option Name	Yield Bin	Unit Cost (\$/AF)	Climate Resiliency Indicator	
Alternative Water Ordinance	*	*	*	Demand Management Options
Alternative Water Incentives	*	*	*	
- AC Condensate Reuse	5,150	\$2,702	Medium	
- Rainwater Harvesting (lot-scale)	18,707-27,662	\$2,619-\$2,960	Medium	
- Stormwater Harvesting (lot-scale)	14,437 -24,472	\$5,510 - \$5,062	Medium	
- Graywater Harvesting (lot-scale)	1,188 – 3,583	\$3,044 - \$10,666	High	
- Wastewater Reuse (lot/building-scale)	78,636	\$12,692	High	
Stormwater Harvesting (community-scale)	10,700-22,387	\$1,522 - \$3,233	Medium	Supply Options
Rainwater Harvesting (community-scale)	1,540	\$9,612	Medium	
Sewer mining (wastewater skimming)	801-16,440	\$6,444 - \$3, 030	High	
Distributed wastewater systems	31,391	\$1,557	High	

Supply Options

Option Name	Yield (AF/yr)	Unit Cost (\$/AF)	Climate Resiliency Indicator
Imported Option Category	84,000	\$3,032	High
Additional Supply from Lower Colorado River Authority (LCRA)	54,600	\$352	Medium
Direct Non-potable Reuse (Reclaimed Water - Current Master Plan/ Region K)	43,100	\$1,229	High
Off-Channel Reservoir (OCR) with Lake Evaporation Suppression	25,827	\$846	Medium
Direct Potable Reuse (DPR)	20,000	\$2,204	High
Indirect Potable Reuse (IPR) Through LBL and Capture Local Inflows	20,000	\$605	High
Aquifer Storage and Recovery (ASR) – Carrizo-Wilcox	10,000	\$1,053	High
Brackish Groundwater Desalination	10,000	\$2,690	Medium