

This presentation premiered at WaterSmart Innovations

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INNOVATIVE CAMPUS
UPGRADES –
SCHOOLS PAVE THE ROAD TO
EFFICIENCY
PHOENIX, AZ



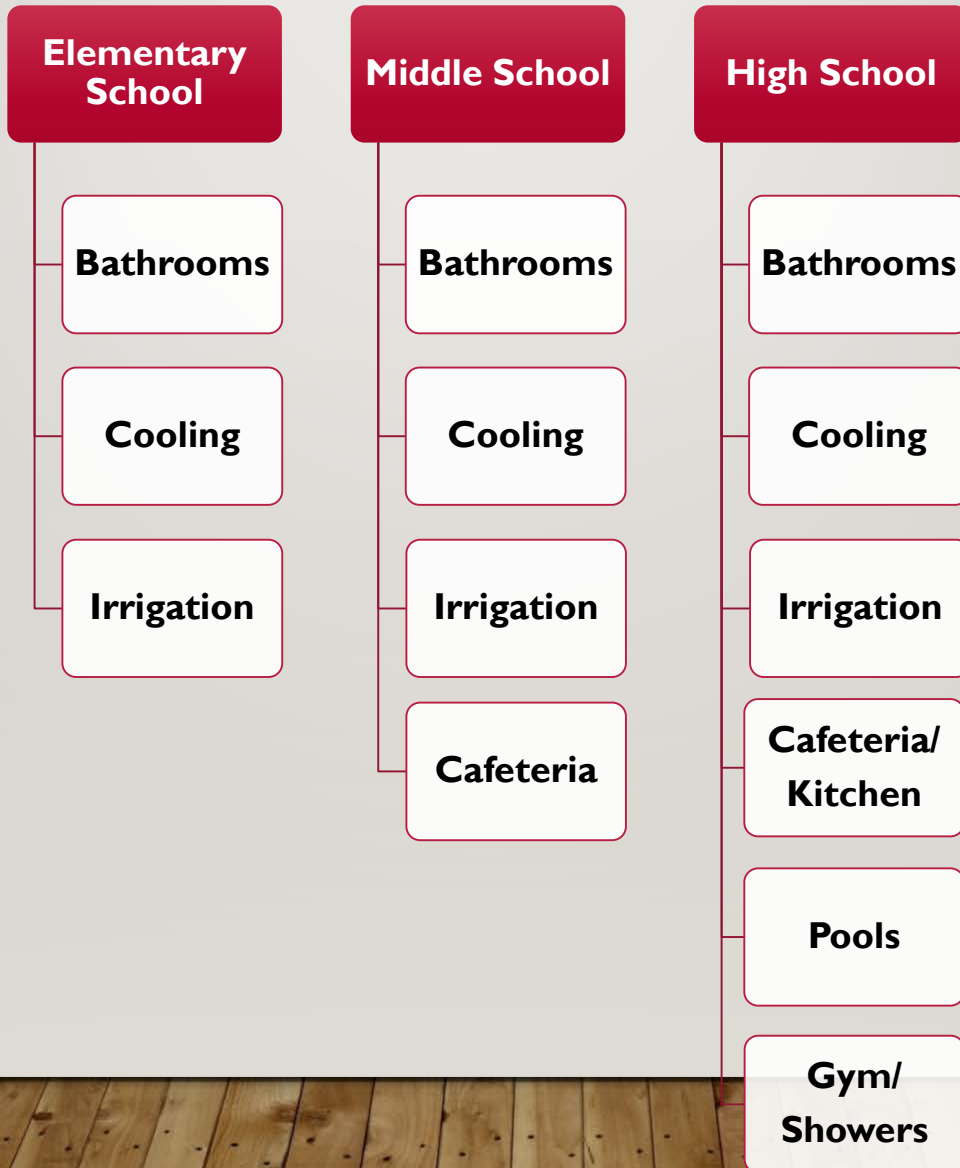
City of Phoenix

WATER SERVICES DEPARTMENT
Quality Reliability Value

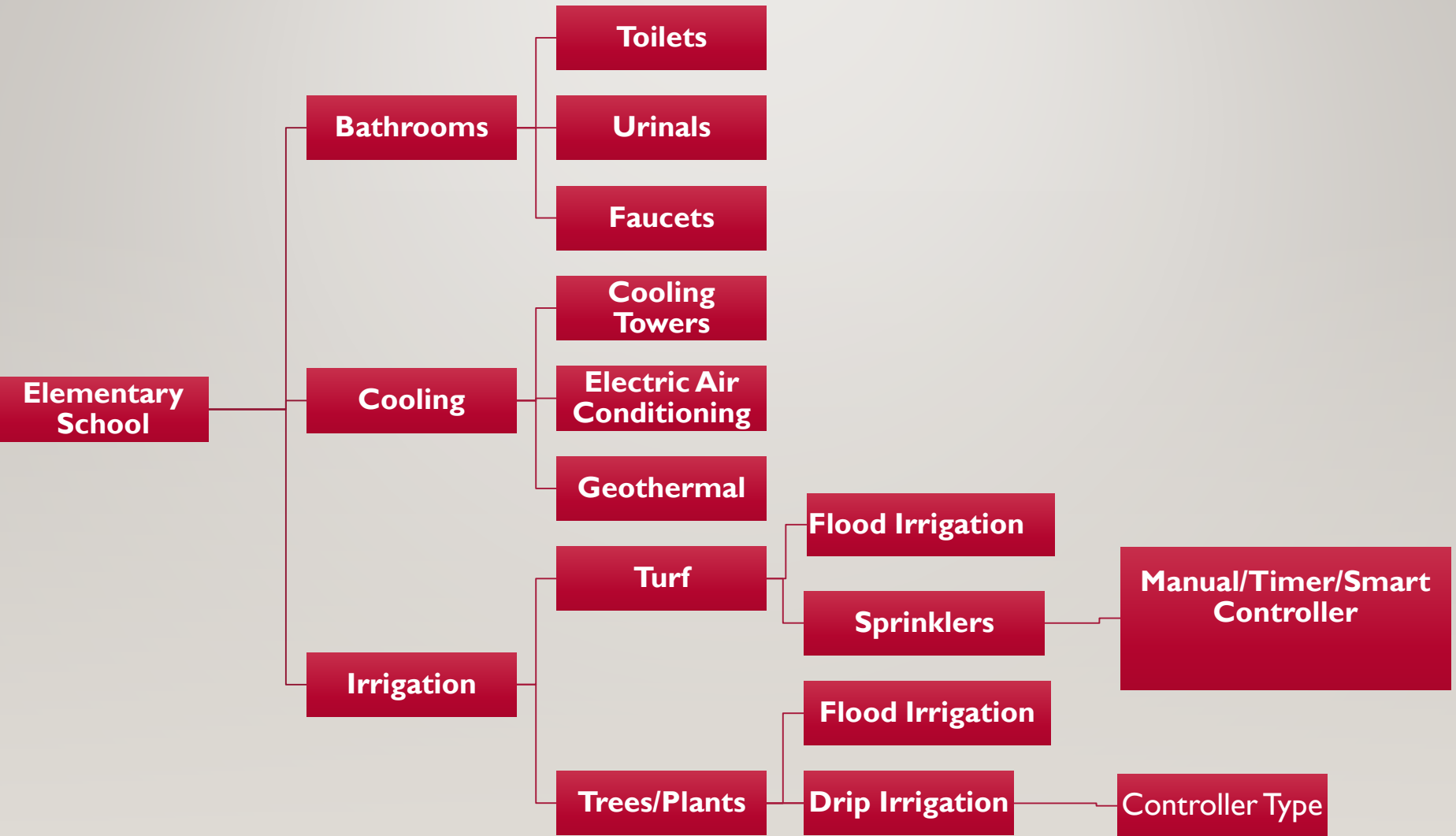
OVERVIEW

- Components of School Water Use
- Observations
- Changes that have reduced water use
- What We Learned
- Case Studies
- Future Reductions

BUILDING BLOCKS: SCHOOLS



BUILDING BLOCKS: SCHOOLS

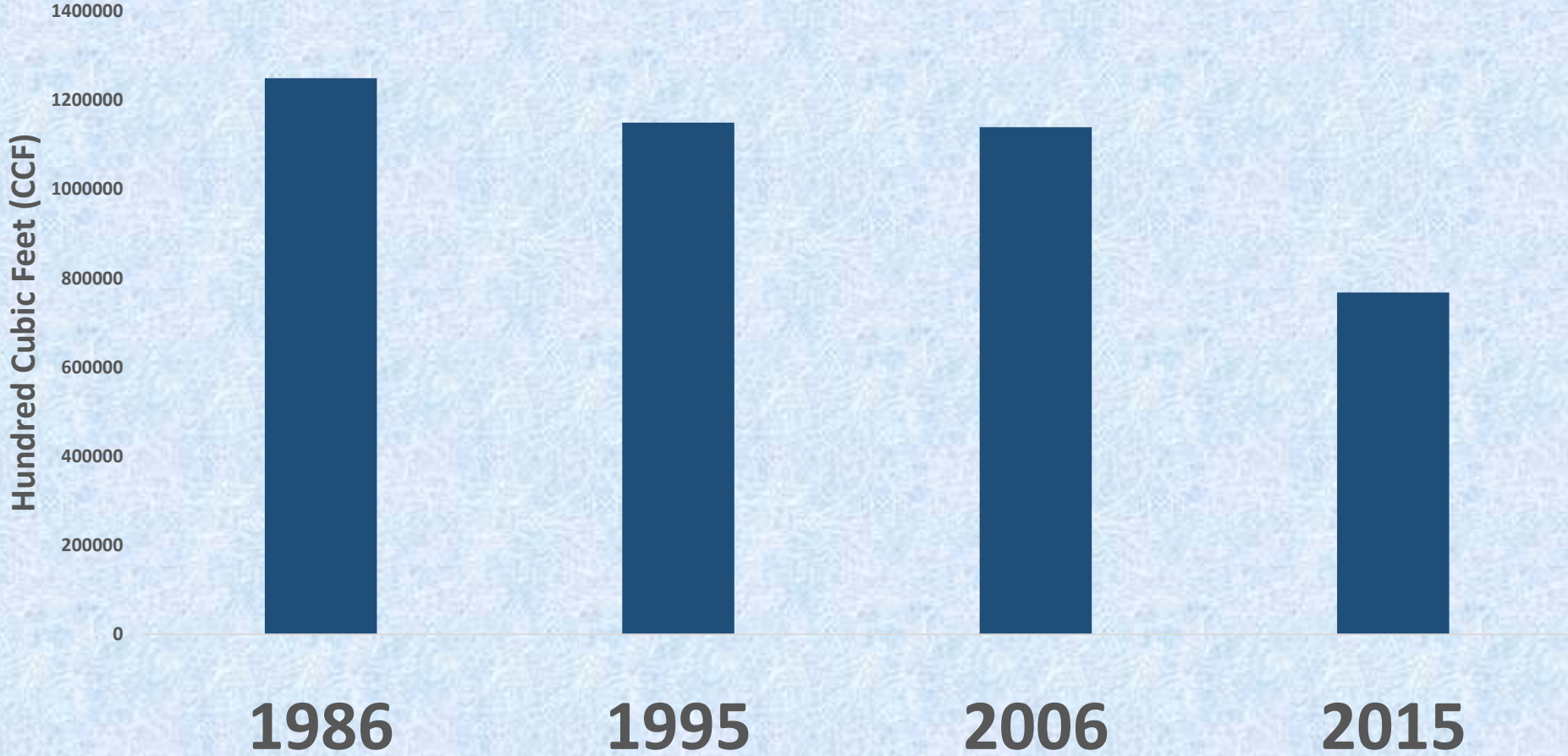


OBSERVATIONS

- Steady decline in water use for existing campuses
- New campuses use less
- More efficient plumbing fixtures/devices
- Transition to less water-intensive landscapes
- Schools built ≥ 1994 have newer fixtures; some schools built < 1994 have upgraded

40% REDUCTION AT EXISTING CAMPUSES FROM 1986 TO 2015

Total Water Use For Schools Built Prior to 1986



WHAT CAUSES REDUCTIONS?

New Bathroom Fixtures?

HVAC Technology?

Less Turf?

Irrigation Technology?

WHY MAKE CHANGES?

Environmental Awareness?

Budgets?

Safety Audits?

Fixture/Device End of Useful Life?

BUDGETS



FUNDING

- Bonds
- Energy Service Companies (ESCOs)
 - Multiple Upgrades (not all water)



ESTIMATING POTENTIAL REDUCTIONS (HIGH SCHOOL BUILT IN 1992)

- High school: 2,600 students and 130 staff
- 3.5 gpf toilets and 1.5 gpf urinals
- 50/50 male: female
- Installing 1.28/0.125 gpf toilets/urinals saves ~ 10 AF/year
- Replacement is occurring without utility incentives

STRUCTURAL CHANGES

- Geothermal Climate Control Systems
- Artificial Turf Football Fields
- Upgraded Plumbing Fixtures to Efficient Models
- Reduced Turf and Conversion to Desert Landscapes
- Installation of Smart Irrigation Controllers
- Reduced Cafeteria/Food Services
- Shower Use Reduced or Abandoned

SUCCESS STORIES IN PHOENIX





10/24/2012



COST ANALYSIS

Assumed System Description	Assumed System Components	Estimated System “First Cost”
Standard Efficiency RTU	All roof top package HVAC	\$ 1,000,000
High Efficiency RTU	All roof top package HVAC	\$1,239,425
Half Geothermal	Half Geothermal and half RTU*	\$1,779,875
Full Geothermal	Geothermal on entire site	\$1,983,080

Note: Since there is an anticipated savings to operational costs for the geothermal or high efficiency units – the point at which savings would result in a full payback of the additional investment is estimated at 9-11 years for either upgraded system.

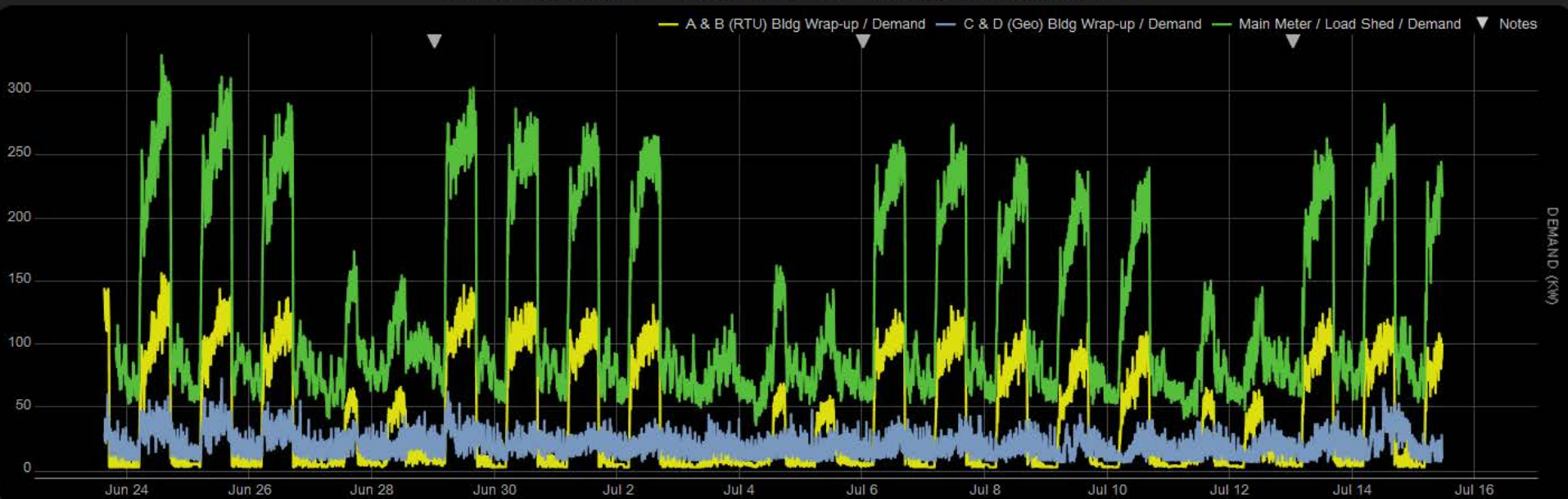
** Geothermal = 50,983 sq. ft. and RTU = 38,333 sq. ft.*

DATA MANAGEMENT

- Since April 2014 the district has been using the HVAC controls application to monitor the following:
 - Well field temperatures
 - Well field pressures
 - RTU demand
 - GSHP demand
 - Main meter demand
 - Peak demand
- Real time data from the HVAC controls application

ENERGY SAVINGS

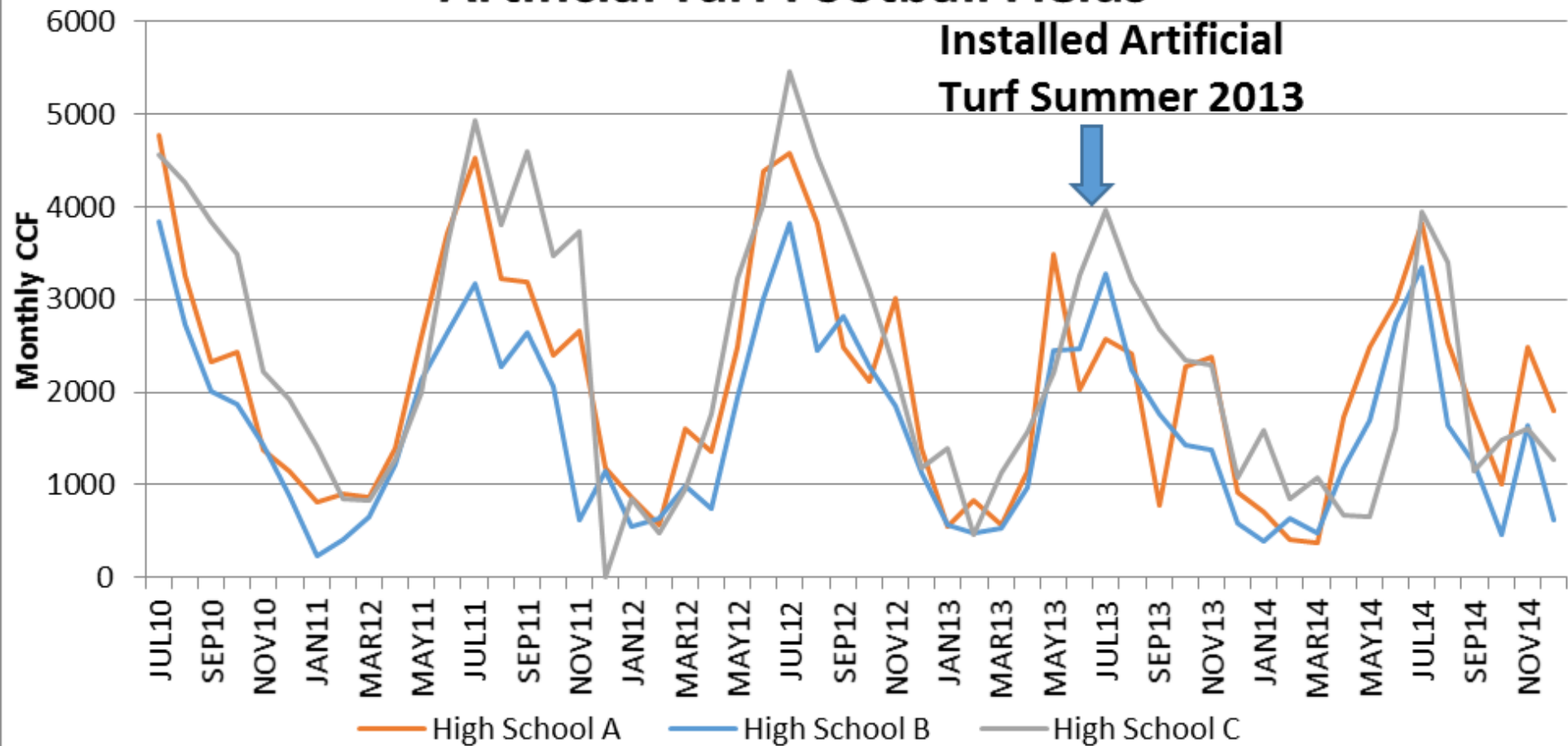
Lookout Mountain - EXAMPLE 2 - ELECTRICAL DEMAND (KW)



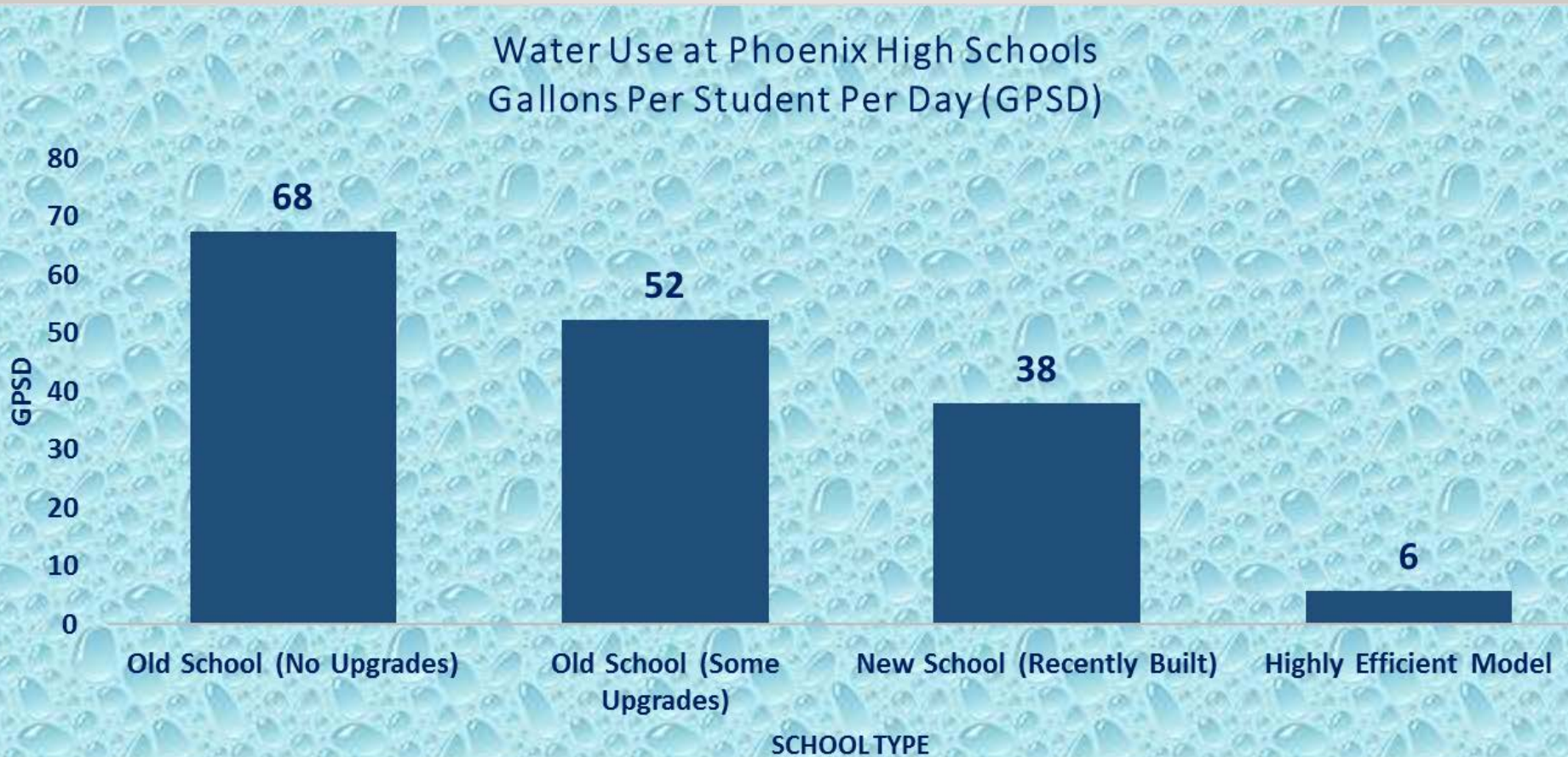


IRRIGATION AND ARTIFICIAL TURF

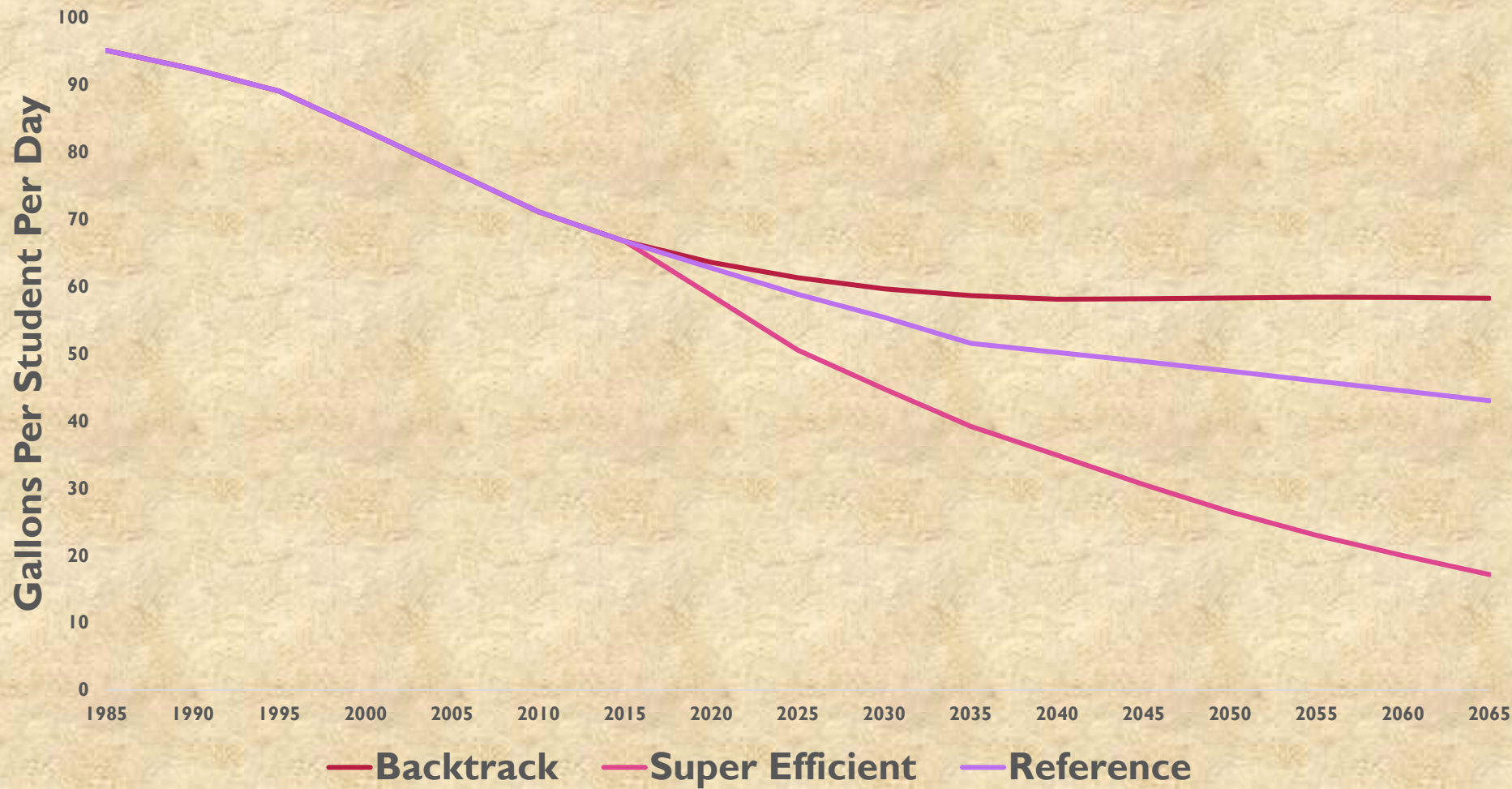
Monthly Outdoor Water Consumption (Landscape Meters) at High Schools With Artificial Turf Football Fields



WATER EFFICIENCY POTENTIAL



Daily Average Water Use for Schools (GPSD)



WHAT WE LEARNED

- Decisions for infrastructure changes are made by district; concentrated decision making
- District Facility and Construction Managers are best point of contact
- Lack of consistency between districts
- Consistent practices within districts
- Key person can provide overview of water use profile for district

WHAT WE LEARNED

- Upgrades that result in reduced water use are not necessarily intended to reduce consumption
- Not all projects are funded by bonds
- Energy Savings Contracts can play a large role in financing projects
- Upgrades/changes are occurring without rebates or incentives

WHAT WE LEARNED

- Future reductions potential are quantifiable
- Schools more progressive than expected
- Conservation measures can be directed toward facilities with the largest potential
- Changes can be accelerated
- Critical if shortages occur and demand curtailment is desired

QUESTIONS

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