CEEn-2018CPST-004

Spanish Fork Irrigation -Water Conservation Study

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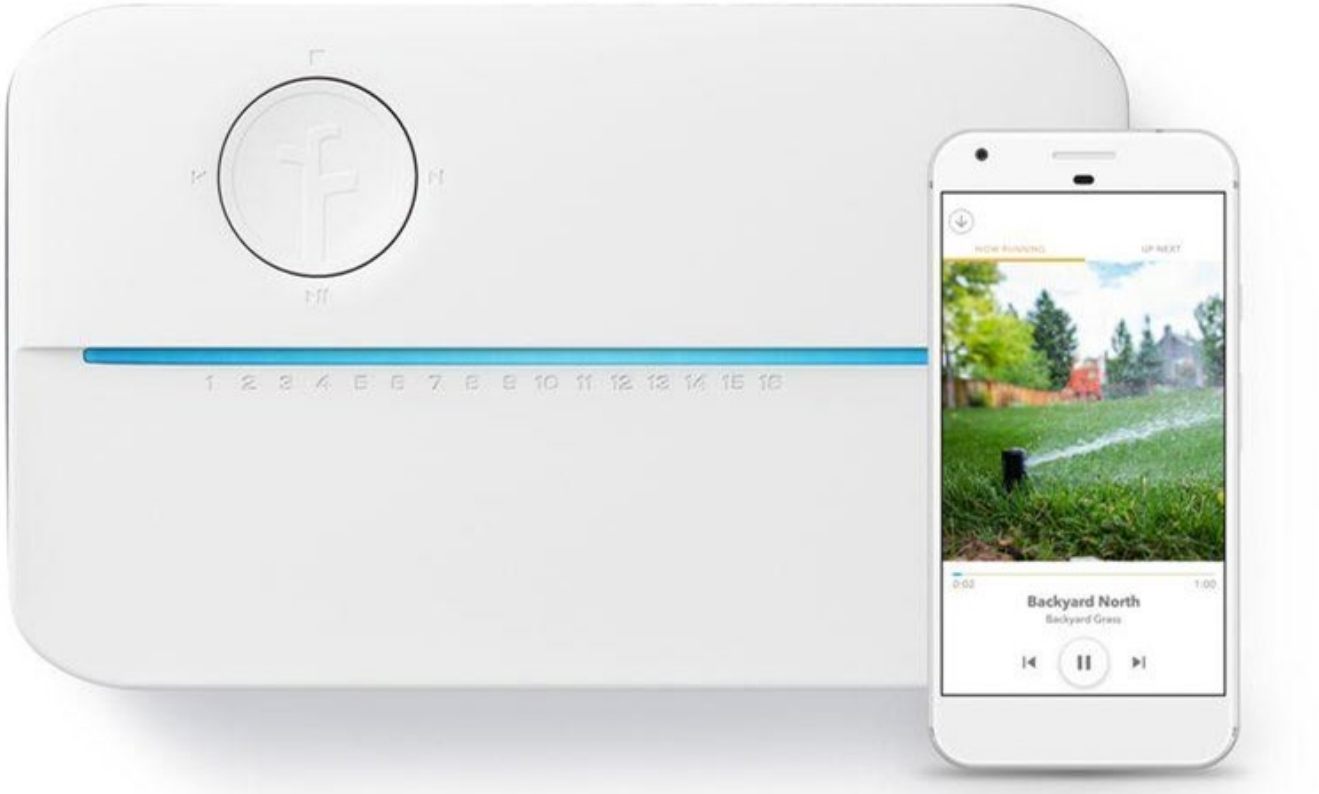
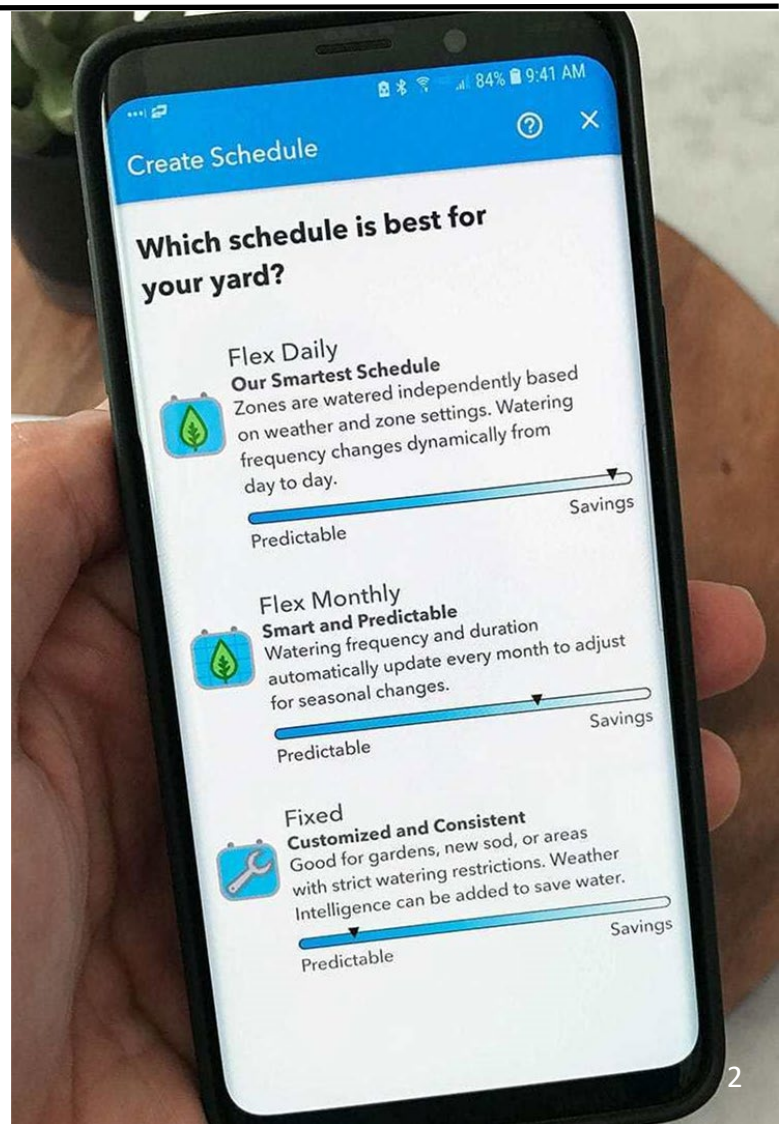
Introduction

- Grant from Central Utah Water Conservancy District (CUWCD)
- Rachio irrigation controllers selected
- 933 controllers installed in 2018
- Recommended start times based on address and wind fan





Project Tasks and Deliverables

- Determine extent of:
  - Peak Reduction
  - Water Conservation

- Update summer 2018 distribution of scheduled start times for use in summer 2019

http://engineering.electrical-equipment.org/energy-efficiency-building/3-strategies-to-reduce-peak-demand-at-industrial-sites.html

Design & Analysis

- Peak Reduction
  - Gather hourly usage (gpm) for three days before controller installation and three days after majority of installations
  - Find the percent of total usage that occurs each hour
  - Plot usage (%) vs time (hr) to create demand curve
  - Compare pre- and post-installation curves to determine reduction

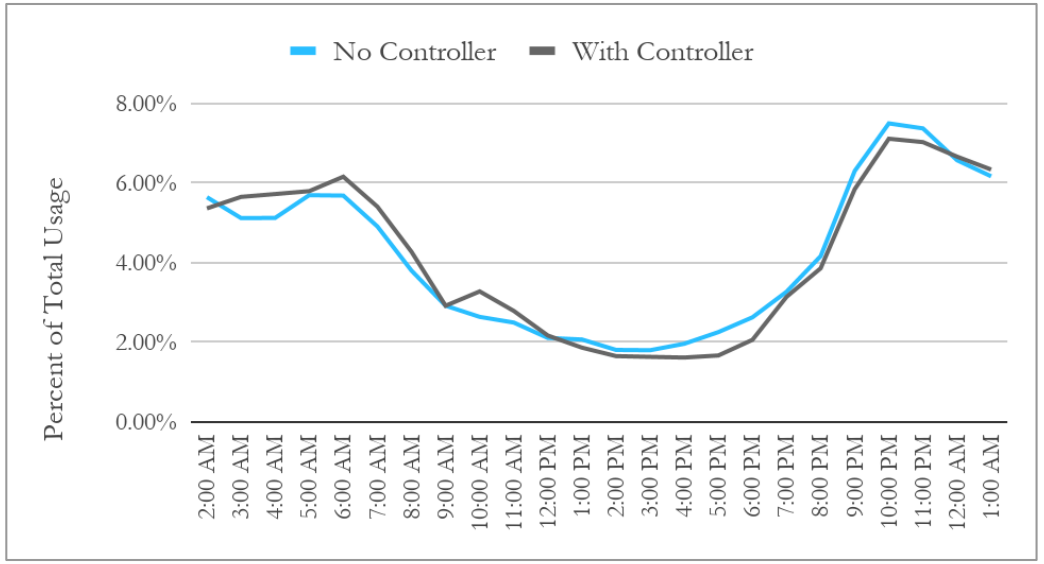
- Peak Reduction
  - Gather monthly water usage for ~2,000 homes (1,452 no controller & 542 with controller)
  - Find average usage for June through September
  - Use student t-tests to prove statistical significance
  - For statistically significant months, find average volume of water (gallons) saved

Design & Analysis

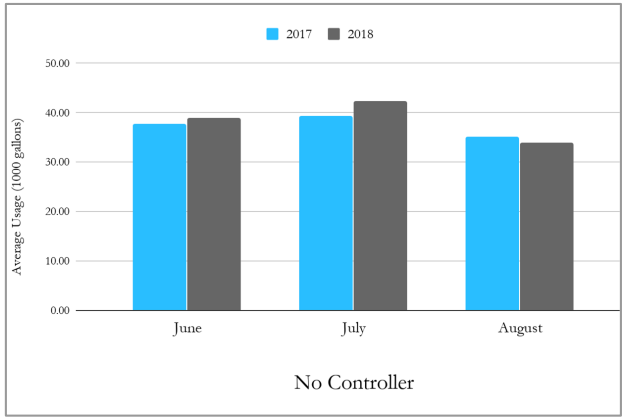
- Updated Schedule
  - Goal to lower all peaks to 6% of total daily usage
  - Fill in 6-9 AM (not to exceed 6% of total daily usage) to reduce watering during peak hour (10 PM)
  - Consider drivers of consumer adherence to the schedule:
    - convenience
    - awareness of the benefits
    - financial incentive (provision of irrigation controller)

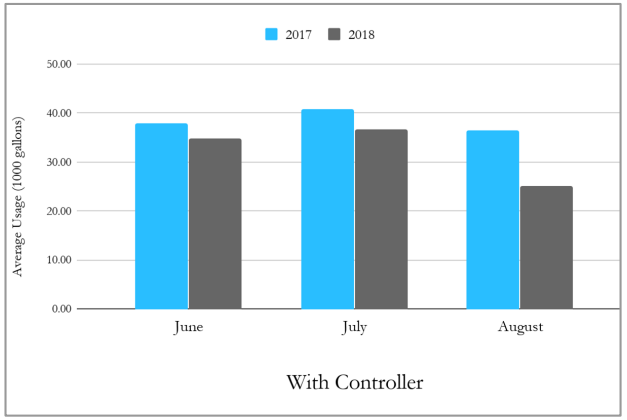
Discussion of Results

- Peak Reduction
  - 7.49% to 7.11% of total daily usage



- Water Conservation
  - 4,620 gallons saved per household with controller (June to August)
  - $3.79 saved per month for user

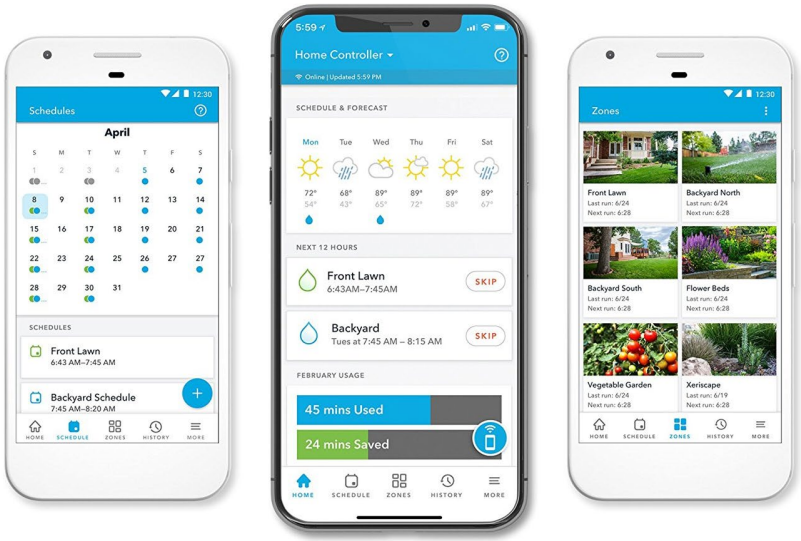




Discussion of Results

- Schedule

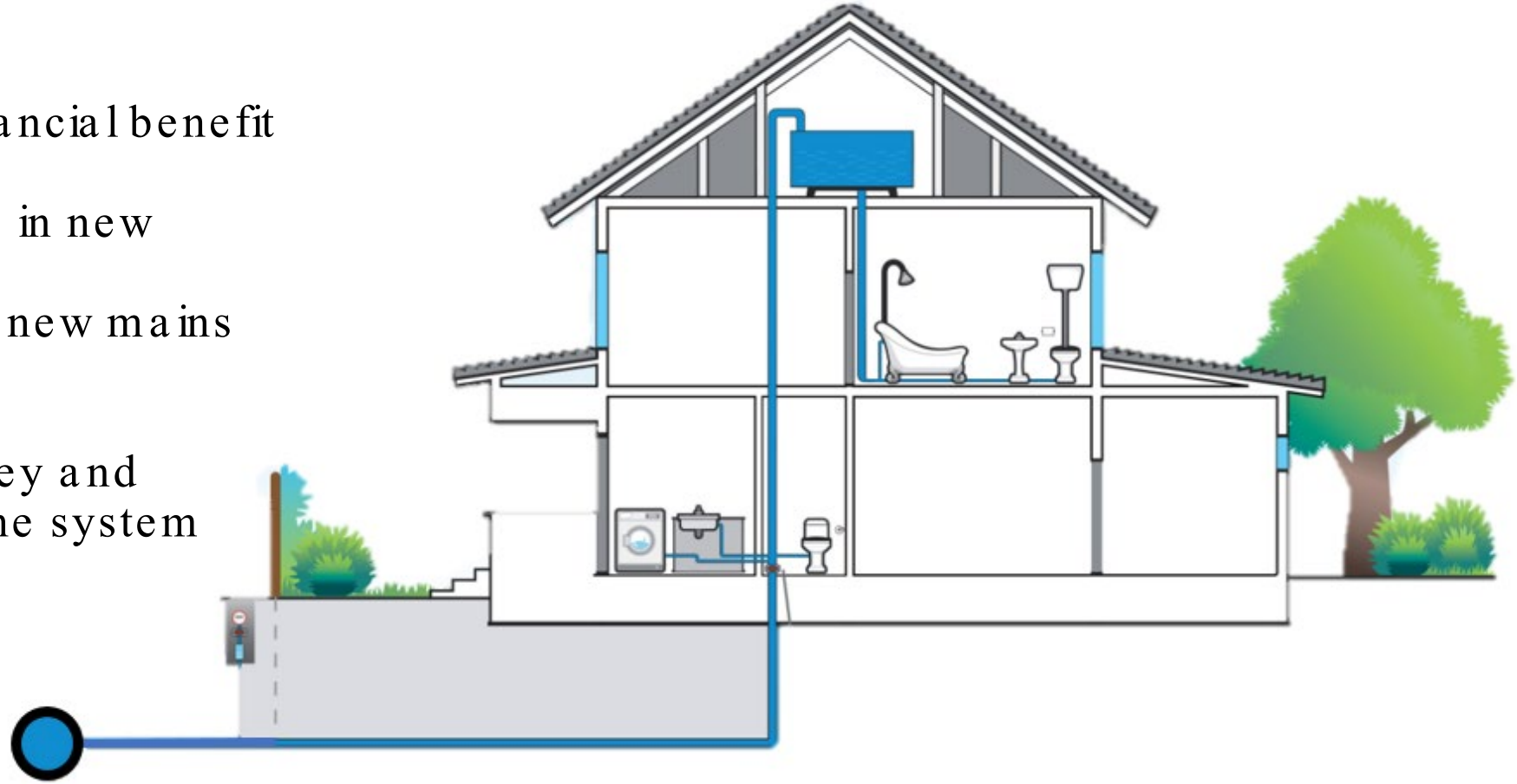
Acronym	Description	Time Block Start	Time Block End
NFO	Non-Wind Fan Area Odd Address	3:45 AM	6:00 AM
NFE	Non-Wind Fan Area Even Address	5:00 AM	8:00 AM
F12	Wind Fan Area Addresses ending with 1 or 2	10:00 AM	3:00 PM
F34	Wind Fan Area Addresses ending with 3 or 4	11:00 AM	4:00 PM
F56	Wind Fan Area Addresses ending with 5 or 6	12:00 PM	5:00 PM
F78	Wind Fan Area Addresses ending with 7 or 8	1:00 PM	6:00 PM
F90	Wind Fan Area Addresses ending with 9 or 0	2:00 PM	7:00 PM
NA	Non-Adjustment Requestees	-	-



https://www.rachio.com/

Conclusions

- Irrigation controllers
  - Provide significant financial benefit to the city
    - delay investments in new system storage
    - reduce the size of new mains that are installed
  - Save consumers money and improve pressure in the system



http://evolve-management.co.uk/water-mains

Recommendations

- Consider motivation for consumers to adopt conservation behaviors
  - pricing structures based on volumetric usage, peak pricing, scarcity pricing
  - education of benefits of the program and water conservation
  - provision of personalized consumption information
  - warnings of excess usage (e.g. leaks, watering during precipitation)
  - respond to feedback to improve recommended start times to be most convenient

The End

Any Questions?