

Smart Schools: Water Use Efficiency

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To research, develop and disseminate efficient technologies and system-based policies for the integrated conservation of water and energy resources.

CA State Policy Momentum

- SB7X7 (2010): 20% reduction in urban water use by 2020
- Green Building 2012 (EO B-18-12): State agencies reduce water use by 20% by 2020
- CEC research investments (2005 and ongoing)
- Water-Energy Team - Climate Action Team (WET-CAT)
- CPUC EE Program Bridge Funding (2013-2014)
- Carbon Cap & Trade (AB 32)



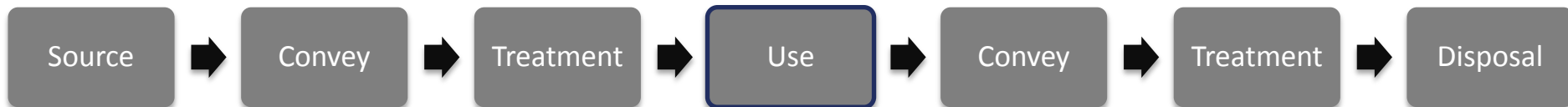
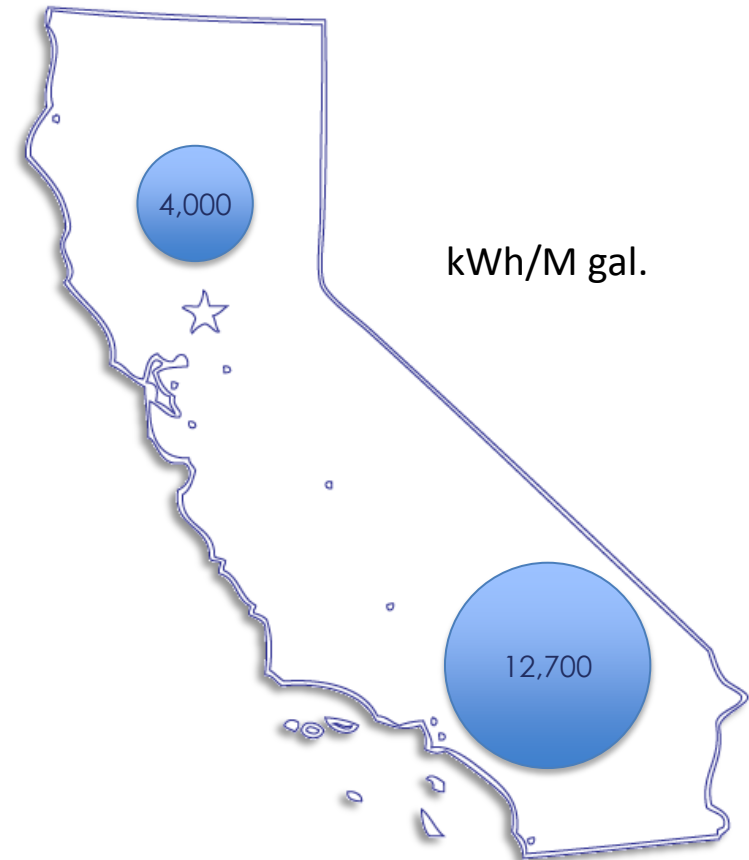
The Energy Landscape in CA

- Energy sales decoupled from profits in 1978 (natural gas) and 1981 (electricity)
- Decoupling 'Plus' (2007)
- Public Goods Charge on energy bills (1997)



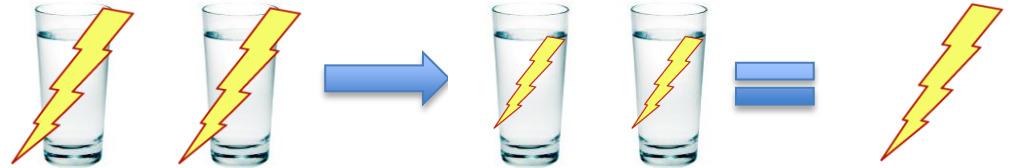
The Water-Energy Imperative

- The Scope of the Challenge in CA:
 - 20% of Electricity
 - 30% of Natural Gas
 - 2.1M Barrels/year of Diesel
 - 100M metric tons CO₂-eq.

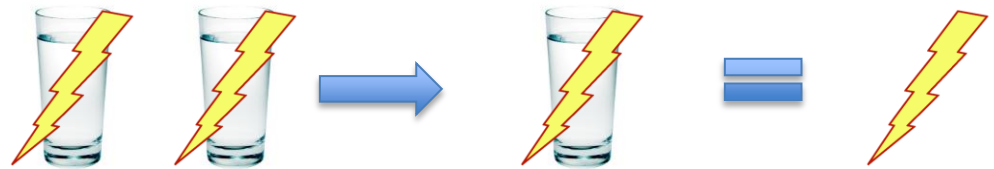


Three Main Opportunities

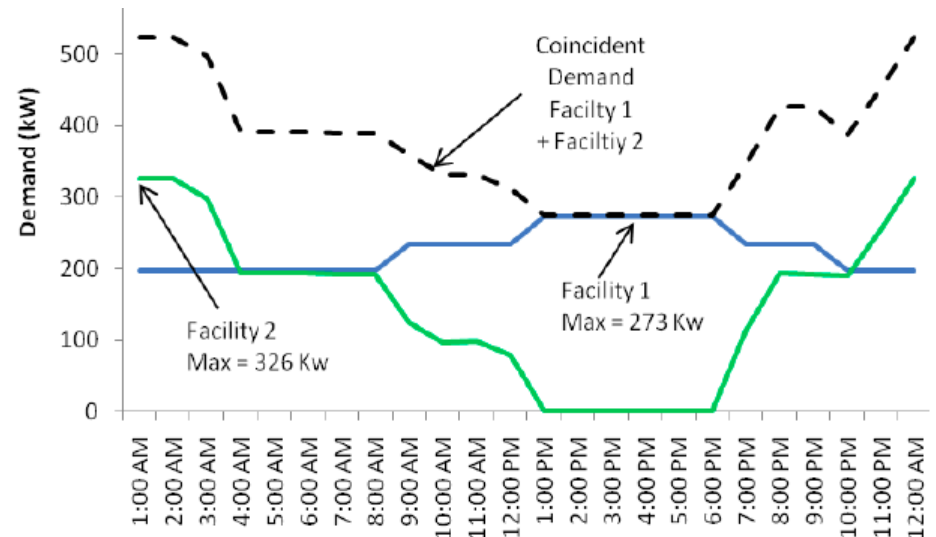
- Improve energy efficiency in the water sector



- Water Conservation and Efficiency



- Demand Management
 - Peak load reduction
 - Peak shifting



UC Davis West Village Development



One of the first zero net energy communities in the U.S.

Includes:

- Community college
- Retail
- Apartments
- Student housing
- Homes (for faculty/staff)

Residential Community Information

UC Davis West Village Case Study

Site		No. of Units	Avg Occupancy (ppl/unit)	Landscaping Area
Single-Family Residence		1	2.5	830 ft ²
Multifamily Complex		540	3-5	14 acres
Overall Community	Single-Family	475	2.5	76 acres
	Multifamily	883	3.2	
	Student Cottages	285	1.5	

Baseline water use and zero-net water use goals

UC Davis West Village Case Study

Site	Site Area	Zero-Net Water Goal (mgy)	Baseline Water Use(mgy)
Single-Family Residence	3,800 ft ²	0.041	0.065
Multifamily Complex	20 acres	9.24	51.9
Overall Community	220 acres	102.1	154.3

Indoor water use duration and flow per indoor water efficiency scenario

UC Davis West Village Case Study

Application	Duration	Daily Uses (per person)	Baseline CA Plumbing Code	Scenario 1 [CalGreen Efficiency]	Scenario 2 High Efficiency
Showerhead (gpm)	8 min	1	2.5	2.0	1.5
Lavatory faucet (gpm)	0.25 min	3	2.2	1.5	0.9
Kitchen faucet (gpm)	4 min	1	2.2	1.8	1.25
Toilet (gal/flush)	1 flush	3	1.6	1.28	0.9
Clothes washer (gal/cycle)	1 cycle	0.37	23	11	11
Dishwasher (gal/cycle)	1 cycle	0.1	6.5	2.4	2.4

Landscape Water Efficiency

UC Davis West Village Case Study

Replace landscape with drought tolerant plants

Meet California code

- 1 Install weather based or moisture sensing irrigation controllers.
- 2 Average Reduction of 16%

Change grass

- 1 Replace conventional turf with drought tolerant warm season grass {UC Verde® Buffalograss) in addition to measures above
- 2 Average Reduction of 28%

Combination of methods

- 1 Install moisture sensing controllers + drip/micro spray irrigation + effective management and maintenance of operations in addition to measures above
- 2 Average Reduction of 40%

West Village Case Study

Payback periods for retrofitting residential buildings with aggressive water conservation:

- Water saving alone = 14 years
- User Energy = 5 years
- Water and Energy = 3 years



Thank You

