

# This presentation premiered at WaterSmart Innovations

[watersmartinnovations.com](http://watersmartinnovations.com)



# **Net Zero Districts: Applying Concepts and Lessons from Energy To Water**

*2012 Water Smart Innovations*



# Net Zero Energy: FortZED



Class	# of Customers	Energy Consumption (KWh)	Peak Demand (kW)
Residential	5,903	38,969,441	20,962
Small Commercial (<50 KW)	1,264	42,216,865	
Commercial (>50 KW)	88	54,389,657	6,609
Comm/Ind (>750 KW)	2	100,482,920	18,059
TOTAL	7,257	236,058,883	45,630

FortZED represents about 10% - 15% of FCU's system in terms of energy consumption, peak demand, and number of customers

# The Water Footprint & Net Zero Planning

- Water Footprint
  - Includes quantity and quality
- Net Zero Planning
  - Reducing water use through efficiency and conservation
  - On-site rainwater capture and water reuse/recycling
  - Minimize impacts of stormwater runoff (reduce impervious area, increase on-site capture)



# Small Business – Dry Climate



# Higher Ed Institution – Wet Climate



# Panelists

- Karen Guz, Conservation Director, San Antonio Water System
- Jill Hoyenga, Water Resource & System Planner, Eugene Water & Electric Board
- Gary Klein, Affiliated International Management



***TRANSLATING NET ZERO  
CONCEPTS FROM  
ENERGY TO WATER***





# Translating Energy To Water: Building Off a Common Lexicon

- Smart meters
- Smart grid
- Peak load
- Storage
- Efficiency
- Conservation
- Supply/Generation
- Distribution losses
- Behavior change
- Footprint
- Rate structures
- Resource planning

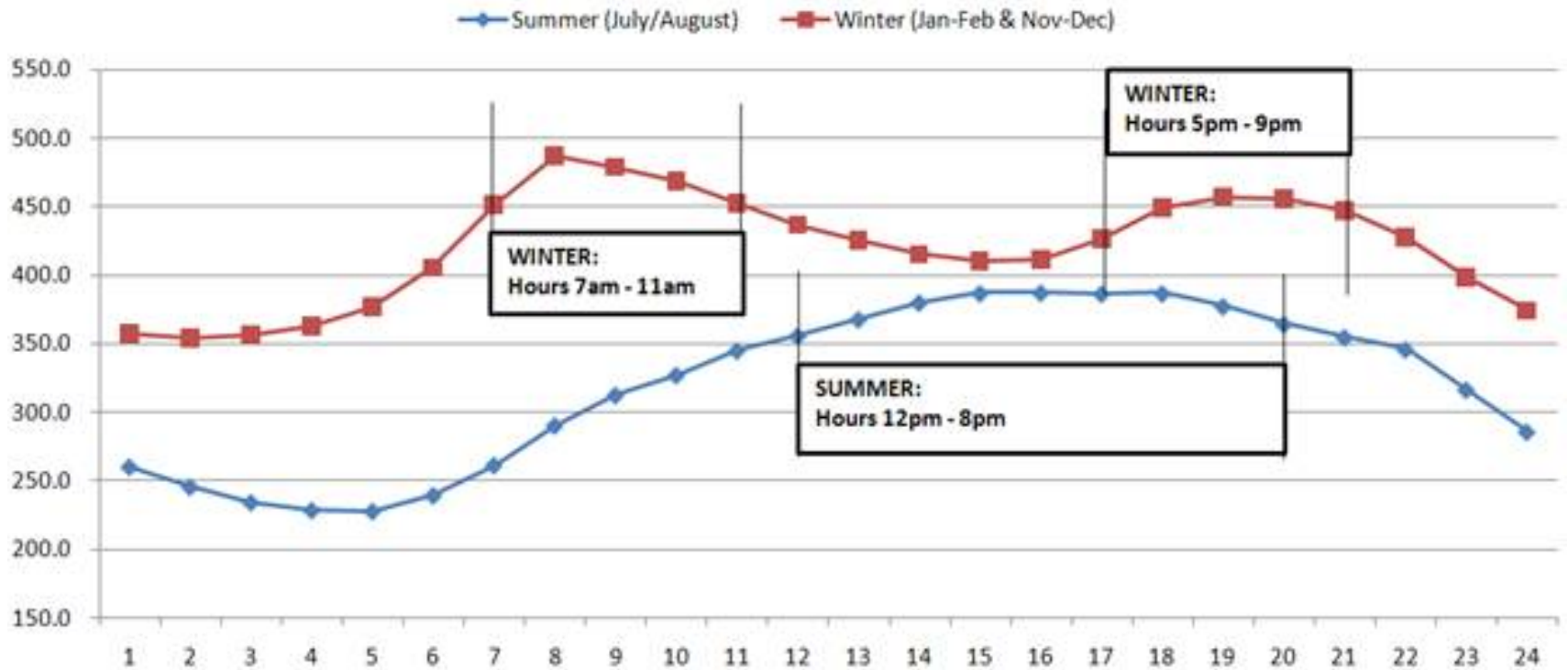
**NET ZERO water**



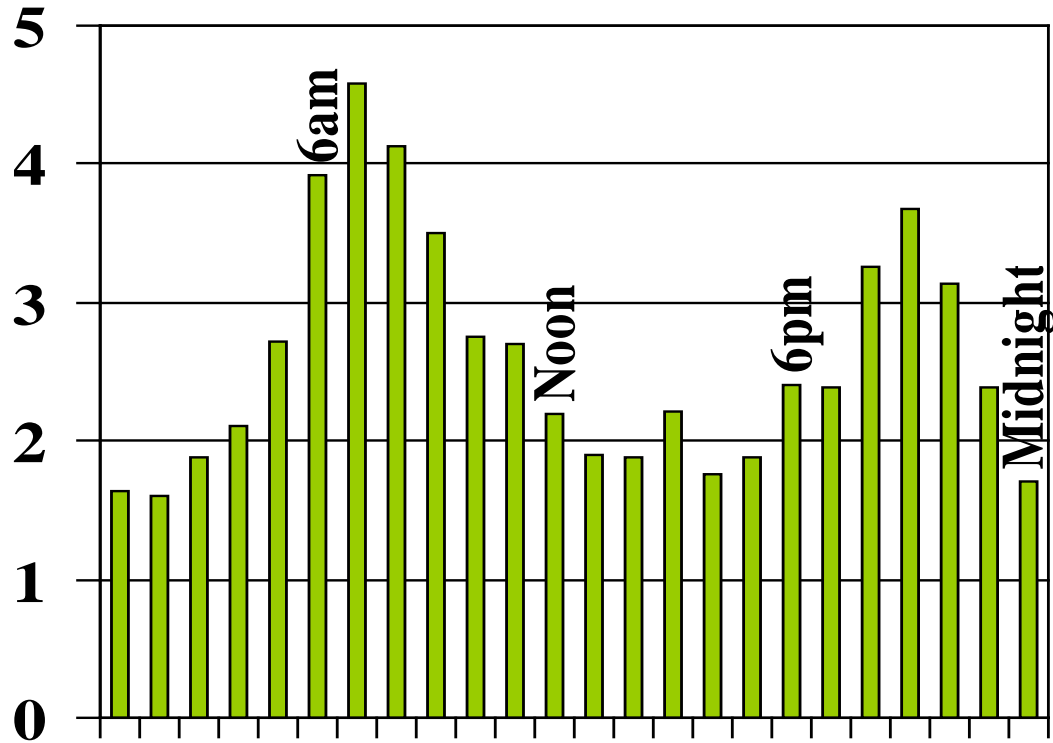
***EUGENE'S JOINT ELECTRIC AND  
WATER UTILITY: Does it make the  
translation easier?***



# Peak hours for Electric



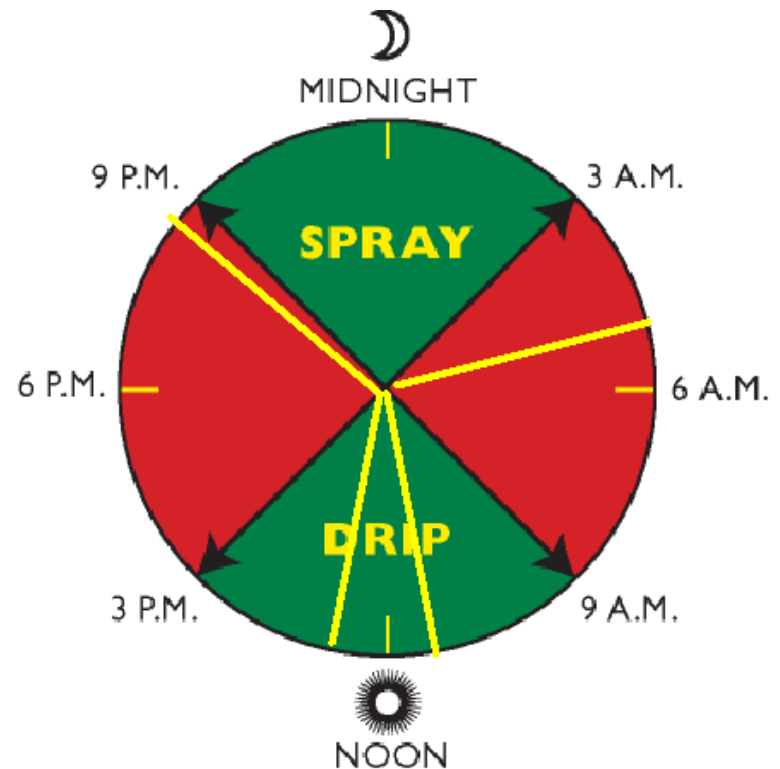
# Peak hours for Water



■ Million Gallons per Hour

# Peak hours for Water & Electric

- Water “red zones” are 3 a.m. to 9 a.m. and 3 p.m. to 9 p.m.
- Electric “red zones” are 5 a.m. to 11 a.m. and 1 p.m. to 9 p.m.
- Can we align our messaging to avoid confusion? Still working on this.



For best performance, set your sprinklers to turn on and off anytime in the **green zone**.

# ***EXAMPLES IN SAN ANTONIO***



# Examples from San Antonio

- Eagle Vet Clinic; LEED Platinum Eligible
  - Planned “net zero water” operation using condensate and rainwater for all but drinking
  - Minor domestic potable water use with the exception of the first two months of operation
  - Careful landscape design
  - Efficient fixtures
  - Careful operations



***DEFINING NET ZERO:  
Discretionary Water Use***





# Defining NetZero Water in San Antonio

- Net Zero Discretionary Water Goal
  - **Example: Dominion Ridge Shopping Center**
  - Preserved native trees
  - Collection of RW and Condensate
  - Native plant landscape with very little turf
  - Drip Irrigation
  - NO potable water landscape meter planned
  - **Rebate:** Based on comparison to “traditional” landscape. Ten year savings of 74 acre feet over 100,000 square feet of landscaped area.

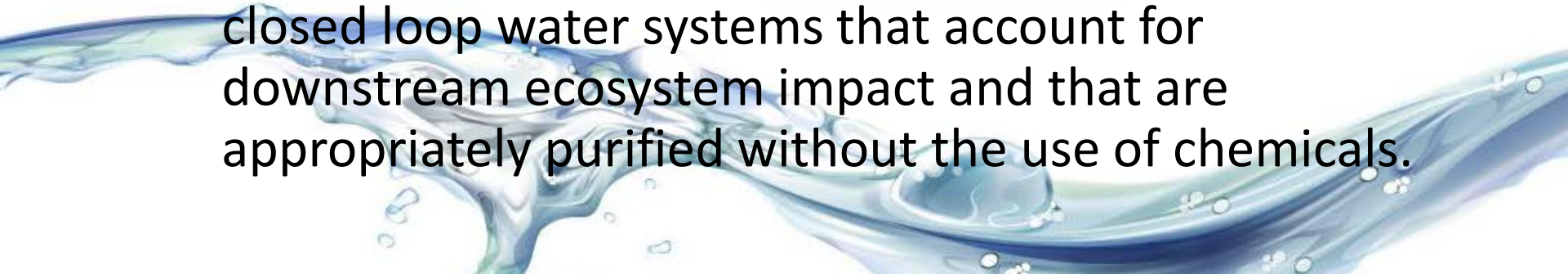


***DEFINING NET ZERO:  
What about water quality?***



# Defining NetZero Water in the Pacific Northwest (Salmon Nation)

- In the Pacific Northwest it is all about the salmon
  - Water quality & stormwater issues are biggest drivers
  - Low Impact Development (LID)
  - Net Zero is extreme LID
- International Living Future Institute
  - Offices in Portland, OR; Seattle, WA; Vancouver, BC
  - Living Building Challenge “petal” framework
  - Net Zero Water: One hundred percent of occupants’ water use must come from captured precipitation or closed loop water systems that account for downstream ecosystem impact and that are appropriately purified without the use of chemicals.



## ***THE WAY FORWARD:***

***What are some of the biggest barriers and where is this topic heading?***



## ***THE FUTURE:***

*What are the next steps for San Antonio and Eugene?*



# The Future for San Antonio

- Peak water usage is driving long-term costs
- Seeking to minimize potable water use on landscapes
- Innovation needed to re-think balancing landscape with available water



# Back Pocket Slides



# The Importance of Saving Hot Water

## *2012 Water Smart Innovations*

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# Why Do I Work on Hot Water?

- Energy Intensity of Indoor Cold Water
  - Range from 5 to 25 kWh per 1000 gallons
- Energy Intensity of Hot Water

	Electric		Natural Gas	
	Resistance (85% Efficient)	Heat Pump (COP=2)	50% Efficient	95% Efficient
kWh/1,000 Gallons	201	85	42	180
Relative Energy Intensity compared to 5 kWh/1,000 gallons	40	17	68	36

- Typically 40-68 times more energy intensive than indoor cold water.



# Improving Hot Water Systems

- **Wring out the waste.**
  - Decrease the volume between source of hot water and the use
    - instantaneousness
  - Insulate hot water piping
  - Utilize the waste heat running down the drain
- **Improve the use.**
  - Reduce hot water outlet flow rates
  - Reduce the volume of hot water needed for each task
- **Increase the efficiency.**
  - Preheat – solar, heat pump, off-peak electric
  - Select a very efficient booster that works with preheated water to reach the desired temperature and for continuousness
  - Combine water and space heating

# How Long Should We Wait?

## How Much Should We Waste?

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

### ASPE Time-to-Tap Performance Criteria

	<b>Acceptable Performance</b>	1 – 10 seconds
	<b>Marginal Performance</b>	11 – 30 seconds
	<b>Unacceptable Performance</b>	31+ seconds

Source: Domestic Water Heating Design Manual – 2<sup>nd</sup> Edition, ASPE, 2003, page 234

Depends on the length of the hot water event.

# I need your help

ICC Final Action Hearing

Group A, including plumbing

Portland, Oregon

21-28 October, 2012

P89 (AMPC) Klein:

System Interconnection

P92 (AMPC) Klein:

Size of Fixture Supply

P129 (AMPC) Klein:

Recirculation Systems

P130 (AMPC) Klein:

Efficient Hot Water Supply Piping

P231 (AMPC) Klein:

Tempered Water for Hand washing

