

US EPA Region VII, P2 Grants

# Lessons Learned from Assisting Beef Packing Industry

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# Goal & Project Objectives

- Work with several partners and develop publications related to baseline water and energy use data for other facilities to use for comparison.
- Evaluation of current water, wastewater, and energy usage at process level
- Recommendations of P2 opportunities

## Partnerships, Integration, and Trust

- ▶ Integrated our assistance program with activities of other grants (USDA and DOE) and programs associated with food safety and energy efficiency.
- ▶ Natural Gas, Water Supply, and Wastewater treatment are major costs.
- ▶ Applied P2 recommendations are a valuable benefit for companies as part of a suite of university-delivered assistance.
- ▶ For older facilities, they know the inputs and outputs, but lack good information on water and energy use within their facility.



# Methods of data collection

Opportunity: Process data, esp. temporal data, combined with costs stimulates interest in P2

- **Water flow:** Ultrasonic flow meter (non-intrusive) and client's existing meters
- **Water Temperature:** infrared digital thermometer (to estimate gas use)
- **Wastewater quality:** Grab and auto-sampler collected composite samples.
- **Electricity:** existing meters and, if needed, collaborate to install temporary meters



Vacuum sampler



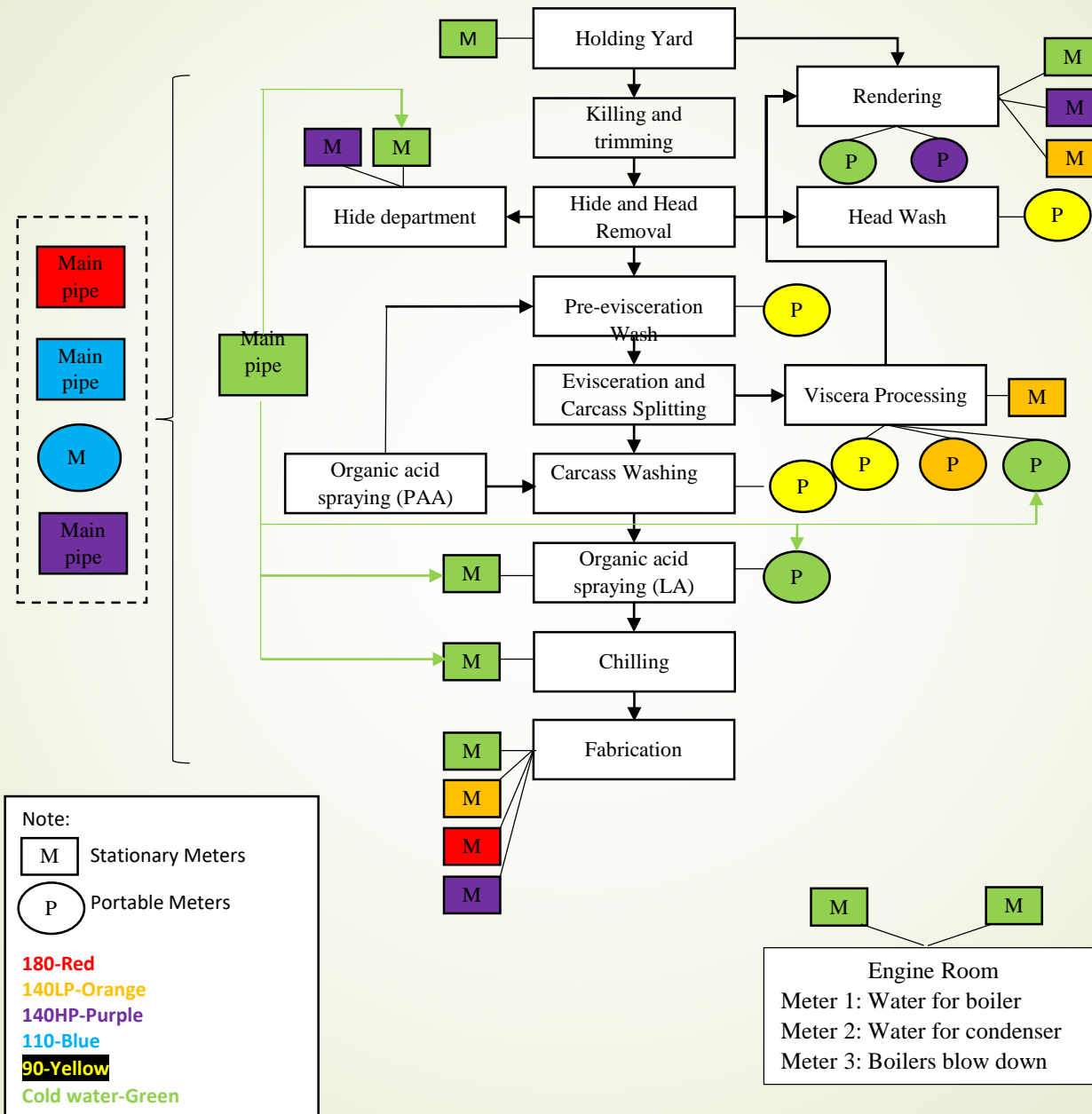
Auto sampler



Ultrasonic Flow Meter

# Processes and Meters

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# Water use at process level

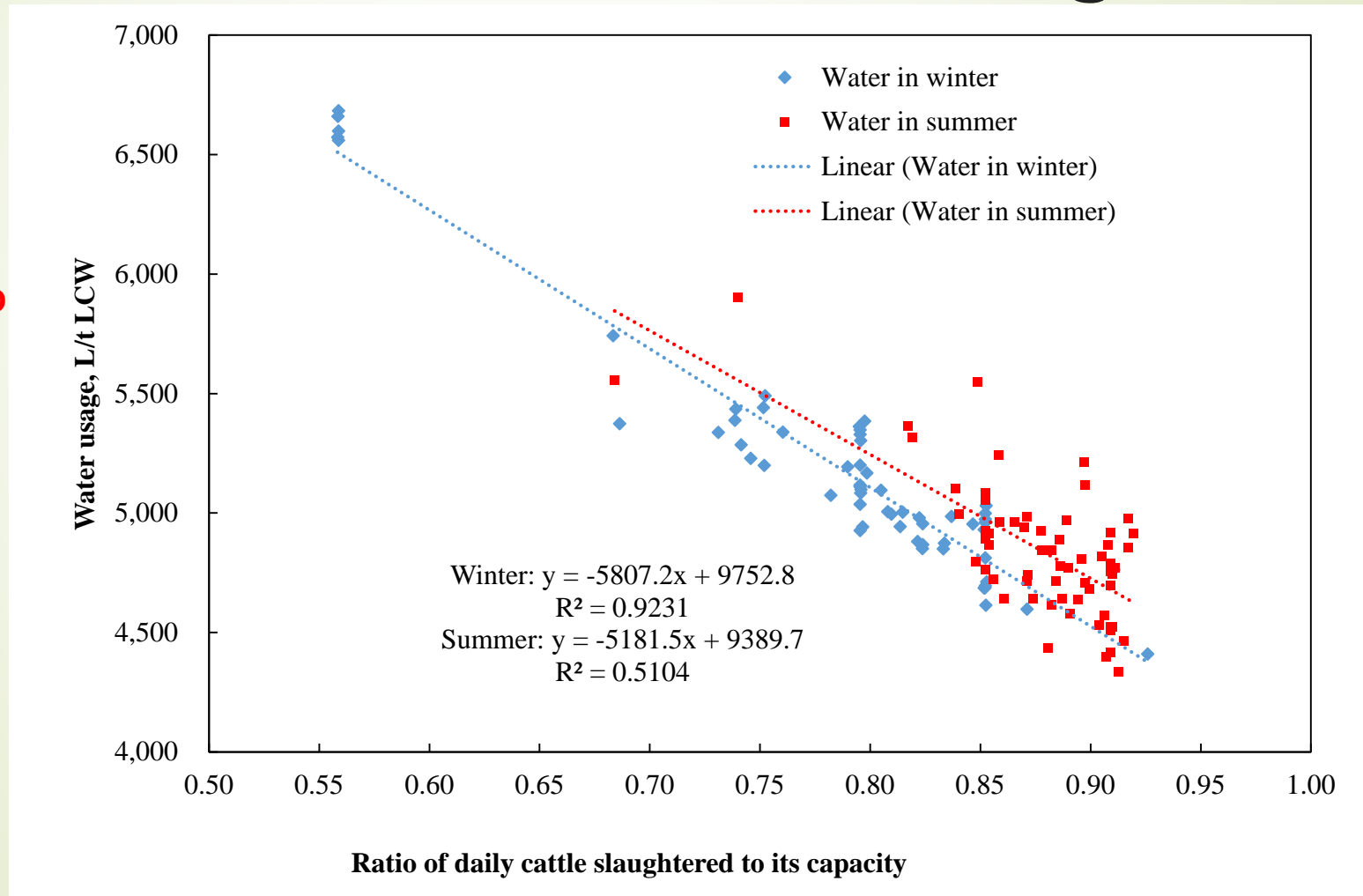
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Processes	Description	# of days	Frequency of data measurement	Water usage (gal/head)			
				Average	std. % of total water		
Yards (5.7%)	Yards washing, live cattle hide washing, cattle drinking	61	3 Shifts/day	49.6	15.2	5.7%	
Slaughter	hide-on wash	10	Daily	12.6	2.3	1.4%	
	Hide processing	61	Daily	1.7	0.5	0.2%	
	head wash	5	1 min interval	23.0	1.9	2.6%	
	Prewash	7	1 min interval	7.4	1.3	0.9%	
	Carcass wash	7	1 min interval	44.1	2.2	5.1%	
	Organic acid spray	61	Daily	2.1	0.5	0.2%	
	Spray chill	61	Daily	38.5	8.6	4.4%	
	Other cold water in kill floor	5	1 min intervals	56.3	2.6	6.5%	
	Other warm water in kill floor	14	Daily	37.0	5.6	4.3%	
	Hot water used in kill floor	61	Daily	54.2	3.4	6.2%	
	<b>Subtotal</b>				<b>276.9</b>		<b>31.8%</b>
	Evisceration and viscera processing	Gut table	2	1 min interval and bucket estimated	41.3	NA	4.7%
Intestine washing and cooking; Tongue dip tank		2 or 5	1 min interval	22.1	NA	2.5%	
Tripe and Omasum wash		14	Daily	25.9	3.0	3.0%	
<b>Subtotal</b>				<b>89.3</b>		<b>10.3%</b>	
Rendering	Edible rendering (cold water)	61		20.6	5.1	2.4%	
	Edible rendering (warm water)	5	1 min interval and daily	7.6	1.4	0.9%	
	Inedible rendering	10	1 min interval	82.6	10.7	9.5%	
	<b>Subtotal</b>			<b>110.8</b>		<b>12.7%</b>	
Fabrication	Cold water	61	Daily	2.6	0.6	0.3%	
	140 LP	61	Daily	13.7	10.0	1.6%	
	180 Sterilizer in fabrication	61	Daily	8.4	1.6	1.0%	
	<b>Subtotal</b>			<b>24.6</b>	<b>10.7</b>	<b>2.8%</b>	
Plant cleaning	140 HP in processing	61	2 Shifts/day	89.3	13.6	10.3%	
	140 HP in overnight usage	61	1 Shifts/day	100.1	6.4	11.5%	
	<b>Subtotal</b>			<b>189.4</b>	<b>33.4</b>	<b>21.8%</b>	
Plant services	Condensers	61	Daily	36.1	5.8	4.2%	
	Boiler feed makeup	61	Daily	15.5	1.6	1.8%	
	Boilers blowdown and pick heaters build-up washing	10	Daily	11.7	4.6	1.3%	
	Unaccounted (human consumption, truck wash and etc.)	NA	NA	65.8	NA	7.6%	
	<b>Subtotal</b>			<b>192.4</b>		<b>22.1%</b>	
Main water usage		61	3 Shifts/day	<b>869.7</b>	<b>83.5</b>	<b>100.0%</b>	

Opportunity: Frequently data stimulates P2 on part of company without our identifying specific recommendation.

# Comparisons water uses between winter (Jan. to Mar.) and summer (Jun. to Aug.)

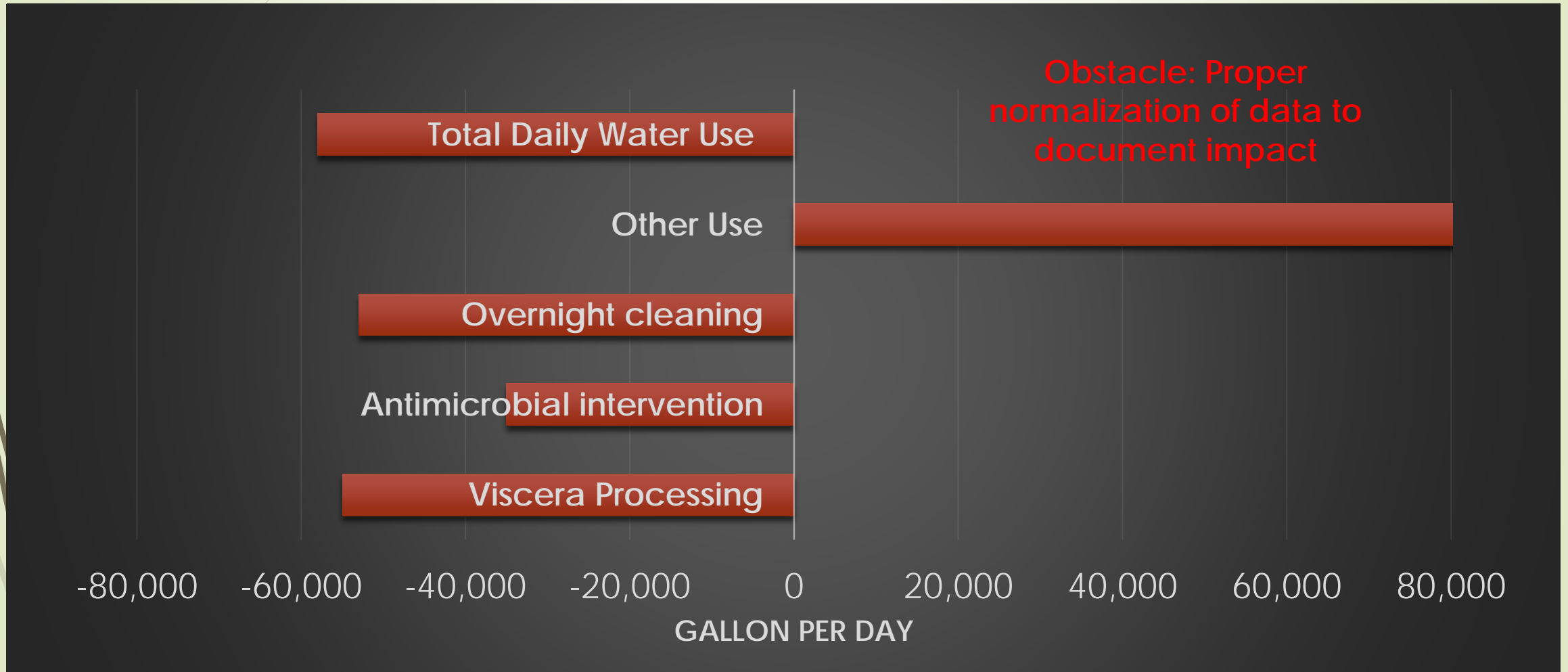
Obstacle: Proper normalization of data to document impact





# Results: Water Improvement in a Mid-size beef packing plant

Water Reduction of 28 million gallons / yr  
Cost savings of over \$100,000/yr.



# Example Recommendations

## Update knife sterilizers in kill floor



**Application of Econoliser in a beef packing a plant**



**Econoliser™ Basic Twin Knife Sterilizers**

<b>Capital cost</b>	<b>\$215,650</b>
Water savings	39,000,000 gal/yr
Heating savings	43,000 MMBtu/yr
Annual savings	\$182,000/yr
Payback	1.2 years

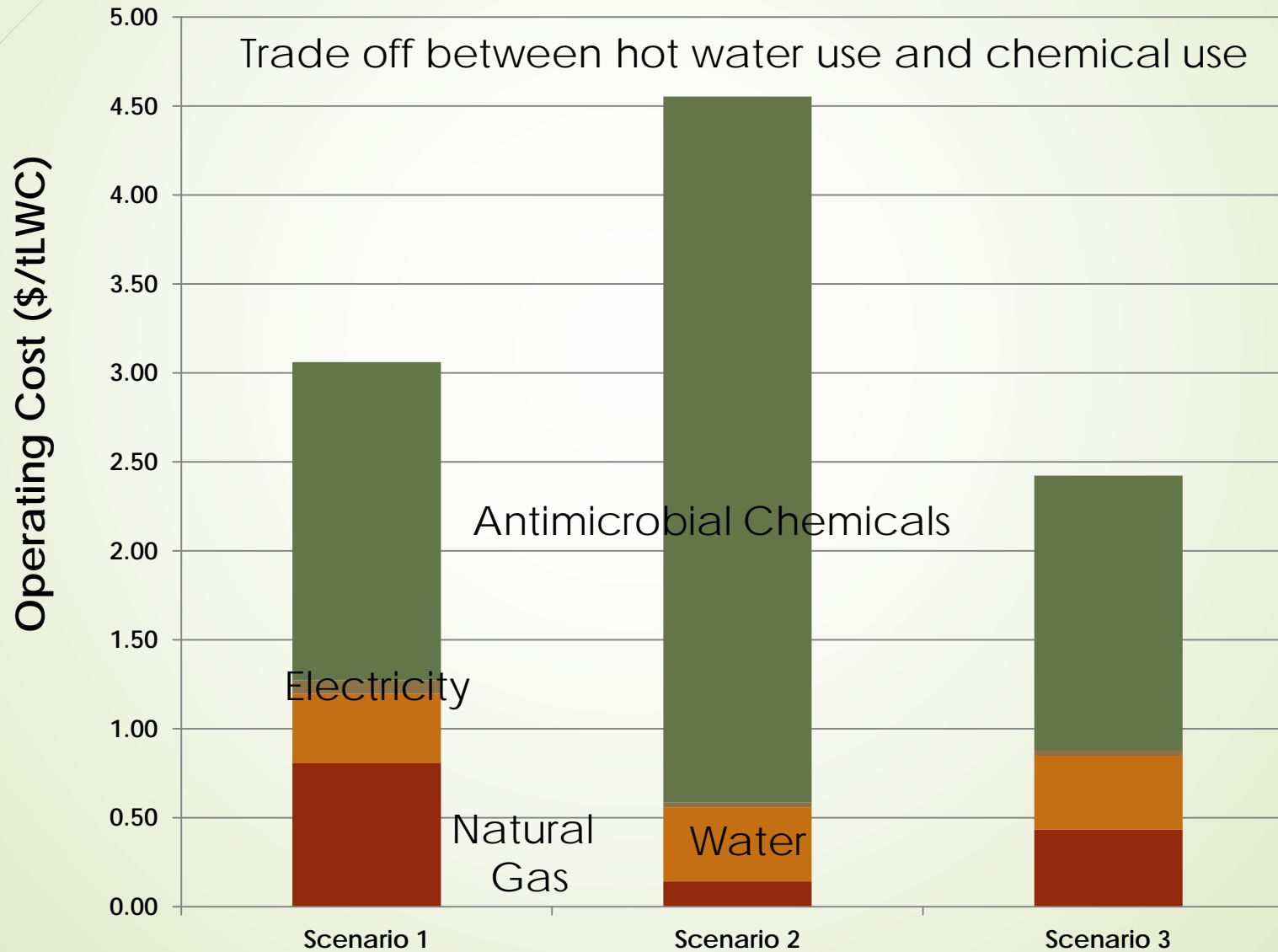
# Additional P2 opportunities

- ▶ Use smaller nozzle sizes for cleaning. Initial cleaning with hot water uses most water. Although crew is suggested to use ¼” nozzles, many used ½” nozzles. Used over twice water, without significant impact on overall cleaning.
- ▶ Annual Savings
  - ▶ \$224,000 water and natural gas cost combined
  - ▶ 21,600,000 gallons of water
  - ▶ 19,000 DTH of natural gas
  - ▶ 1,100 MT CO<sub>2</sub>E
- ▶ Hot Water Final Pasteurization **with recirculation tank** from Chad Equipment



# Other Grants Using P2 Data for Additional Analyses: Life Cycle Assessment of Alternative Microbial Interventions

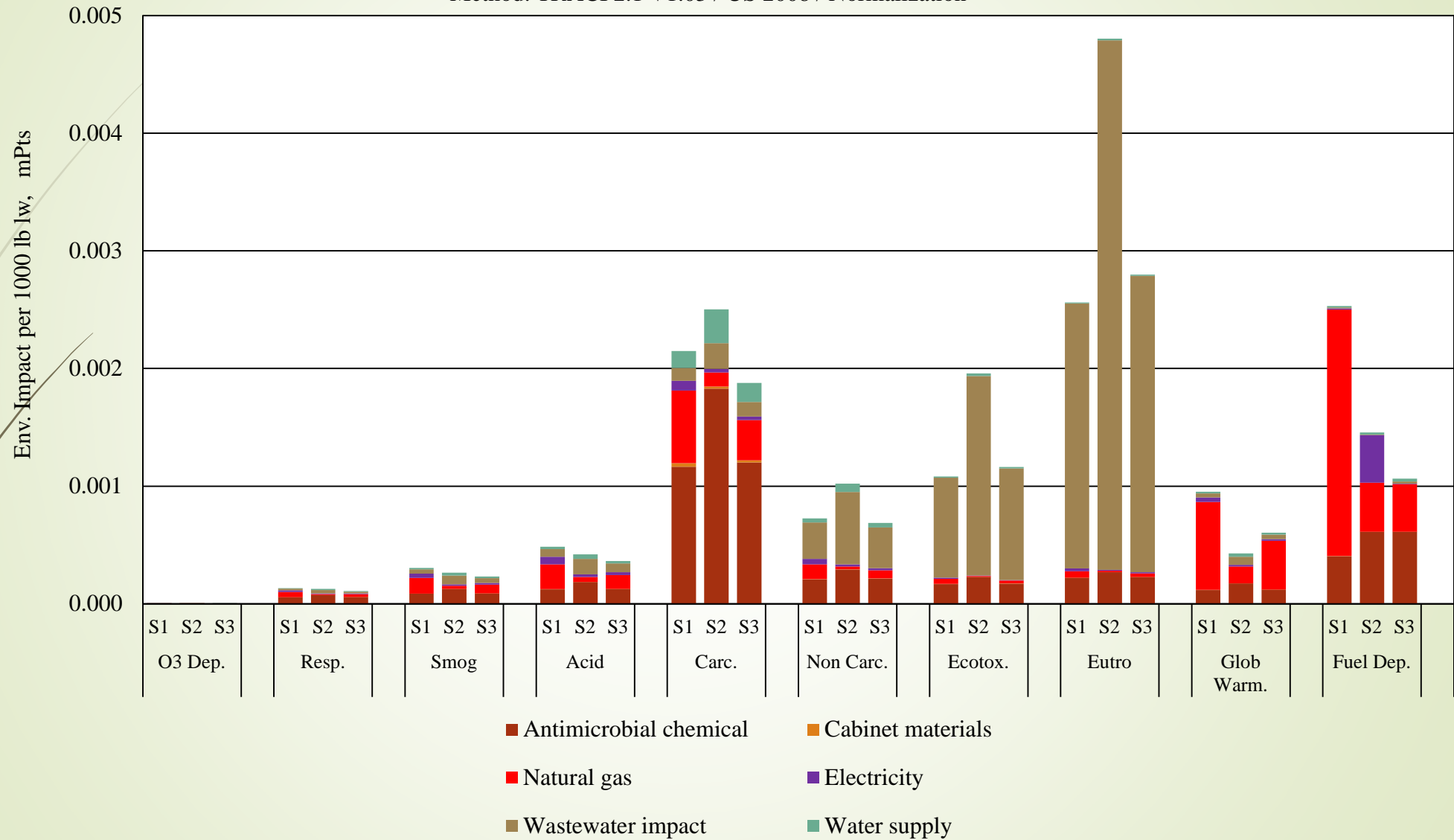
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# LCA (SimaPro) Comparison: Environmental impacts

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Process Comparison - With Subprocesses  
Method: TRACI 2.1 V1.03 / US 2008 / Normalization



# *Questions*

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