



Realizing Water Savings Through Dipper Well Replacement

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**Food Service
Technology Center**

Total Dip Well Water/Energy Use in CA



- California has 100k dip wells
- Water use from 0.25 to 1 gpm
- Some run 24/7/365
- Between 100 and 1400 gal/d
- CA estimated total: 75,000 AF/yr

Overview of Work

- Pilot Study
 - Juice Shop
 - 3 Dip wells monitored, 1 replaced
- Metropolitan Water District of Southern California
 - Full Service Restaurants
 - 2 Dip wells monitored, both replaced
- Santa Clara Valley Water District
 - Various Site Types
 - Project will total 5 dip wells monitored and replaced
 - So far: 3 dipper wells monitored, none yet replaced



Technologies Monitored (1/2)

LOLSBERG



Lolsberg i.ScoopShower

- Pressure switch
- Adjustable head



ConserveWell Heated Utensil Holder

- Manually replace water
- 4h timer



S E R V E R

SERVE BETTER™

Technologies Monitored (2/2)



Wells Heated Dipper Well

- Has electric heater to maintain 140°F tank temperature
- Has built-in spigot for easy filling
- Has manual drain valve

These were field monitoring studies!



Pilot Study: Jamba Juice Emeryville (cold water Dip Well)

- Daily Averages:
 - Time = 12.5 hr
 - Water consumed = 167 gal
 - Flow Rate = 0.25 gpm



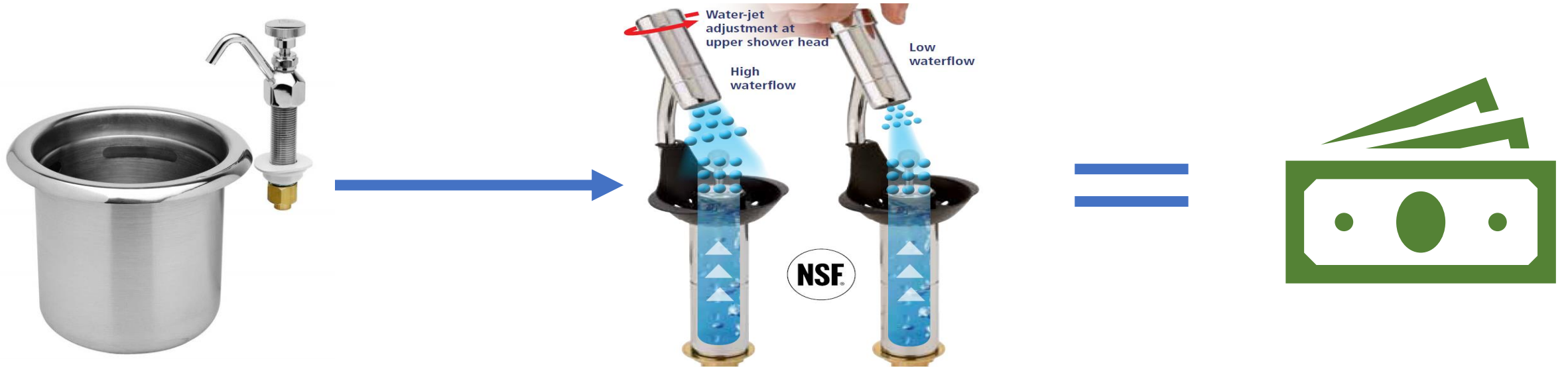
Jamba Results

	Replacement	Post Replacement
Average Flow Rate (gpm)	0.25	0.3
Operating Time (hr)	12.5	0.5
Daily Water Use (gal)	167	9.6
Reduction in Water use		94%

Cost Savings

If all 3 Dipper Wells were Replaced

- Total water use: 10,450 gal/y
- Total cost: \$182/y
- **Savings: 170,000 gal, \$2,980 per year**
- **ROI: Less than 1 year**



Black Bear Los Banos Scoop Shower Savings



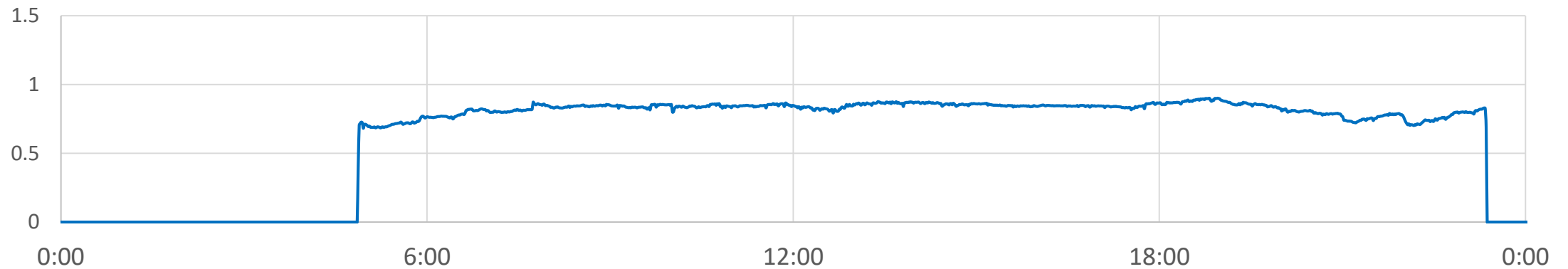
- Baseline Dipper Well used 486.5 gal/day of cold water
- Scoop Shower replacement used 4.9 gal/day

Black Bear Los Banos Results

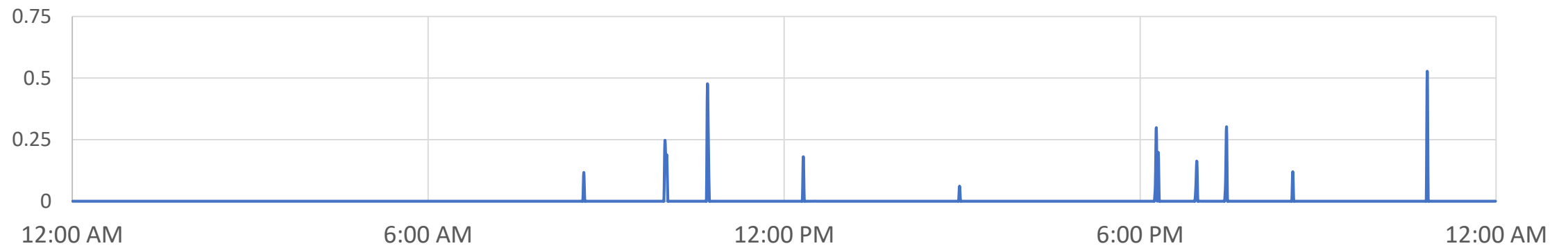
	Existing	Replacement
Average Flow Rate (gpm)	0.6	0.3
Operating Time (h)	12.5	minimal
Daily Water Use (gal)	486.5	4.9
Reduction in Water use		99%

Continuous flow is extremely wasteful

Los Banos Dipper Well Flow Rate (gpm) 6/14

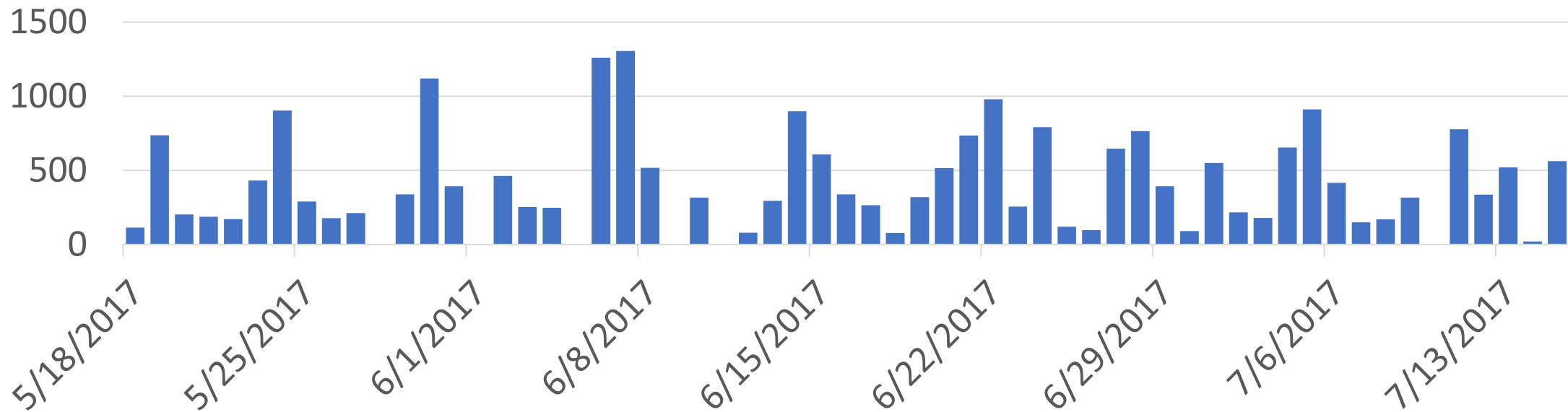


Los Banos Scoop Shower Flow Rates (gpm), 8/1



Black Bear LB Operation

BBDLB Daily Water Use, 5/18 - 7/14 (gal/day)



Staff operating practices had massive impact on total use!!!

Savings through Operation Standardization



- Replacement Use per day = 5 gpm
 - Very little variation
 - Weekend use higher than weekday use
 - New water use pattern matches service demand!
- Single well changeout saved 175,000 gallons per year

BB Madera Savings – both water and energy

Hot-Water Fed Dipper Well

- Left on overnight
- Low flow rate

Replaced with ConserveWell:

- Manual dump/fill
- Staff replaced water every 4h
- Left on overnight



Black Bear Madera Results

	Existing	Replacement
Average Flow Rate (gpm)	0.25	N/A
Operating Time (hr)	24	24
Daily Water Use (gal)	321	4
Daily Energy Use	2.8 therms	3.2 kWh or 0.1 therms equiv.
Reduction in Water use		97%
Reduction in Energy use		99%

Lifetime savings

	Los Banos Savings	Madera Savings
10 Year water savings (gal)	1,762,000	1,159,000
10 Year energy savings (therms)	N/A	9,970 equivalent therms
10 Year Direct utility savings	\$30,660	\$29,270
Embedded energy savings (kWh)	6,500	4,170

SCVWD Study (so far...)



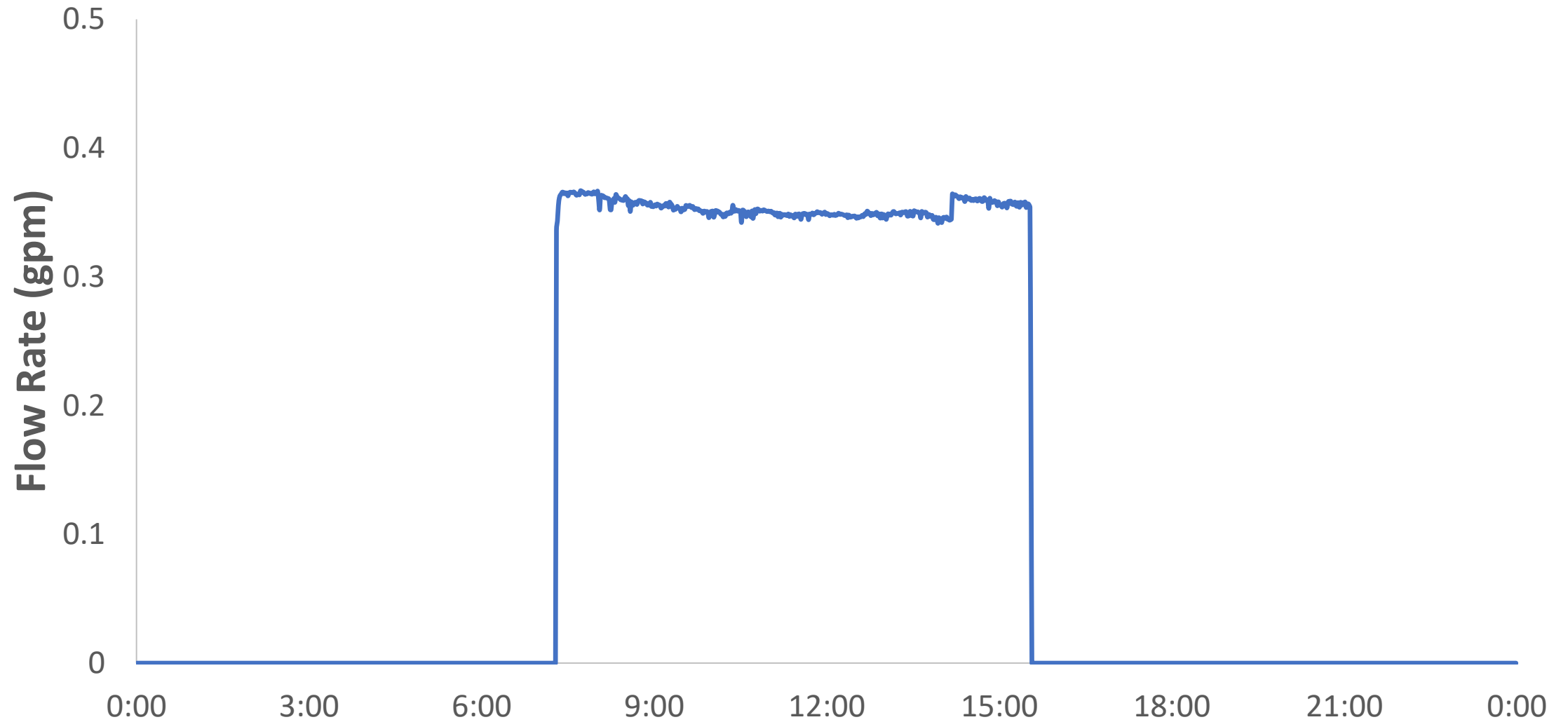
SCVWD Baseline Results

	Corporate Campus (Hot Wells)	Stanford FloMo	Stanford Jamba Juice
Daily Water Use (gal/d)	178	231	46
Average flow rate (gpm)	0.4	0.4	0.08
Energy Use per day	2.1 kWh	N/A	N/A

Corporate Campus site is not ideal use of Wells Heated Utensil Holder, also not worst case scenario

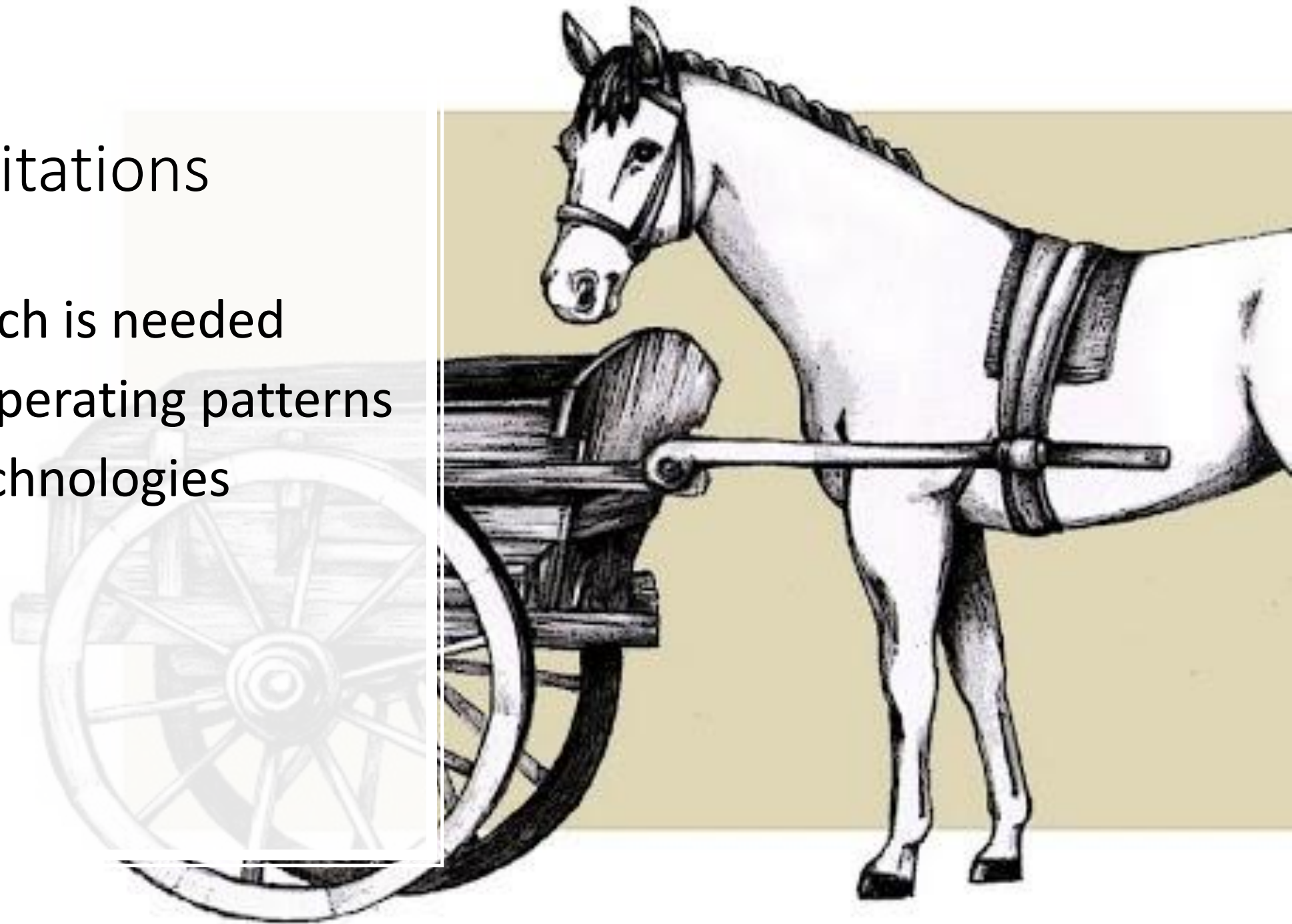
Difference between Stanford FloMo and Stanford Jamba is the difference between average and best-in-class operating practices

Google Operating Profile 1/22/18



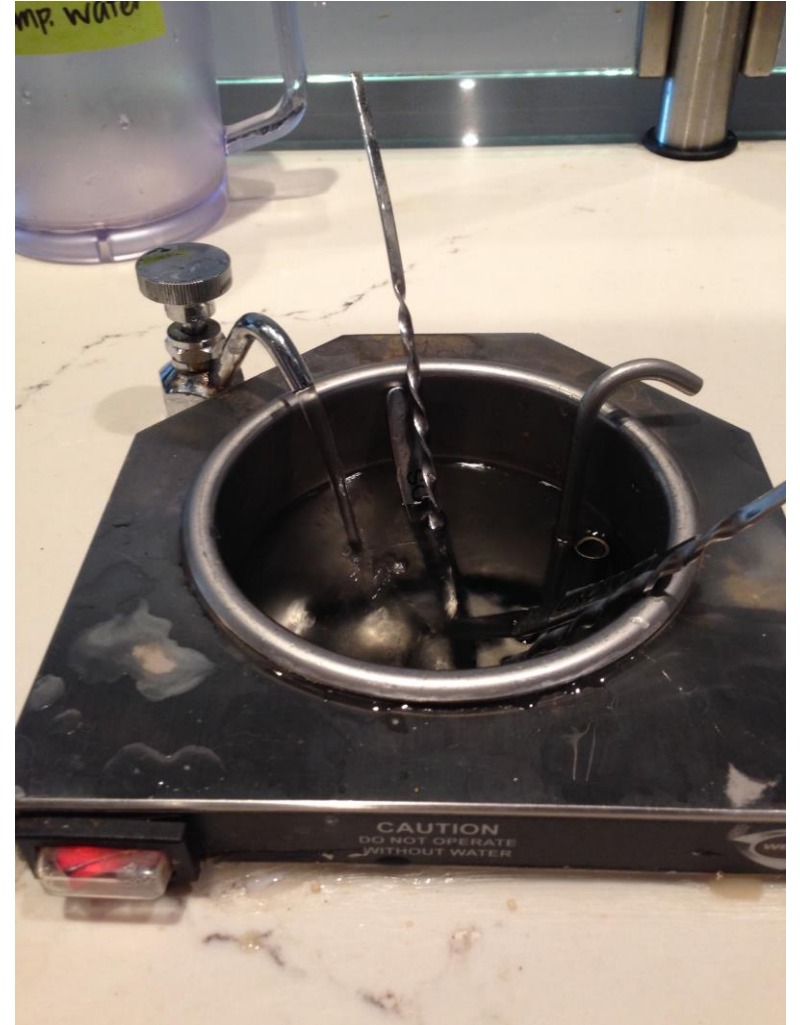
Project Limitations

- More research is needed
- Site types, operating patterns
- Untested technologies



We can be the manufacturer filter!

- Any utility incentive program needs to only apply to verified technologies
- Set minimum water and energy savings threshold for recognition
- Have Frontier Energy test new technologies in the field in each applicable segment and have manufacturers fund the testing





Down the Road...

Third party program justification

	Estimated Average State Rebate Value	Scoop Shower Savings	Scoop Shower Incentive Potential	Utensil Holder Savings	Utensil Holder Incentive Potential
Water (HCF/y)	\$4/HCF	235	\$940	155	\$620
Gas (therms/y)	\$1/therm	0	0	997	\$997
Electricity (kWh/y)	\$0.08/kWh	0	0	-1,168	-\$93
Embedded Energy (kWh/y)	\$0.08/kWh	650	\$52	417	\$33
Total			\$992		\$1,557

Purchase price for each unit is \$500, so there's strong potential for a third party direct install program. Frontier Energy is equipped to be project implementers



Next Steps

Field evaluate remaining untested products

Field studies at different site types

Work with health departments to get approval of each unit in every application and develop universal SOPs

Develop joint-utility incentives and direct install program

Thanks!

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