

Battery Truths & Myths

How to Evaluate Competing Claims About Battery-Powered Restroom Fixtures

Presenters



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Learning Objectives

This webinar is designed to:

- Explain why commercial restrooms use batteries
- Cover what commercial products use batteries for
- Provide information about what battery types are used in commercial restrooms and the differences between them
- Explain how batteries work in combination with hardwired power supplies and hybrid power generation systems like solar cells and turbines
- Advise how to evaluate the various battery claims made by manufacturers

This webinar is not designed to:

- Disparage any competitor by name



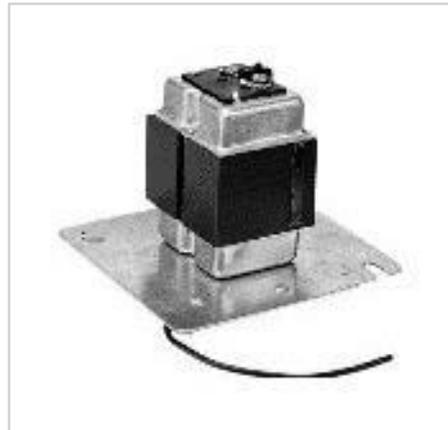
Overview of Power Supply Types



Battery



**Hardwired –
Adapter Plug***



**Hardwired –
Wall Transformer***



**Solar Energy
Harvesting***



**Turbine Energy
Harvesting***

*May have battery back-up

Sloan Leads the Evolution of Commercial Restroom Power Options

Manual Technology

1906 – Sloan invented the manual diaphragm flushometer
1928 – Sloan invented the manual piston flushometer



Hardwired Technology

1974 – Sloan introduced the automatic sensor faucet
1980 – Sloan launched the automatic sensor flushometer



Battery Technology

1992 – Optima Plus battery-powered faucets and flushometers



Hybrid Energy Technologies

2005 – EAF-275 SOLIS solar power harvesting faucet
2008 – SOLIS solar power harvesting flushometer
2012 – BASYS solar power harvesting faucet
2012 – BASYS 380 turbine capacitance faucet
2015 – BASYS 280 turbine IR faucet
2018 – Optima BT turbine faucet



Why Use Batteries?

In 1992, electronics became efficient enough to transition from hardwired to battery power.

- Facilities converting from manual to touch-free automatic operation did not need to rewire the restrooms
- The installation time required to install faucets and flushometers was reduced
- Reduce labor costs



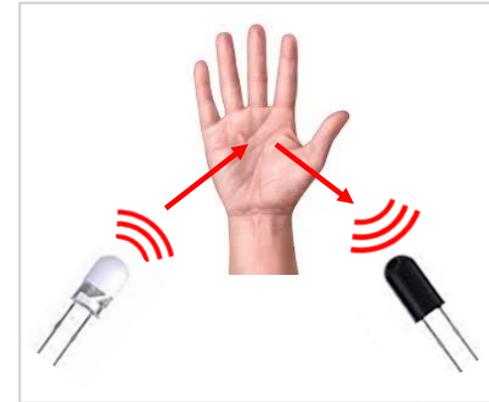
What Do Commercial Restroom Products Use Battery Power For?

- Sensing a valid target
- Activating a solenoid
- Moving a flushometer handle
- Pumping soap



Sensing a valid target

Infrared (IR)



Capacitance
(Proximity)



1. Scanning
2. Detection
3. Calculation
4. Activation
5. Completion

Solenoid Activation

Flushometer
Solenoid



Faucet
Solenoid



1. Closed
2. Energized to Open
3. Energized to Close

“Bi-Stable” solenoids save energy because they do not require a continuous signal to stay open.

Side Mount Retrofit Kit Activation

- Replaces or Clamps over existing manual handle
- Gears move to depress the handle and activate the valve
- Uses 4 “C” alkaline batteries because of the energy required



SMO



SMOOTH



SFISM



DFISM

Pumping Soap

- Uses 4 “D” alkaline batteries because of the energy required



Batteries Most Often Used in Commercial Restrooms

Disposable



AA 1.5V
Alkaline
\$0.68 ea.



CRP2 6V
Lithium
\$7.95 ea.



2CR5 6V
Lithium
\$13.20 ea.



AA 1.5V
Lithium
\$1.33 ea.



Custom 6V Lithium
"10-Year Battery"
\$57.95 ea.



Custom 3.6V
Lithium Thionyl Chloride
"30-Year Battery"
\$119.50 ea.

Rechargeable



Custom 3V Lithium-ion
\$24.66 ea.

Most flushometers and faucets use four 1.5v "AA" alkaline batteries or one 6v lithium battery

Key Battery Definitions

Term	Definition
Power Capacity	The amount of energy stored in a battery
Power Capability	The amount of energy that can actually be drawn from the battery
Shelf Life	The length of time a battery can remain in storage without losing its capacity
Service Life	The time period for which the battery can deliver energy (power capability)
Self Discharge	Internal reactions that reduce the capacity of a battery in storage over time



What's the Difference between Alkaline and Lithium?

Shelf life, service life, and capacity



Characteristic	Alkaline	Lithium	Takeaway
Power Capacity	1800 – 2850 mAh	2700-3400 mAh	Lithium is higher
Power Capability	Dependent upon: <ul style="list-style-type: none"> • Discharge Strength • Temperature • Number of Activations • Product Efficiency 		The capability of the battery to deliver power over time is related more to how it's used rather than its capacity
Shelf Life	10 years	10 -15 years	Lithium is longer
Service Life	At lower discharge rates (in higher efficiency products for example) alkaline power delivery is equal or better	At higher discharge rates (camera flashes for example) lithium power delivery is longer	Service life is related more to product efficiency than battery type
Self Discharge	2-3% per year	0.5% per year	Lithium is lower

What's the Difference between Alkaline and Lithium?

Disposal and recycling



Characteristic	Alkaline	Lithium	Takeaway
Disposal	OK to trash (except California)	Must be collected	Recycling is always better
Recycling	Can be recycled	Can be recycled	Earth911 Recycling Center Locator link



What's the Difference between Alkaline and Lithium?

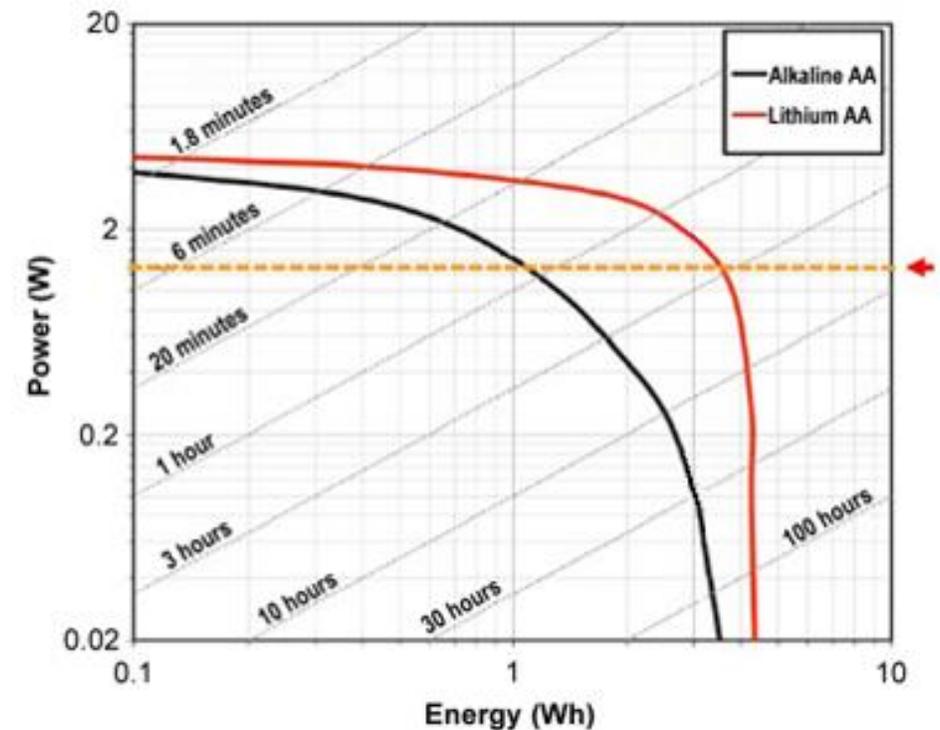
Discharge Curve Characteristics

Alkaline and lithium start at similar power levels.

- Alkaline discharges gradually
- Lithium discharges suddenly

Implications for low battery indicators

Source: CADEX Battery University

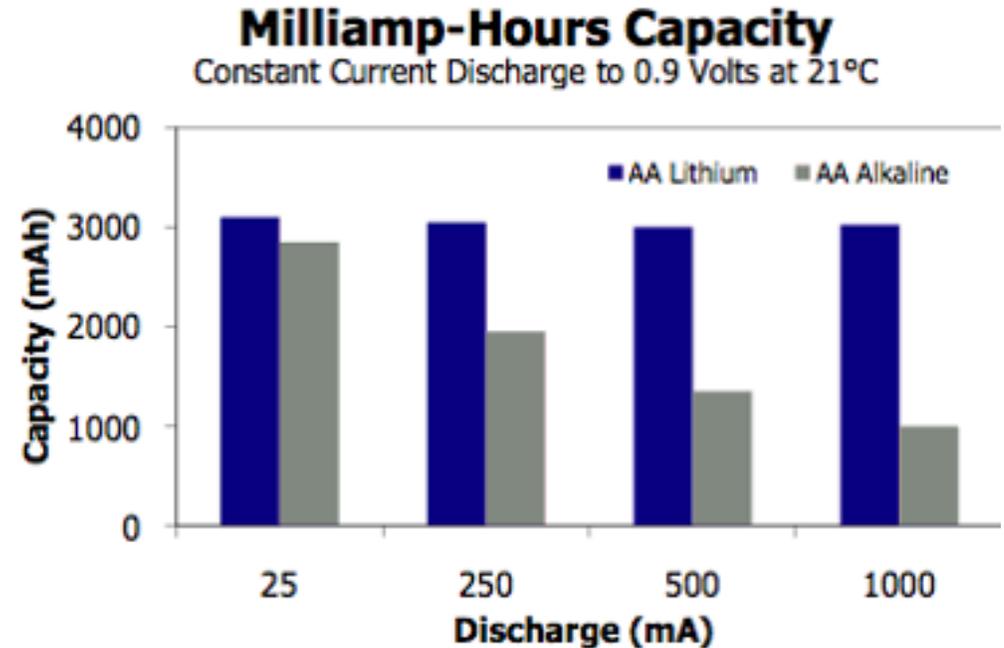


What's the Difference between Alkaline and Lithium?

Power capability

- Alkaline power capability is almost identical to lithium when discharges are small
- Lithium can generate higher powered discharges longer

Lithium lasts longer in inefficient products like cameras



How Do Batteries Work in Combination with Other Power Supplies?

- Battery
- Hardwired with battery back-up
- Solar with battery back-up
- Turbine with battery back-up



Perception vs. Reality

“Lithium batteries last longer.”

False. The capability of the battery to deliver power over time is related more to how it's used rather than its capacity.

Note: Cold reduces battery capacity, but heat reduces battery life. Above 77°F, every increase of 15° reduces battery life by 50% for both alkalines and lithiums.



Perception vs. Reality

“Batteries are always a better choice”

False.

Batteries are not always the most sustainable choice and the total cost of ownership (TCO) can be much higher when service time is factored in.

In high traffic applications battery replacement may become a burden.



Perception vs. Reality

“All batteries can be recharged.”

Single-use primary batteries (including lithium and alkaline) are not designed to be rechargeable and are an explosion hazard.

Lithium batteries should not be confused with lithium-ion. They are not the same.



Perception vs. Reality

“A ‘10-year battery’ and a ‘30-year battery’ will work for as long as their names say they will.”

Don't confuse “shelf life” with power capability and service life.



Perception vs. Reality

“Lithium and alkaline batteries have different capacities.”

True – but different power capacities do not equal different power capabilities or service life.

Although they have a higher power capacity, lithiums might not last longer than alkalines on low discharge applications.



Perception vs. Reality

“Some automatic sensor products require no batteries at all”

False. Even sensor products with power harvesting technologies require batteries to function properly and reliably.



Perception vs. Reality

“All batteries are the same, and they are all manufactured in the same place, anyway.”

False. Batteries can vary in power capacity by as much 80%.

Only use brands you know and trust.



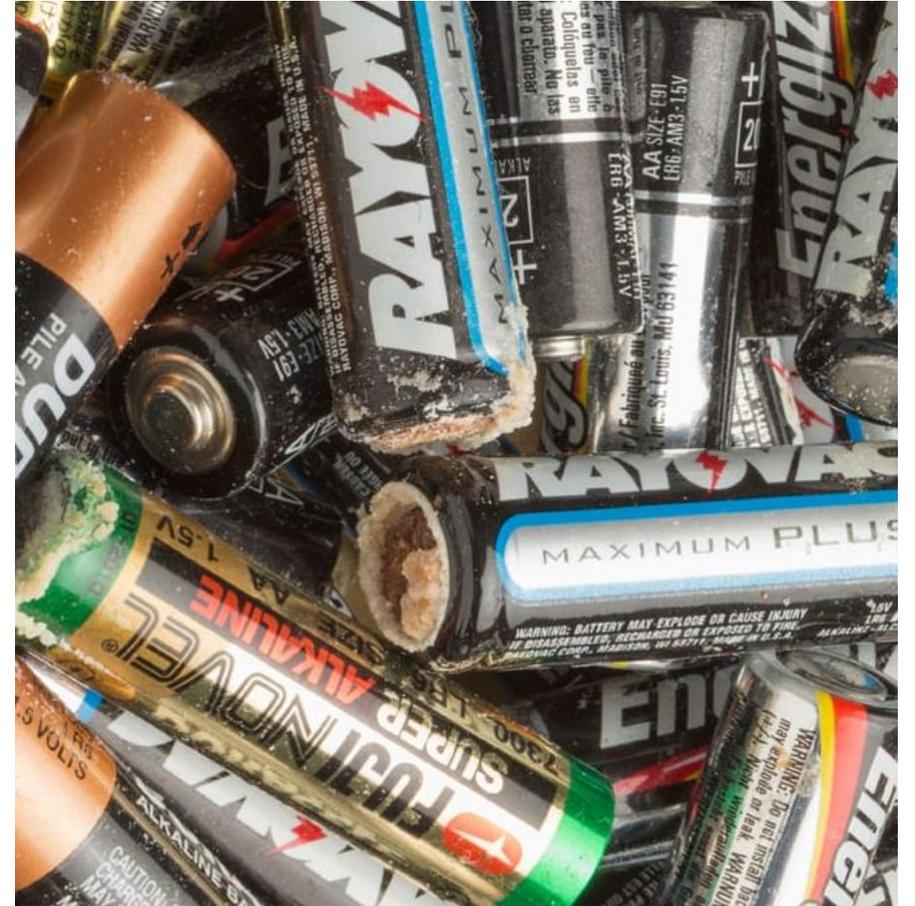
Perception vs. Reality

“Batteries are never supposed to leak.”

False. Alkaline batteries are more prone to leaking.

When exhausted, alkaline batteries can corrode and vent small amounts of hydrogen. This allows potassium carbonate (white powder) to escape. The powder is corrosive.

Never combine fresh batteries with older batteries. Corrosion will result.



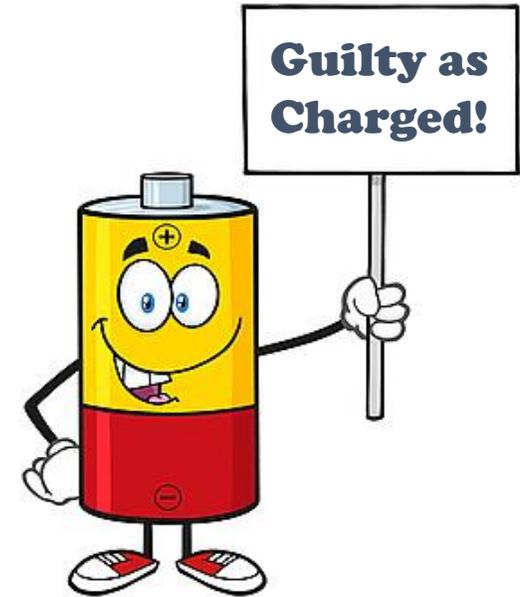
How Do I Evaluate the Battery Claims Made by Manufacturers?

Sensor Faucet Manufacturer	Commercial Warranty Period	Number of Activations	Number of Years / (Activations)	Normal Battery Option	“Long Life” Option	Long Life – # Activations	Est. Battery Net Price to End User
A	3 years	8,000 per month	3/(288,000)	Some alkaline / some lithium	NA	NA	\$2.72 4x alkaline \$7.95 1x lithium
B	3 years	NA	NA	Alkaline	Lithium “10-year battery”	NA	\$2.72 4x alkaline \$57.95 1x “10-year”
C	5 years	4,000 per month	5/(300,000)	Lithium	Lithium “10-year battery”	NA	\$7.95 1x lithium \$83.82 1x “10-year”
D	5 years	NA	NA	Alkaline	Lithium thionyl chloride “30-year battery”	875,000 (based on accelerated lab testing)	\$2.72 4x alkaline \$117.50 1x “30-year”

**“10-year” batteries deliver same number of activations at 21x price.
“30-year” batteries deliver 3x number of activations at 43x price.**

Summary

- Batteries are only part of the overall product design
- Disposable alkaline and lithium batteries are almost identical in terms of performance in energy efficient products
- Lithium batteries last longer in higher demand applications like digital cameras with flashes
- Alkaline batteries are considered more “environmentally friendly”
- Battery capacity, capability, shelf life, and service life claims can be manipulated to confuse end users
- Hybrid energy harvesting has supplanted “long life” battery options



Upcoming Sloan Training Webinars



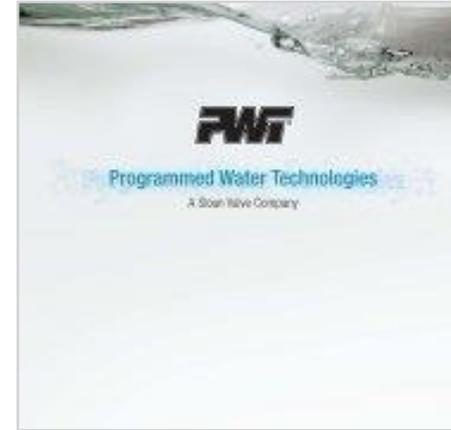
May 14th

Touch-free Hygiene in
K-12 and Higher
Education Facilities



May 21st

Regal vs. Sloan vs. Royal



May 28th

PWT New Product Launch



June 4th

Introduction to
Sloan Sensor Faucets



Thank You – Questions?

Training Comments, Questions, or Suggestions?

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