

CHARGING AHEAD

How to Find Powerful Rechargeable Batteries



RPN Webinar
September 28, 2016

RPN

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- Nonprofits



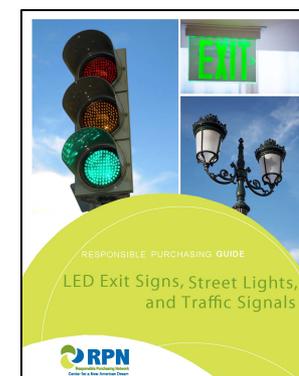
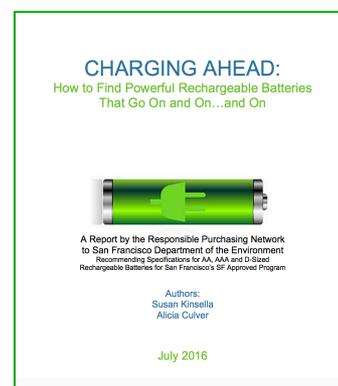
Our Mission

“Promote and practice responsible purchasing by identifying best practices, developing effective purchasing tools, educating the market, and using our collective purchasing power to maximize environmental stewardship, protect human health, and support local and global sustainability.”

RPN Resources

- *Responsible Purchasing Guides*
- **Webinars**
- **RPN newsletter**
- **Model specifications**
- **Technical assistance**
- **Model purchasing policies**
- **Calculators and other tools**

Green Purchasing Best Practices: Imaging Equipment



Audio and Recordings

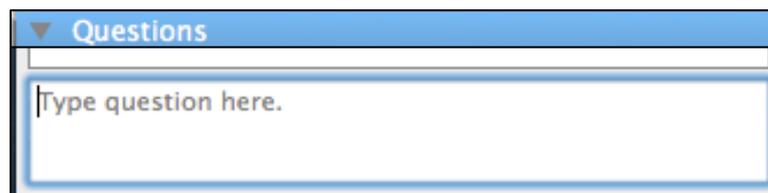
- **Participants are muted. Communicate technical questions (about sound, etc.) through the CHAT BOX in your GoToWebinar application.**



- **This presentation will be recorded, and shared through email and online.**

Questions?

Submit questions at any time by typing them into the
GoToWebinar QUESTION BOX.

A screenshot of a GoToWebinar question box. It features a blue header bar with the word "Questions" and a downward-pointing triangle. Below the header is a text input field with a light blue border and a white background. Inside the field, the text "Type question here." is displayed in a light gray font, with a vertical cursor line at the beginning.

We will compile and answer them...

- **After each presenter *and***
- **At the end of the webinar
with discussion.**

Presenters



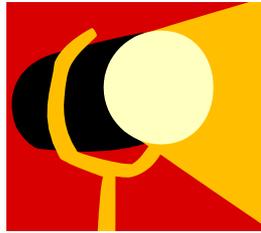
- *Chris Geiger*, San Francisco
Dept. of the Environment



- *Alicia Culver*,
Executive Director, RPN



- *Susan Kinsella*,
Senior Analyst, RPN



Overview

- **Why rechargeable batteries are needed**
- **Strategies to reduce battery use**
- **How to find high-performance rechargeable batteries**
- **Tips for purchasing chargers**
- **How to pilot test rechargeable batteries**
- **How to recycle rechargables – for free!**





Chris Geiger
**San Francisco Department
of the Environment**

San Francisco EPP Program Structure

City
Purchasers

Green
Teams

Dept. of the
Environment



Cost



Performance



Impacts

- Worker health
- Environmental
- Social

San Francisco's Rechargeable Battery Law

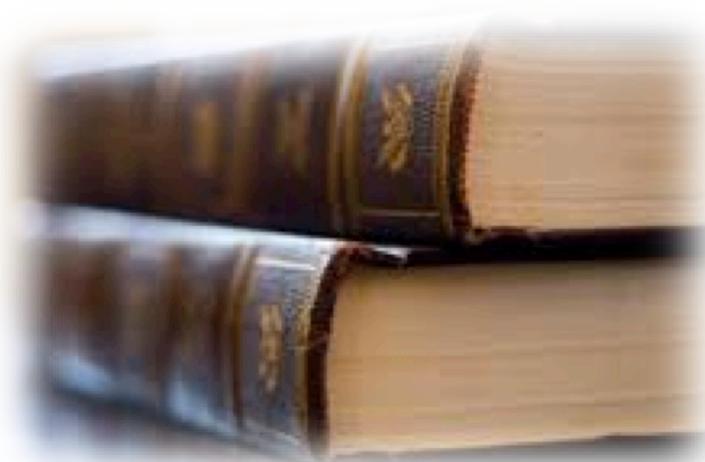
A City department that purchases or contracts to purchase batteries or products that include or incorporate batteries or battery packs, shall purchase...

- **Rechargeable nickel-metal-hydride batteries**
- **Another rechargeable battery type identified by the Director of the Department of the Environment**
- **Only from vendors that collect spent batteries and recycle them in accordance with applicable laws**
- **Products accompanied by detailed recycling instructions**
- **Products in which battery packs are easily removable**



SF Precautionary Purchasing Ordinance Requirements

- City agencies only
- Purchases restricted to “approved list”
- Prioritization
- Reporting
- Waivers
- Training & outreach





Welcome to SF APPROVED. Explore green products & services that meet San Francisco's health & environmental requirements.

What would you like to get?

Search batteries, cleaners, LED lights

[Advanced Search](#)



People should be sure to use green products, for safety and for the environment.

Cliff Hsiung, Custodial Supervisor, Recreation & Parks Department



News

[New Report: The Best Rechargeable Batteries](#), July 7, 2016

[SF Approved Green Product Specifications for Your Contracts](#), April 11, 2016

[Tools for Safer Graffiti Control](#), May 1, 2015



SF APPROVED

Use less, buy the right thing

Search

batteries, cleaners, LED lights



[Advanced Search](#)

Browse



Info on this product category: Batteries

Why Go Green

Criteria for Batteries

Specifications for AA Rechargeable Batteries

- Nickel-metal hydride (NiMH) chemistry
- Minimum 2000 mAh capacity
- Low self-discharge (LSD): Maintains a minimum of 80% capacity after 1 year in storage, or 75% after 3 years in storage

Specifications for AAA Rechargeable Batteries

- Nickel-metal hydride (NiMH) chemistry
- Minimum 800 mAh capacity
- Low Self-Discharge: Maintains a minimum of 80% capacity after 1 year storage, or 75% after 3 years storage

Specifications for D Rechargeable Batteries

- NiMH chemistry
- Minimum 8000 mAh capacity
- Low Self-Discharge: Maintains a minimum of 80% capacity after 1 year in storage, or 75% after 3 years in storage

Non-rechargeable alkaline batteries are acceptable for precision electronic equipment that is voltage sensitive, for emergency use equipment, or for other applications requiring longevity and slow power drain.

Last updated: July 1, 2016

[Regulation Adopting an Approved Alternatives List - #SFE-05-01-PPO](#), July 18, 2005

Polling Question #1

How often does your organization use rechargeable batteries?

VOTE NOW



CHARGING AHEAD:

How to Find Powerful Rechargeable Batteries
That Go On and On...and On



A Report by the Responsible Purchasing Network
to San Francisco Department of the Environment
Recommending Specifications for AA, AAA and D-Sized
Rechargeable Batteries for San Francisco's SF Approved Program

Authors:
Susan Kinsella
Alicia Culver

July 2016

Alicia Culver

and

Susan Kinsella

RPN

[www.sfapproved.org/
sites/default/files/files/
general-files/
sfa_rpn_charging_ahead_july2016.pdf](http://www.sfapproved.org/sites/default/files/files/general-files/sfa_rpn_charging_ahead_july2016.pdf)

Single-Use Alkaline Batteries



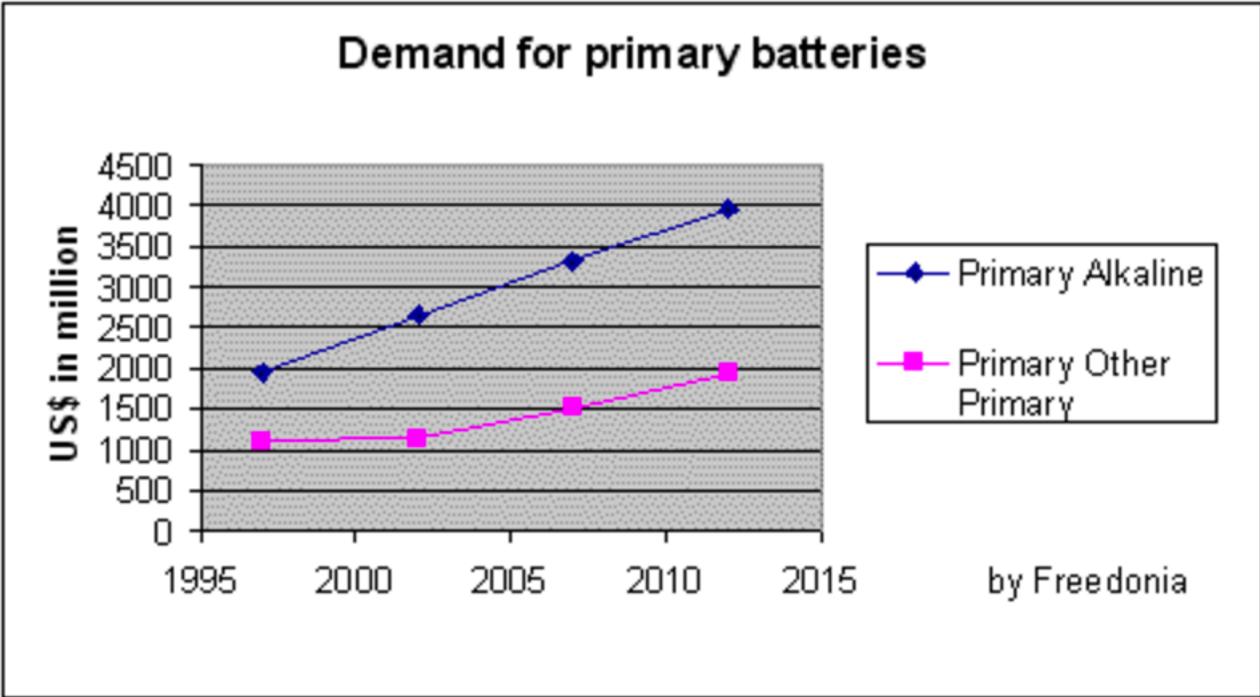
- **Widely available**
- **Low initial cost**
- **Expensive to replace in high-usage equipment (50 cents – \$2/battery)**
- **Need special handling at end-of life (Universal Waste)**

Why are Single-Use Batteries a Problem?

- Energy-intensive and polluting to manufacture (via smelting)
- Heavy to transport (~20 AAs per pound)
- Rapidly disposable (250 million pounds/year)
- Hazardous (corrosive, heavy metals)



US Battery Consumption is Growing



What Types of Equipment Use Batteries?

- *Hardware* (flashlights, power tools, emergency lighting)
- *Communications equipment* (pagers, cell phones, hand-held radios, walkie-talkies)
- *Office supplies* (calculators, clocks)
- *Janitorial equipment* (hands-free towel/soap dispensers)



Sustainable Battery Procurement Goals

- Use fewer batteries
- Purchase environmentally preferable rechargeable batteries
 - High performance rechargeables
 - Less toxic rechargeables
- Improve labeling of batteries
- Create efficient & safe battery collection and recycling system





How Can You Reduce Battery Consumption?



Choose products that eliminate/minimize battery use

- Manual paper towel and hand soap dispensers
- LED flashlights
- Cameras/other products with built-in rechargeable battery

Choose rechargeable batteries (whenever practical)

- Specify high-performance rechargeable batteries
- Pilot test rechargeable batteries in targeted equipment
- Add compliant products to bid lists

How are Batteries Purchased?

Contracts for:

- Batteries
- Facility MRO Supplies
- Office Supplies
- Janitorial supplies
- IT Equipment

STANDARD BATTERIES
6 Results Found that Include 105 Products
How can we improve the [Search Experience?](#)



Standard Batteries



Rechargeable Batteries



Battery Recycling

- **Require or give preference to vendors that agree to collect (takeback) and recycle batteries free of charge**



Contact Us

Customer Service: 1.877.723.1297

- **Request recycling plan to be included with bids**

Call2Recycle Program



FIND A DROP-OFF LOCATION: REGION

WHY RECYCLE?

COLLECTION PARTNERS

STEWARDS

RESOURCES

NEWS & EVENTS

CONTACT US

What Can I Recycle? [Home](#) > [What Can I Recycle?](#)



Rechargeable Batteries



Single-Use Batteries*



Cellphones

Polling Question #2

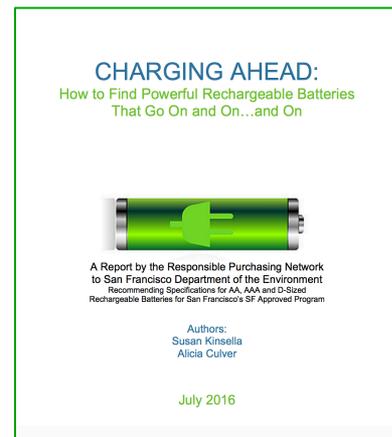
What do you think are the biggest barriers to using rechargeable batteries?

VOTE NOW



Research Methods

1. Literature review
2. Interviews with battery suppliers
3. Interviews with government agencies about their pilot tests of rechargeable batteries
4. Market assessment of rechargeable batteries



“After comparing available rechargeable battery technologies, RPN concluded that nickel-metal hydride (NiMH) batteries with low-self discharge technology are the best drop-in replacement for single-use, alkaline consumer batteries.”



Why Nickel-Metal Hydride?

- Available in standard sizes (AAA, AA, C, D, 9V)
- Same voltage (1.2V) as alkaline batteries = direct replacement
- More powerful than in the past; some = alkaline batteries
- No “Memory Effect”
- Low-self discharge (LSD) products widely available
- Many pre-charged = can use right away
- Affordable; opportunity for cost savings



Other Types of Rechargeables

- **Nickel Cadmium**
 - Less capacity and cadmium is highly toxic
 - Suffers from the “Memory Effect”
- **Rechargeable Alkalines**
 - Can only be charged ~50X
- **Nickel-Zinc**
 - Less capacity and longevity than NiMH
- **Lithium Ion**
 - Operate at higher voltage
 - Available mostly in non-standard sizes



Sample Specifications



Recommended Specifications for AA Rechargeable Batteries

- Nickel-metal hydride (NiMH) chemistry
- Minimum 2000 mAh
- Low self-discharge (LSD): Maintains a minimum of 80% capacity after 1 year in storage, or 75% after 3 years in storage

Power Rating

- Capacity of the battery when fully charged
- Measured in milli-Amp-hours (mAh)
- Varies among brands



Some NiMH Rechargeable Batteries Far More Powerful Than Others

AA: 1000 – 2800 mAh (~3X difference)

AAA: 500 – 1100 mAh (~2X difference)

D: 2200 – 12,000 mAh (~5X difference)



Low-Self Discharge (LSD)



- Maintain 80% of their charge for 1 year (or 75% for 3 years)
- Non-LSD rechargeables lose ~4% of their charge/day
- Some products clearly label discharge rate, others do not
- No standard definition

Labeling Important

eneloop pro™

AA size Batteries: Up to 2,550 mAh
AAA size Batteries: Up to 950 mAh



Huge 2,550 mAh capacity for long life in high-drain devices

Retains 85 % capacity after one year in storage

Twice the number of external camera strobe flashes*¹

Capacity
up to
2550
mAh
(AA)



About
800
Flashes
eneloop pro™



About
400
Flashes
Dry-Cell Batteries



AA Power Rating + LSD (Pass)

Brand	Product Name	Capacity (mAh)	LSD Claim
1. Aibocn	EBL High-Capacity AA NiMH Precharged Rechargeable Batteries, 1500 Cycle	2800	Can maintain 75% of capacity after 3 years of non-use
2. Panasonic	Eneloop Pro AA High Capacity New Ni-MH Pre-Charged Rechargeable Batteries (Black label)	2550	Retains 85% of charge for 1 year when not in use
3. Sanyo	Eneloop 1.2V, 2500 mAh Rechargeable Batteries	2500	Maintains 75% charge after 1 year of non-use
4. PowerEx	Imedion Low Self-Discharge AA 2400 mAh Rechargeable Batteries	2400	Keeps up to 85% of charge after 1 year of storage
5. Duracell	Rechargeable Staycharged/Duralock AA Batteries	2400	Retains 80% of its charge after 12 months of storage
6. Amazon Basics	AA High-Capacity Pre-charged Rechargeable Batteries	2400	Stays 80% charged even after a full year of non-use
7. Sanyo	Eneloop AA Rechargeable Batteries	2000	Retains 85% of its charge for 1 year when not in use
8. Panasonic	Eneloop AA New 2100 Cycle Rechargeable Batteries (White label)	2000	Retains 90% of its charge for 1 year
9. Tenergy	Centura Low Self-Discharge AA Nickel-Metal Hydride Rechargeable Batteries	2000	Very slow self-discharge; maintains 85% capacity after 1 year of storage and 70% residual capacity after 2 years of storage
10. Amazon Basics	AA Rechargeable Batteries	2000	Maintains 75% after 3 years



AA Power Rating + LSD (Fail)

Brand	Product Name	Capacity (mAh)	LSD Claim
1. Energizer	Recharge Universal Batteries	1400	Charge lasts up to 12 months in storage
2. Rayovac	Recharge Rechargeable Batteries	1350	Not enough information provided about ability of battery to maintain charge over time
3. Eveready	Rechargeable AA Batteries	1300	Ready to use for up to 1 year
4. Panasonic	Eneloop Lite AA Rechargeable Batteries (Blue label) ⁶	1000	Retains 65–70% capacity after 5 years in storage



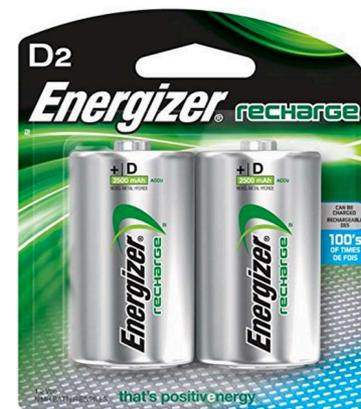
Other Performance Criteria (Not in Specification)

of charges/battery

- Information not reliably or consistently reported

“Pre-charged”

- Some pre-charged batteries are LSD, while others are not (unreliable indicator of LSD technology)
- Beware most pre-charged batteries are *only partially* charged



Which Equipment is Best for Rechargeables

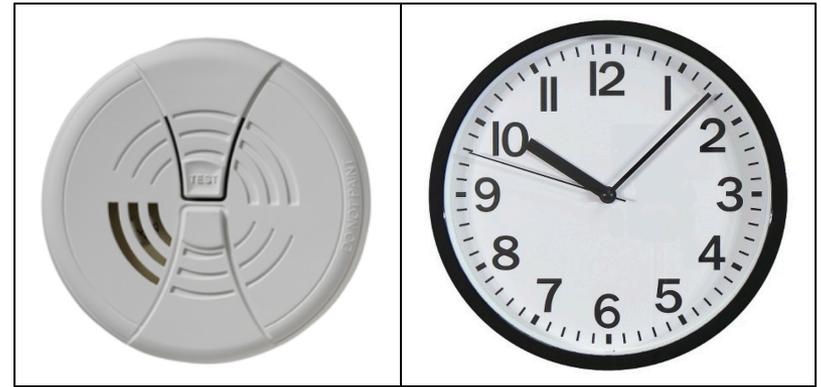


- Wireless mice
- Telephone head sets
- Radios
- Pagers
- Calculators
- Non-emergency flash lights
- Paper towel/soap dispensers
- Touchless faucets, toilet flush units

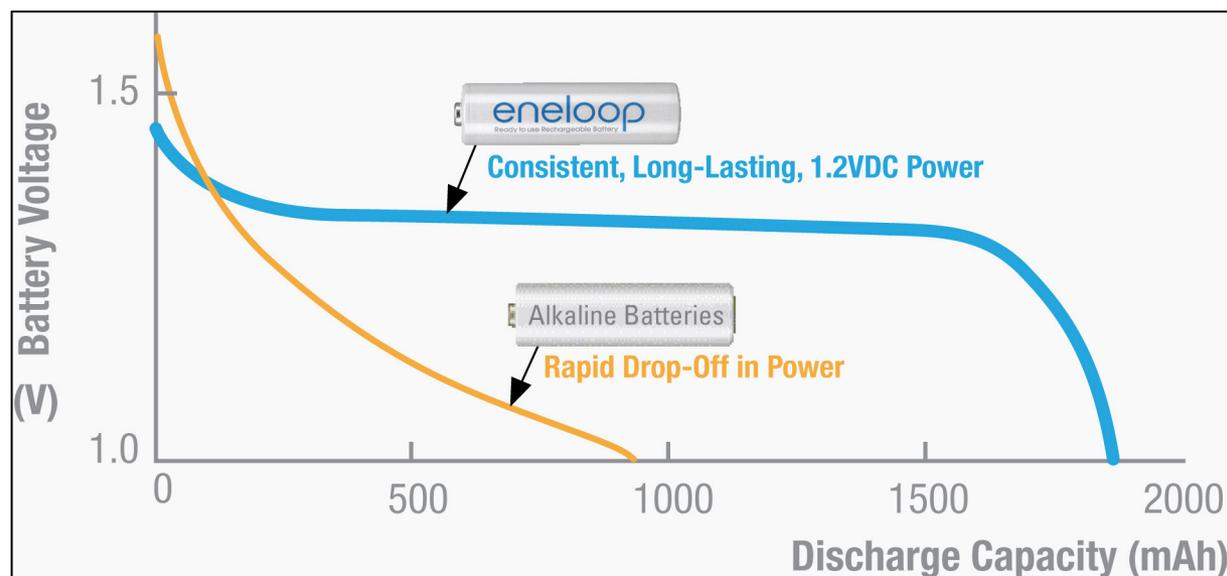


Which Equipment is Challenging for Rechargeables

- **Emergency equipment**
- **Medical devices**
- **Smoke detectors**



- **Some applications (e.g., clocks) may not be cost-effective if batteries are replaced infrequently**



Most emergency equipment gauges are designed for alkaline batteries' sloping voltage discharge curve (not for rechargeable batteries)

Polling Question #3

Would you be interested in pilot testing high-performance rechargeable batteries?

VOTE NOW



How to Performance Test Rechargeable Batteries

Assess current battery usage

- Battery types, #s used
- Cost for purchasing single-use batteries
- Frequency of battery replacement



Identify best applications for rechargeables

- Equipment with frequent battery replacement
- Pick brand(s) of rechargeable batteries to pilot test
- Submit your results: length of charge, cost savings

How to Performance Test Rechargeable Batteries

Date _____ **BATTERY USAGE AND WASTE MANAGEMENT SURVEY** Page _____ of _____

Agency/Office		Contact Name		Surveyor Name			
Phone Number		Contact Email Address		Surveyor Email Address:			
1. Type of Battery-Powered Equipment	Battery Size <input type="checkbox"/> AAA <input type="checkbox"/> AA <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> 9-volt <input type="checkbox"/> Button <input type="checkbox"/> Other _____	Number of Batteries Required/Unit	Purchase Cost per Battery	Type of Battery <input type="checkbox"/> Single use <input type="checkbox"/> Rechargeable <input type="checkbox"/> Hybrid	Battery Chemistry <input type="checkbox"/> Alkaline <input type="checkbox"/> Lithium <input type="checkbox"/> Lead acid <input type="checkbox"/> Nickel-cadmium <input type="checkbox"/> NiMH <input type="checkbox"/> Other	Primary Vendor(s) for this Type of Battery	How do you Usually Purchase this Type of Battery? <input type="checkbox"/> Warehouse <input type="checkbox"/> Go to store <input type="checkbox"/> Order by phone <input type="checkbox"/> Order online <input type="checkbox"/> Other
		Total Number of Equipment Units at Location	Brand(s) Commonly Used for this Equipment				
Battery Change Frequency	How is this battery handled when spent? <input type="checkbox"/> Recycle/City <input type="checkbox"/> Recycle/RBRC <input type="checkbox"/> Trash	Total Number of this Type of Battery Discarded (#) _____ per <input type="checkbox"/> Month <input type="checkbox"/> Year	Favorable to Rechargeables for this Equipment? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No opinion	Experience Using Rechargeable Batteries for this Application	Additional Information		

Chargers

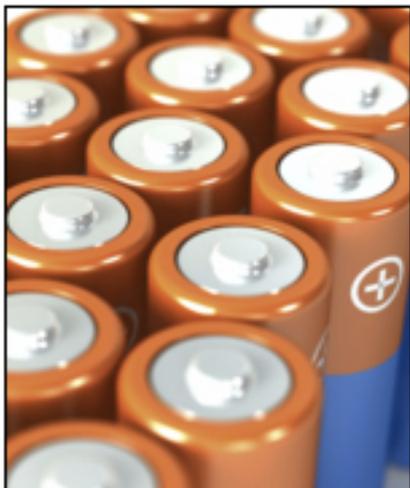
- **ENERGY STAR** no longer certifies chargers
- **Beware of charge-battery combo packs**
 - Batteries often not high-performance, less labeling
- **Choose battery chargers that:**
 - Work with all battery sizes needed
 - Hold the number of batteries needed
 - Are designed for your battery chemistry
 - Charge each battery independently, as needed
 - Have LED indicator lights
- **Consider in-vehicle chargers and equipment with built-in chargers**



Some Innovative Rechargeable Batteries



Thank You!



Alicia Culver

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www.responsiblepurchasing.org