

BATTERIES

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▶ Battery usage/ growth

▶ Battery Recycling

▶ Electrification of the SWA Fleet



INTRODUCTION

▶ LEAD Acid Batteries

- ▶ Currently over one Billion vehicles worldwide use lead based batteries.
- ▶ Use of lead based batteries is projected to decline in the coming years as the EV market grows.

BATTERY USAGE/GROWTH

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- ▶ Lead Acid Batteries
 - ▶ 99% of used lead batteries get recycled. 1.7 million tons annually
 - ▶ Lead Acid batteries can be recycling with no loss in performance
 - ▶ Most are recycled by service centers and dealers.
 - ▶ SWA handles about 40 tons per year .



BATTERY RECYCLING/LEAD ACID

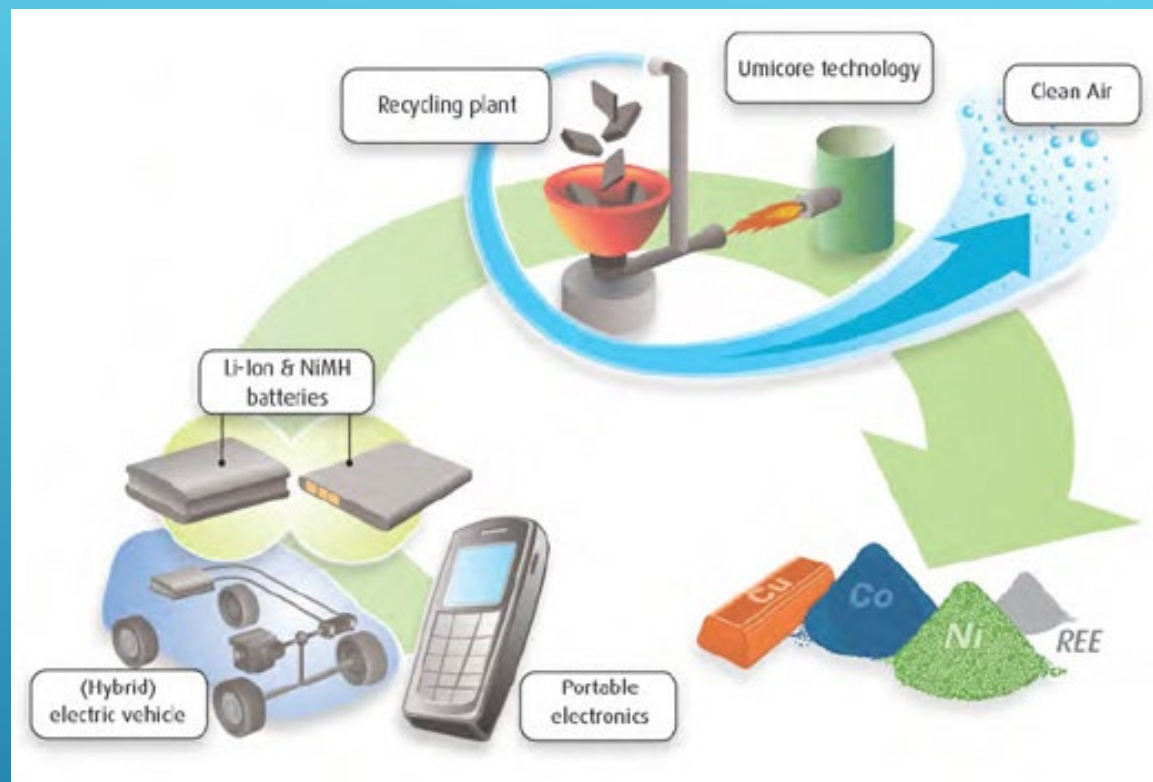
- ▶ Rechargeable device batteries are used in everything to include phones, computers, toys, tools and appliances
- ▶ The applications and uses for these types of batteries is growing at a very rapid pace

LITHIUM ION BATTERY GROWTH

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- ▶ Currently approx. 10 million Electric Vehicles worldwide
- ▶ Expected to grow to 145 million by 2030

ELECTRIC VEHICLE BATTERY GRWOTH



LITHIUM ION BATTERY RECYCLING

- ▶ Very low recycling Rate 12%-15%.
- ▶ Virtually no reuse.
- ▶ When damaged can cause fires in recycling facilities/MSW Facilities.
- ▶ SWA Recycles approximately 13,000 pounds of device batteries annually.
- ▶ Proper disposal is essential. They should be taken to an SWA Home Chemical Recycling Center or to any of the retailers that accept them.

BATTERY RECYCLING/DEVICE BATTERIES

EV Batteries

- ▶ Limited State/ Federal Regulations in place.
- ▶ OEM are primarily responsible for handling of EV Batteries.
- ▶ Useful life in excess of 100,000 miles.
- ▶ Reuse is first best option for old EV batteries.
- ▶ Two primary recycling methods are Pyrometallurgy & Hydrometallurgy.
- ▶ Recycling process is very difficult and energy intensive.
- ▶ Metals such as cobalt, Nickel and others can be recovered.
- ▶ Lithium not valuable enough to recover.

BATTERY RECYCLING/EV BATTERIES



ELECTRIFICATION OF SWA FLEET

- ▶ Constantly monitoring the state of the art in new technology for Road Tractors.
- ▶ Currently between 70-80 SWA Road Tractors on the road.
- ▶ Currently performing approx. 67,000 trips per year equal to 3 million miles.
- ▶ All maintenance is performed at the Jog road complex or West Delray T.S.
- ▶ SWA will be acquiring electric passenger vehicles in the near future.
- ▶ Development of future maintenance facilities will include infrastructure to charge and maintain Electric vehicles

ELECTRIFICATION OF SWA FLEET

- ▶ Major Manufactures are just starting to produce vehicles for commercial use.
- ▶ Capital costs currently approx. 2.5 x traditional diesel powered road tractors.
- ▶ Range currently limited to approximately 200 miles per charge, which is too short for our needs.
- ▶ Payload reduced by additional weight of batteries.
- ▶ Significant infrastructure investment needed to develop charging facilities but it is feasible, however charging at transfer station would be at retail electric rate.
- ▶ PTO (Power Take off) not available on any current models.

ELECTRIC ROAD TRACTORS



QUESTIONS?