

Electric Vehicle Battery Recycling Ecosystem

Japan, California and South Africa

Zakir Hussain Rather

Department of Energy Sciences and Engineering
Indian Institute of Technology Bombay
Mumbai



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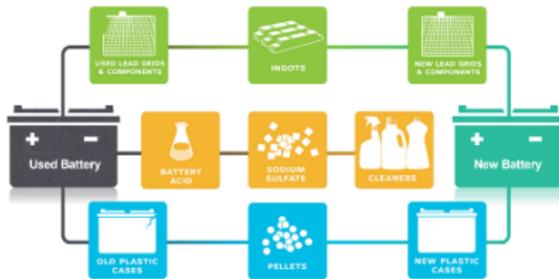
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- ✓ Policy initiatives
 - ✓ Li-Ion Battery collection mechanism
 - ✓ Lead Acid Battery collection
 - ✓ Stakeholders' views

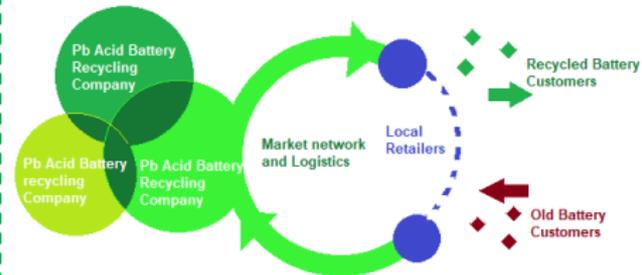
Introduction

Introduction

Recycling Process



EOL and Market



Lead Acid Battery [20]



Li-Ion Battery [19]

Japan

Japan : Battery Recycling Policy Initiatives

- ❑ A law for the promotion of efficient utilization of resource : 2001
- ❑ The promotion of reuse and recycling of used small electronic equipment : 2013
- ❑ **Japanese government did not lay any hard rules** for people to follow a recycling process
- ❑ JBRC : Producer responsibility organization : 2001
 - Responsible for collection of all nonindustrial battery technologies including Li-Batteries (except Lead Acid Batteries)
- ❑ Lead Acid Battery Recycling Association : 2014

Table: Role of Stake holders in collection and Recycling

| Obligations | | Stake holders | |
|--|---------------------------------------|-----------------------|---|
| | | Battery Manufacturers | Manufacturers of products using batteries |
| Collection of waste rechargeable batteries | | ✓ | ✓ |
| Recycling of waste rechargeable batteries | Specified resources-recycled products | ✓ | |
| Provision of information | | ✓ | ✓ |
| Cooperation with municipal govt for collection | | ✓ | |
| Labeling of rechargeable batteries | Specified labeled products | ✓ | |
| Equipment design that makes it easy to remove rechargeable batteries | Specified reuse promoted products | | ✓ |

Japan : Battery Recycling established by JBRC [1][2]

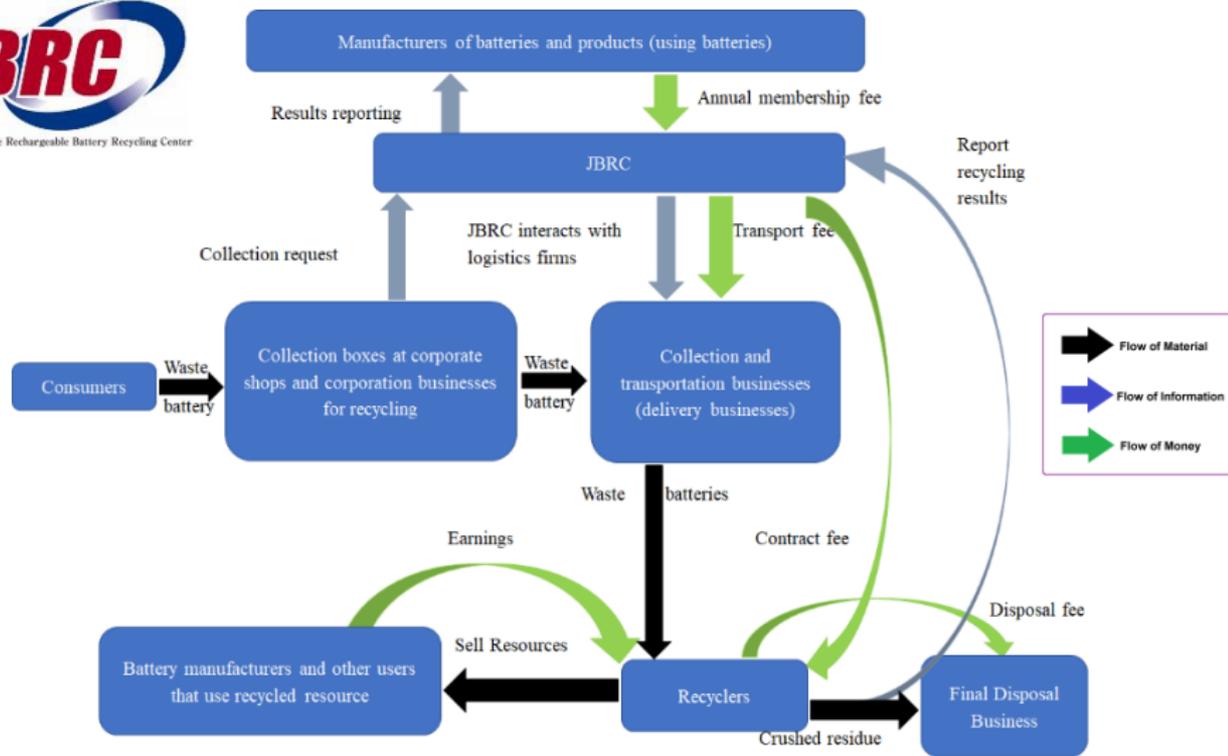


Fig: Japan Portable Rechargeable Battery Recycling Center (JBRC) route

Japan : Lead Acid Battery Collection [3]

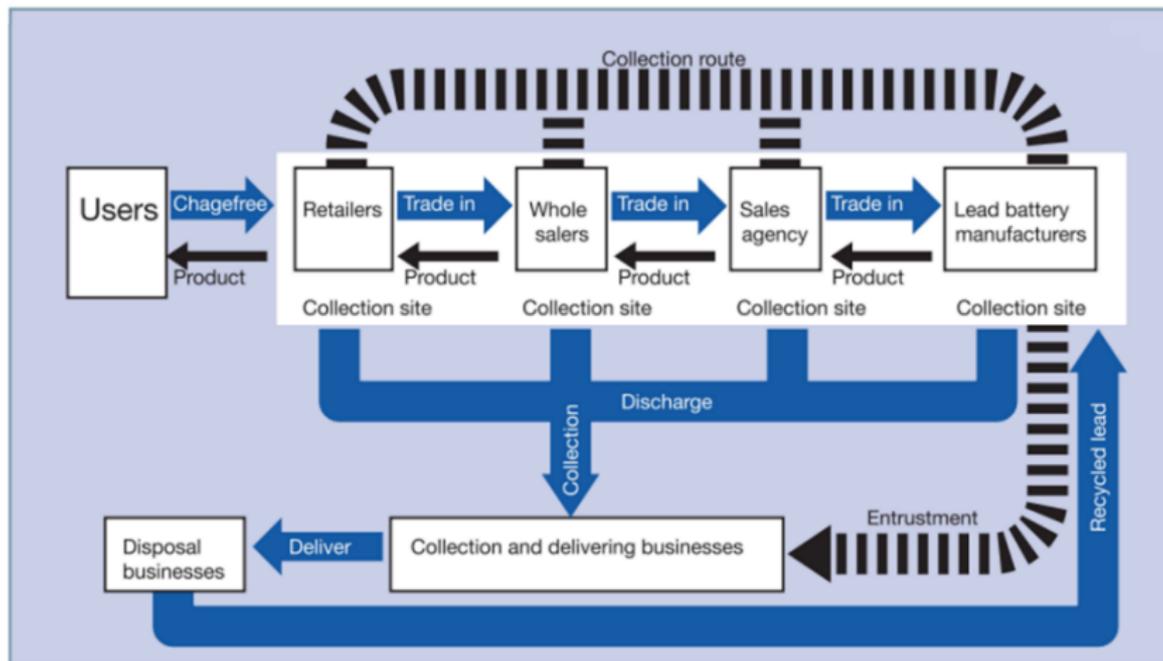


Fig: Japan's Lead Acid Battery (LAB) ecosystem

Japan : Recycling by Major Players



Fig: Recycling by Honda [5]

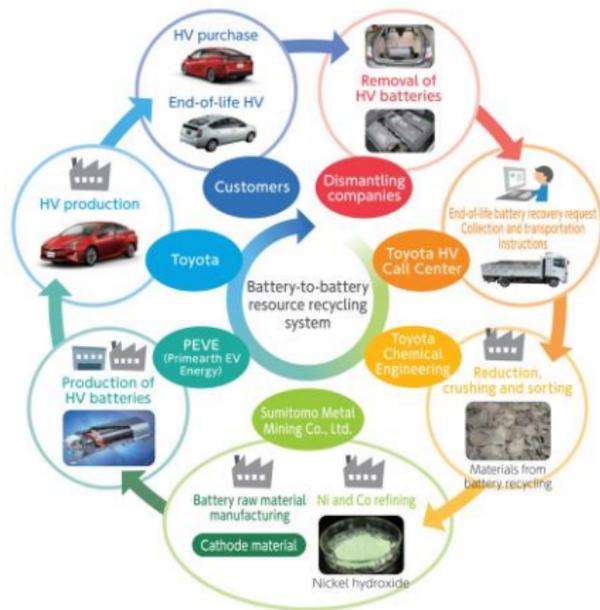


Fig: Recycling by Toyota [6]

Japan : Recycling by Major Players (Cont.)

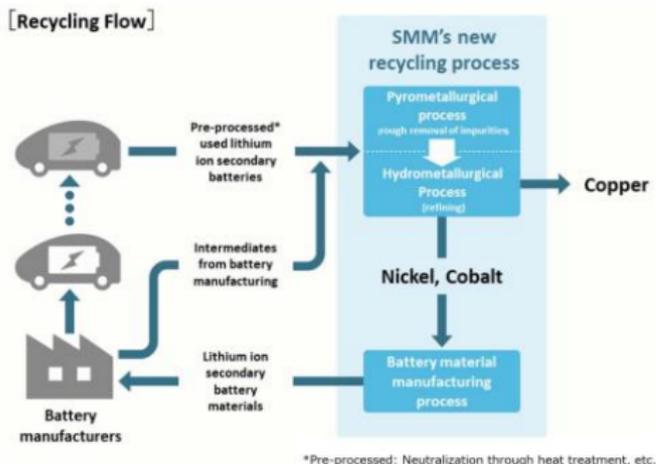


Fig: Recycling by Sumimoto Corp. [7]



Fig: Recycling by Nissan [8]

California

California : Battery Recycling Policy Initiatives

- ❑ California has specific Li-Ion Battery (LIB) Policy published on 16th Mar 2022 [4]
- ❑ As per Lead Acid Battery Rec. Act 2016, there exists specific Lead Acid Battery (LAB) Policy
- ❑ There is a common battery recycling law in to picture as per Rechargeable battery Rec. Act 2006 [9]
- ❑ There is no cost to be bored by customer at time of return at the time of return of the batteries
- ❑ Battery cleanup fund (govt fund) must be paid by both Customers & Manufacturers
- ❑ There exist Extended Producer's Responsibility (EPR) Guidelines [10]
- ❑ Market value chain exists for both Lead Acid and Li-Ion Batteries. Lead Acid battery has well established market.

California : Li-Ion battery ecosystem

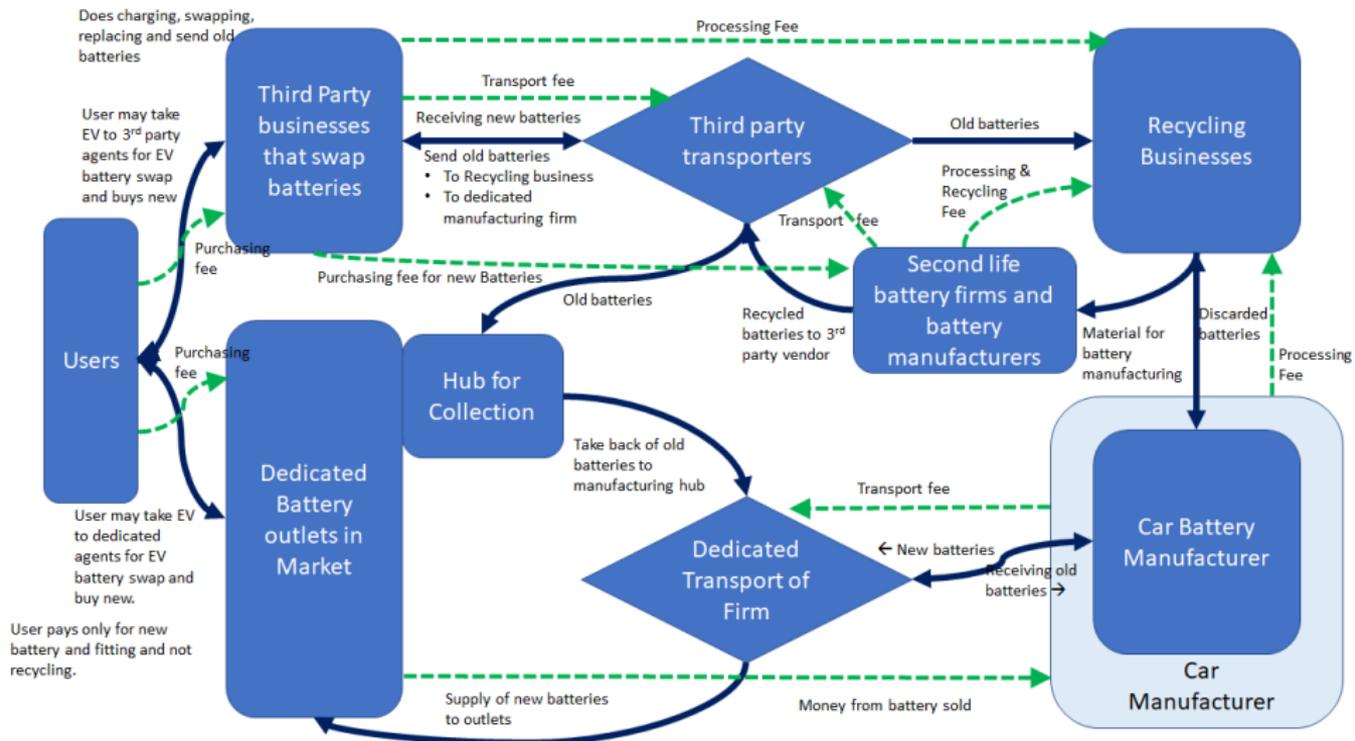


Fig: EV Battery takeback ecosystem

California : Lead acid battery recycling

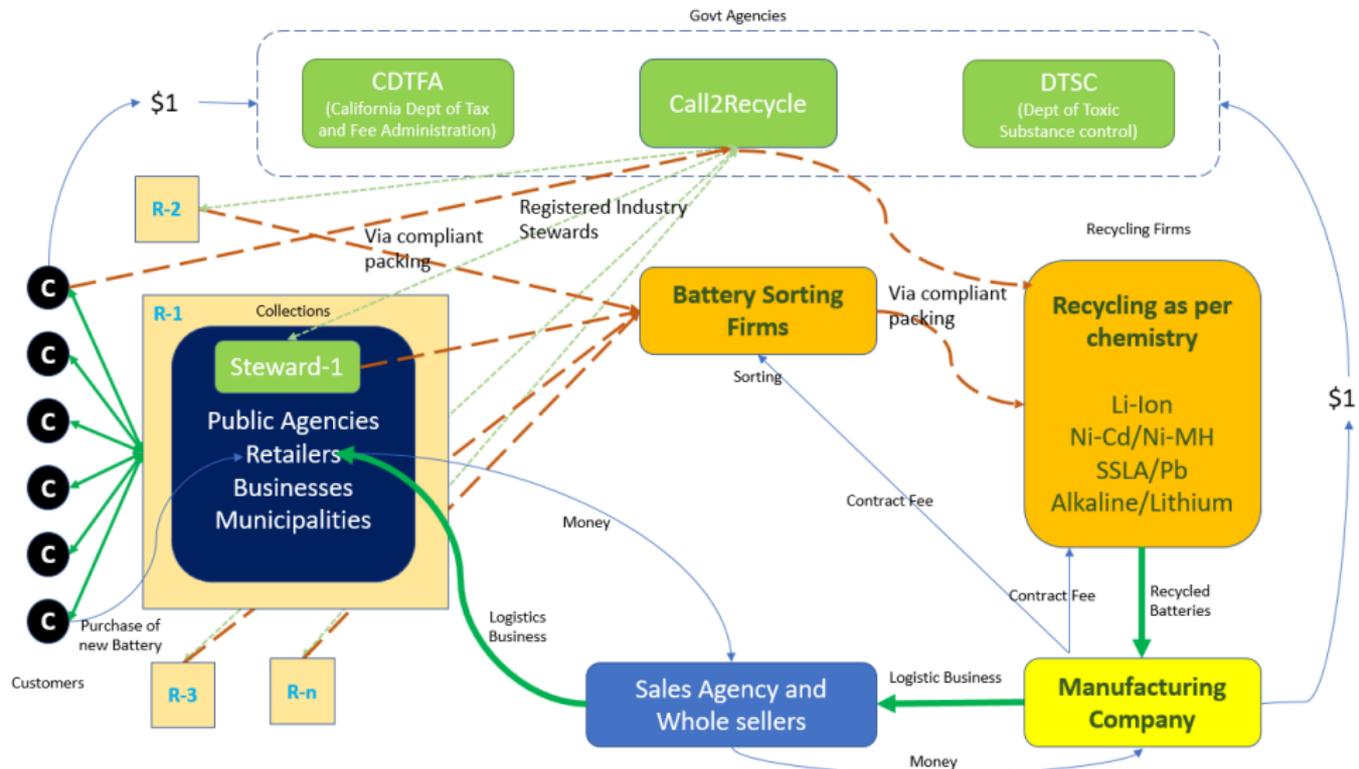


Fig: Lead Acid Battery takeback ecosystem

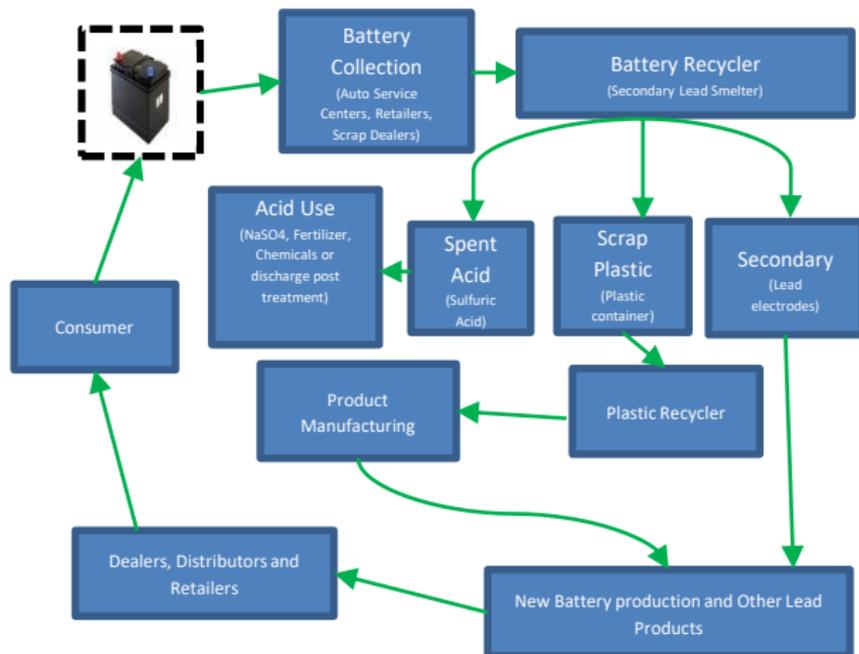
South Africa

South Africa : Policy Initiatives

- ❑ Atmospheric Pollution Prevention Act 1965 [12]
- ❑ National Environmental management: Waste Act 59 of 2008 [13]
- ❑ EPR Guidelines
- ❑ Lithium Battery Recycling Policy initiatives
 - Lithium-Ion battery ecosystem will take time to flourish in SA.
 - Facility for recycling is under construction near mining vicinities
 - Battery levy charge on petrol and diesel to promote EVs
- ❑ Three sets of developed National Norms and Standards which may be relevant to the management of Spent Lead Acid Batteries:
 - Standards for Scrapping or Recovery of Motor Vehicles (GN No. 925 of 29 November 2013) [14]
 - Norms and Standards for the Storage of Waste (GN No. 926 of 29 November 2013) [15]
 - Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN No. 331 of 02 May 2014) [16]

South Africa : Lead Acid Battery Recycling scheme

- ❑ On exchange of old LAB customer gets Scrap discount. (Rand 50 per battery in 2015)
- ❑ Customer can trade their batteries
- ❑ If new battery is bought with out replacement Rand 50 is charged as levy
- ❑ Levy not applicable to vehicle manufacturing plants as LAB are termd as equipment of vehicles



South Africa : Lead Acid Battery Recycling Scheme

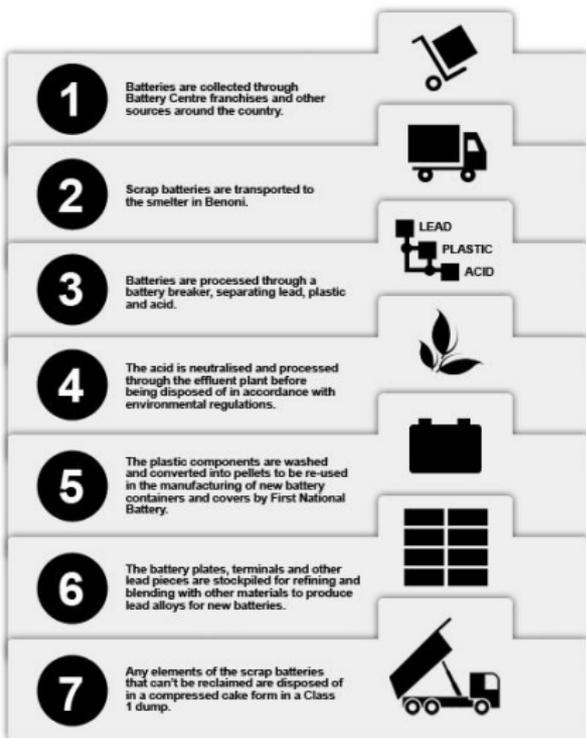


Fig: First National Battery Recycling [17]

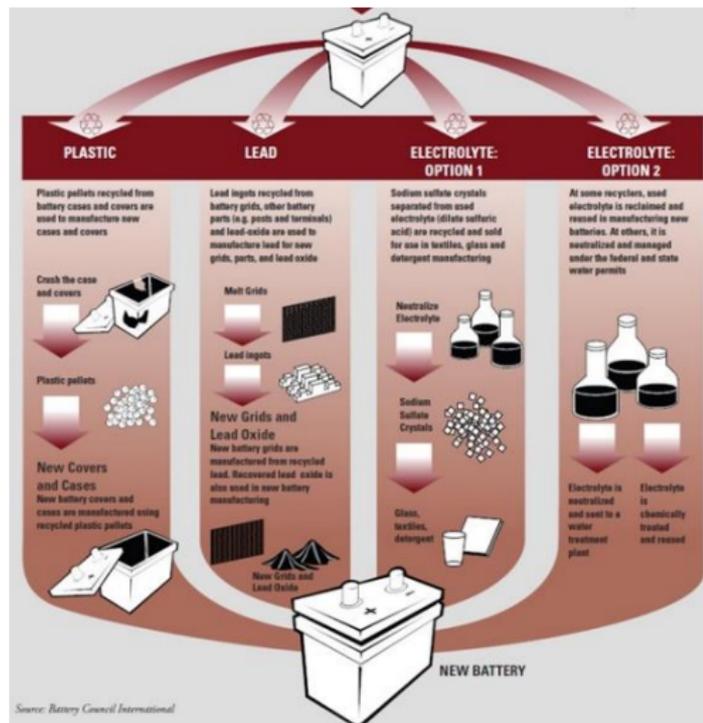


Fig: BHG Battery Recycling [18]

Conclusion

Conclusion

LIBs and LABs have set their standard recycling infrastructure. Lithium-ion battery recycling framework is comparatively new.

❑ Japan

- Japan has the act of promotion and effective utilization of resources (1991), which motivates firms for voluntary collection and recycling scheme into picture.
- To handle small portable batteries of all the types, JBRC has set a mechanism with specified supply chain.
- As per Japan's capacity and changing economies, firms get into collaboration to look after the value chain and recycling technological adjustments from time to time to time.

❑ California

- Presently California has the latest policy draft in Li-Ion Battery recycling.
- They have referred mainly European Union Battery recycling guideline as base framework and have addressed their market challenges.
- Policy draft leaves scope for real time implementation for data accumulation and collaborative research in this area.

❑ South Africa

- Growth of EV market is evident and hence SA is parallelly progressing on policy development for LIBs
- Well established Lead Acid Battery policy framework exists that implies flourished business

Thank You!

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