

Roadmap and Implementation Plan for the Management of EOL EVs in Canada

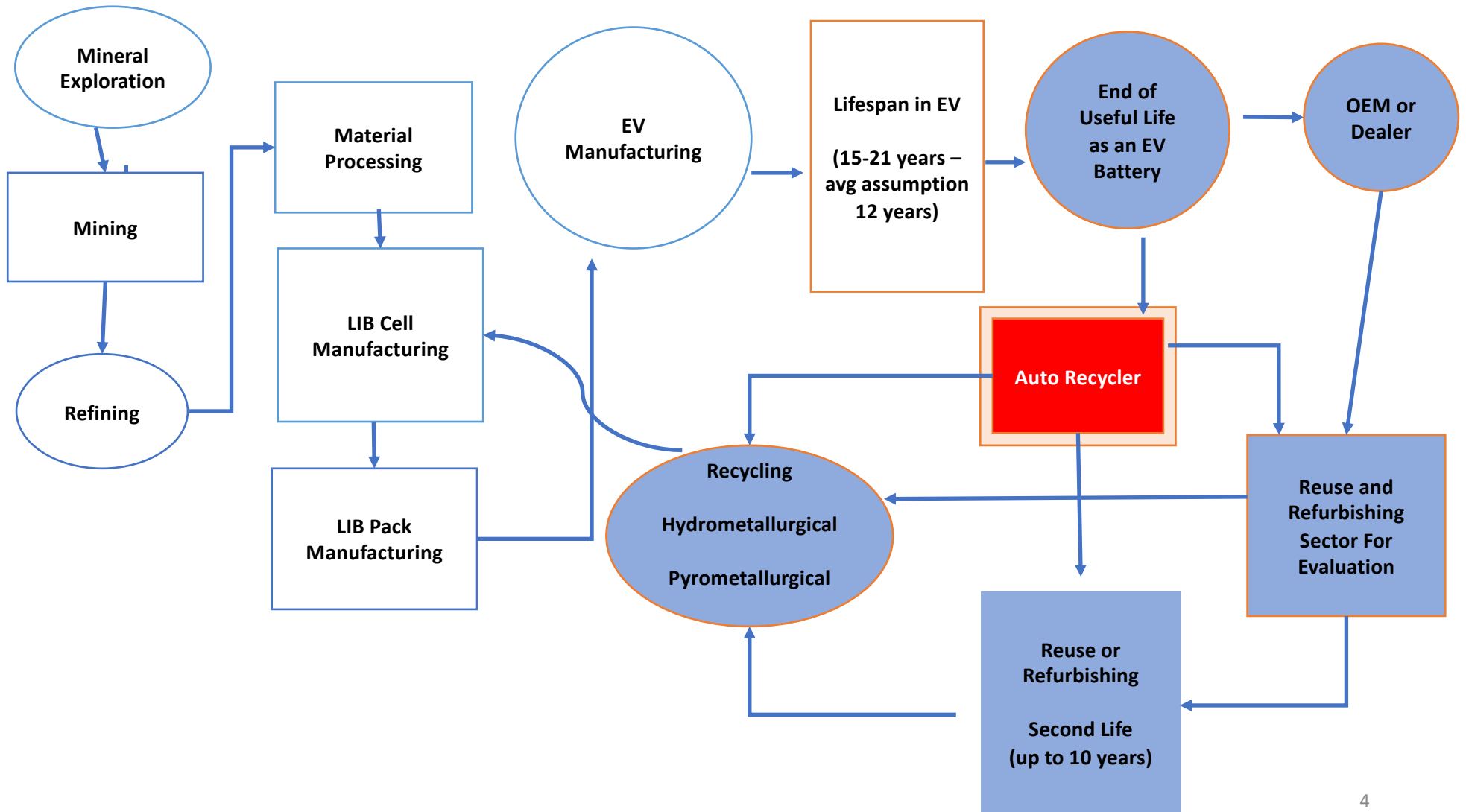
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LIB Circular Economy Model





End-of-Life (EOL) EV Battery Issues

- ~1600 ICE auto dismantlers
- ~1000 scrap dealers who touch ICE vehicles
- Auto dismantlers process ELVs for parts and materials
- Scrap dealers process ELVs for metal
- Maybe 350 dismantlers and 25 scrap dealers with some EV experience
- Removing a lead acid battery or operating fuels is relatively easy. You can properly depollute a vehicle in 30-60 minutes
- Removing an EV battery is more time consuming, much more dangerous, and there is very little info or training available
- #1 sellers for ICE dismantlers is the engine and transmission
- #1 seller for EV dismantlers is not the battery, and early data shows it may never be the drivetrain

End-of-Life (EOL) EV Battery Issues

- EVs are forecasted to be at 50% of the on-road Canadian fleet by 2038, at present levels of uptake
- EV batteries reaching end of 1st Life are expected to surge after 2030
- EV batteries are lasting much longer than originally anticipated – 10 to 15 years vs the original guesses of 6 to 8 years. They will generally outlive the EV itself.
- An EV battery can be used in 1st Life if it retains 80% of its original power
- Most OEMs developing three regional supply chains for EV batteries: North America, Europe and Asia
- Shortage of materials anticipated with high demand for EV batteries – 300 new mines needed to meet global demand for EV battery materials

End-of-Life (EOL) EV Battery Issues

- Recycling expected to meet 12% of material demands by 2030. It won't solve supply problem but will help
- Most recycling supply expected to be production scrap until 2030
- 2nd Life in energy storage or other applications extends useful life – reuse business is growing
- 2nd Life is good for circularity but delays supply to recycling
- EV batteries lasting longer than anticipated creates some very unique policy challenges. They aren't waste and seem to be a sought after asset.

EV Battery Unknowns & Questions

- Lifetime of a first use battery?
 - Effect of chemistry (NMC, NCA, LFP, ++)
- Value of a battery at EOL of the vehicle?
 - Reuse vs 2nd Life vs Recycling
- Second life options?
- When will markets develop?
- Who owns the battery at EOL?
- Who is responsible if an EV battery has multiple lives?
- How to track EV batteries through multiple lives?
- Collection and logistics infrastructure and cost?

Regulatory Environment

- China
- European Battery Directive (and new ELV Directive)
- USA infrastructure funding
- California study of EOL lithium batteries
- Canadian Federal policies, departments, funding...
 - Critical metals, mining, battery production, EV assembly, incentives and mandates, charging, electronics, on-road service, EOL
- Quebec EPR battery rethink
- BC EPR battery consultations underway
 - I think they understand this is not a paper or paint or tires product, and that EPR doesn't always support the Circular Economy

Companies
involved in the EV
battery Circular
Economy today
(in or near Canada)

- Li-Cycle
- Lithion
- ElectroVaya
- American Manganese
- Johnson Matthey
- Nano One
- Novinix
- RetrieV/Cirba Solutions
- Ascend Elements
- Ecobat
- Umicore
- LG Energy
- Glencore
- Vale
- GM
- Ford
- Stellantis
- Lion Electric
- NovaBus (Volvo)
- Tesla
- Sayona Mining
- Electra Battery Materials
- All EV
- Spiers New Technologies/Cox
- Redwood Materials
- Moment Energy
- EVB360
- ReJoule
- RePowered Batteries

ARC has produced a Roadmap and Implementation Plan for the Management of EOL EVs in Canada for Natural Resources Canada

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Questions

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