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Climate-Smart Mining

ESMAP
Energy Sector Management Assistance Program

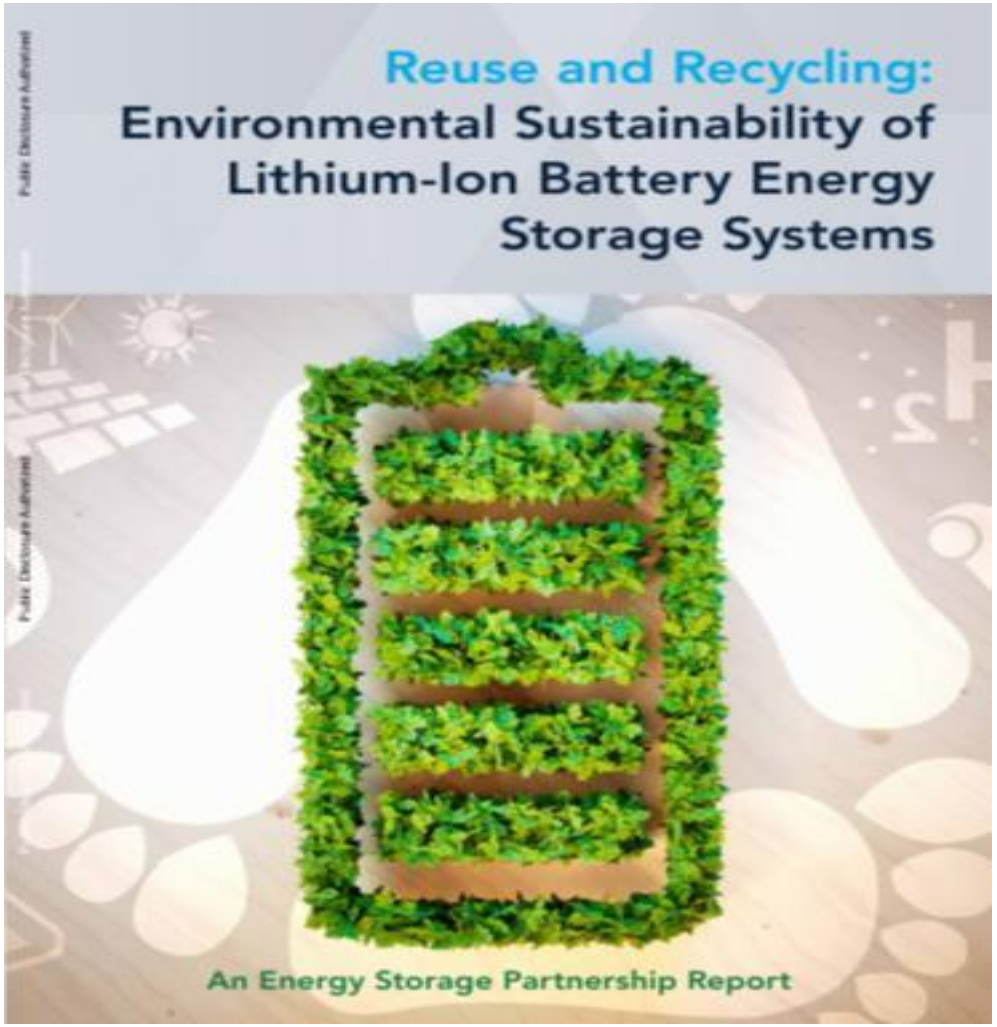
REUSE AND RECYCLING:
ENVIRONMENTAL SUSTAINABILITY OF LITHIUM-ION BATTERY ENERGY STORAGE SYSTEMS (LIBESS)

ESP Learning Series February 1, 2021

WG 7 OBJECTIVE

THE POTENTIAL ROLE OF DEVELOPING COUNTRIES IN A ‘CIRCULAR ECONOMY’ APPROACH FOR LI-ION BATTERIES :

- KEY TO ACHIEVING 1.5C CLIMATE GOAL
- CRITICAL IN MANAGING LOCAL ENVIRONMENTAL IMPACTS
- RECYCLING AND RENEWABLES: PLAYING A ROLE IN THE POST COVID GLOBAL GREEN ECONOMY



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WORKING GROUP 7 PARTNERS

Thanks for all the substantive input and advice of WG 7 members:

- Faraday Institution, the National Renewable Energy Laboratory, the National Physical Laboratory, the Chinese Industrial Association of Power Producers, the Korea Battery Industry Association, the Indian Energy Storage Alliance, the Global Battery Alliance, the Belgian Energy Research Alliance, the UNEP DTU Partnership, and the World Bank Group.

- A work led by the Climate Smart Mining Initiative within the framework of the Energy Storage Partnership.

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Climate-**Smart** Mining

CSM supports the **sustainable extraction, processing** and **recycling of minerals and metals** needed to secure supply for low-carbon technologies by *minimizing* the climate and material footprints of these technologies throughout their value chain.

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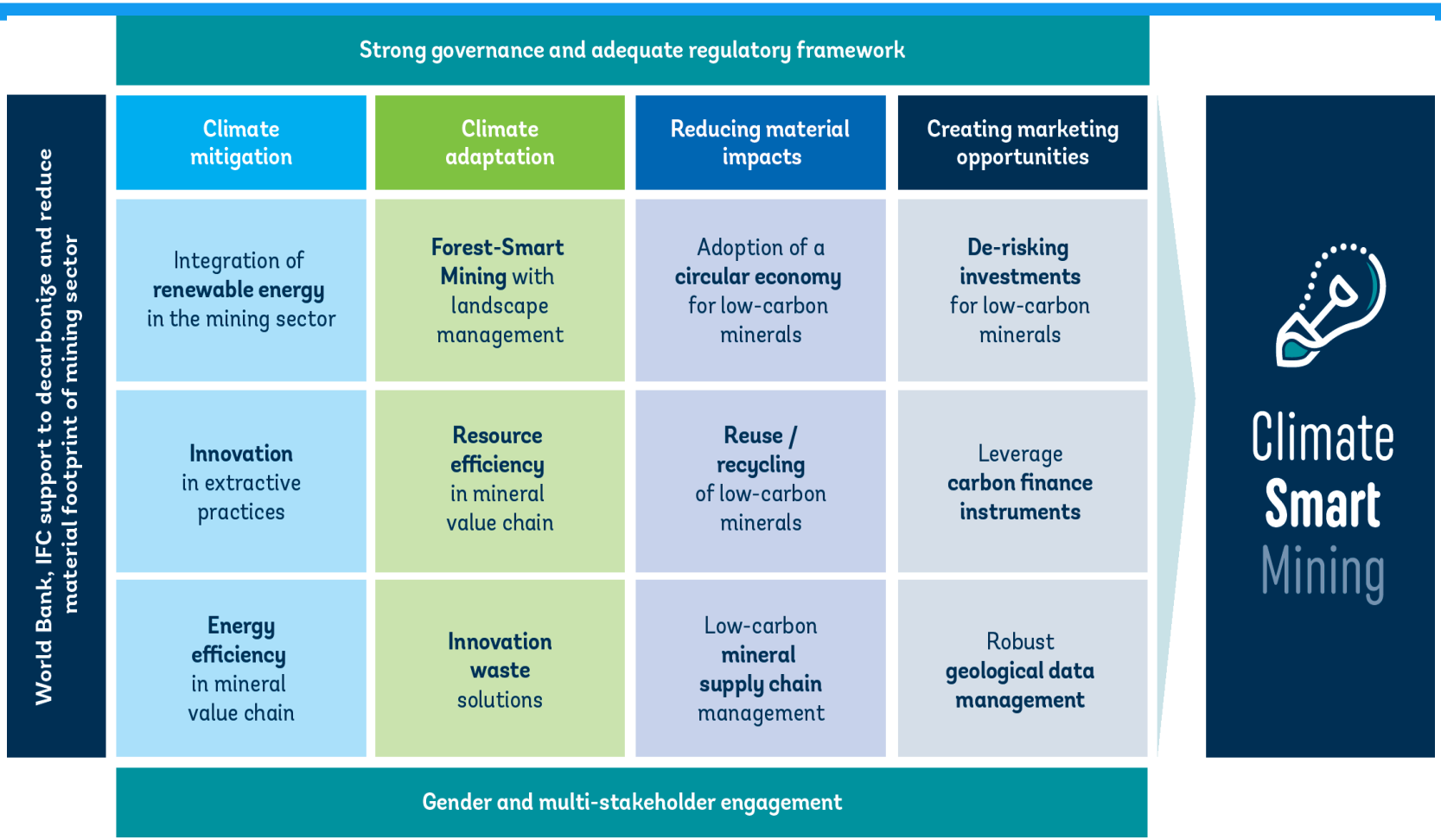
BUILDING BLOCKS OF CLIMATE SMART MINING



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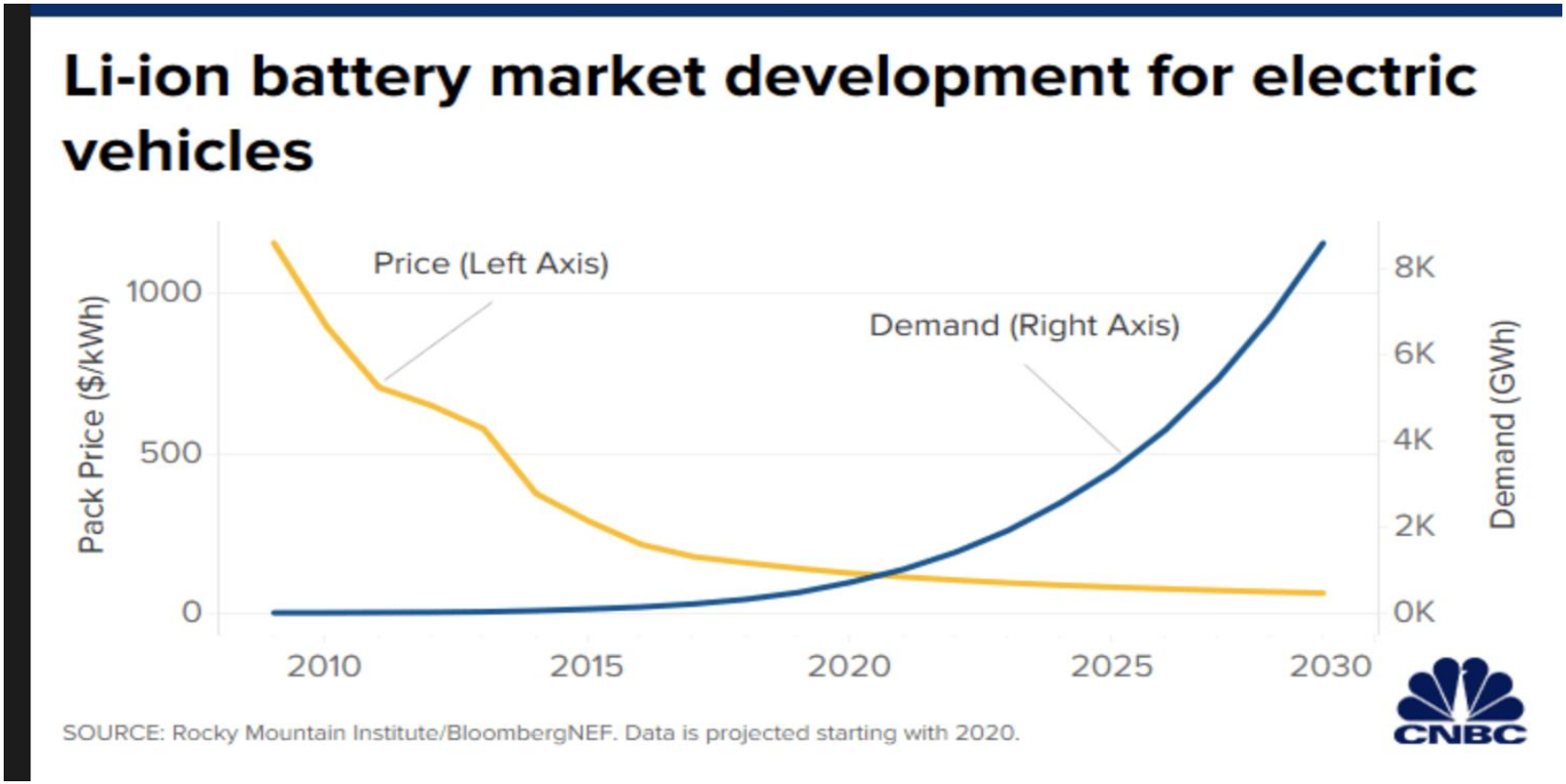
ON THE VERGE OF A LI-ION BATTERY BULL MARKET…..
WHAT TO DO AT THE END OF ITS EV LIFE?



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A CIRCULAR ECONOMY APPROACH TO EV BATTERIES: RECYCLING

- Focuses on retrieval of minerals/metals for use in a wide range of contexts (power, IT, small tools…) or as part of a country's critical minerals/metals strategic supply.
- Current practices – pyrometallurgy and hydrometallurgy – both have environmental complications. Research is underway to pursue options : for example, "direct recycling" out of NREL.
- Critical to ensure a new 'ewaste' regime is developed for LiBESS in developing countries: from the 'dumping ground' of developed countries to a sustainable platform for the EV battery recycling industry

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A CIRCULAR ECONOMY APPROACH TO EV BATTERIES: REUSE/REPURPOSING

- Focuses on the ‘repackaging’ of EV batteries from their 1st life as an EV power provider to a stationary energy storage system provider
- If properly implemented, has the potential to provide more economic and environmentally benign options, than new batteries, to meet clean energy goals.
- Challenges with developing protocols as there are currently at least six different li-ion batteries in use.

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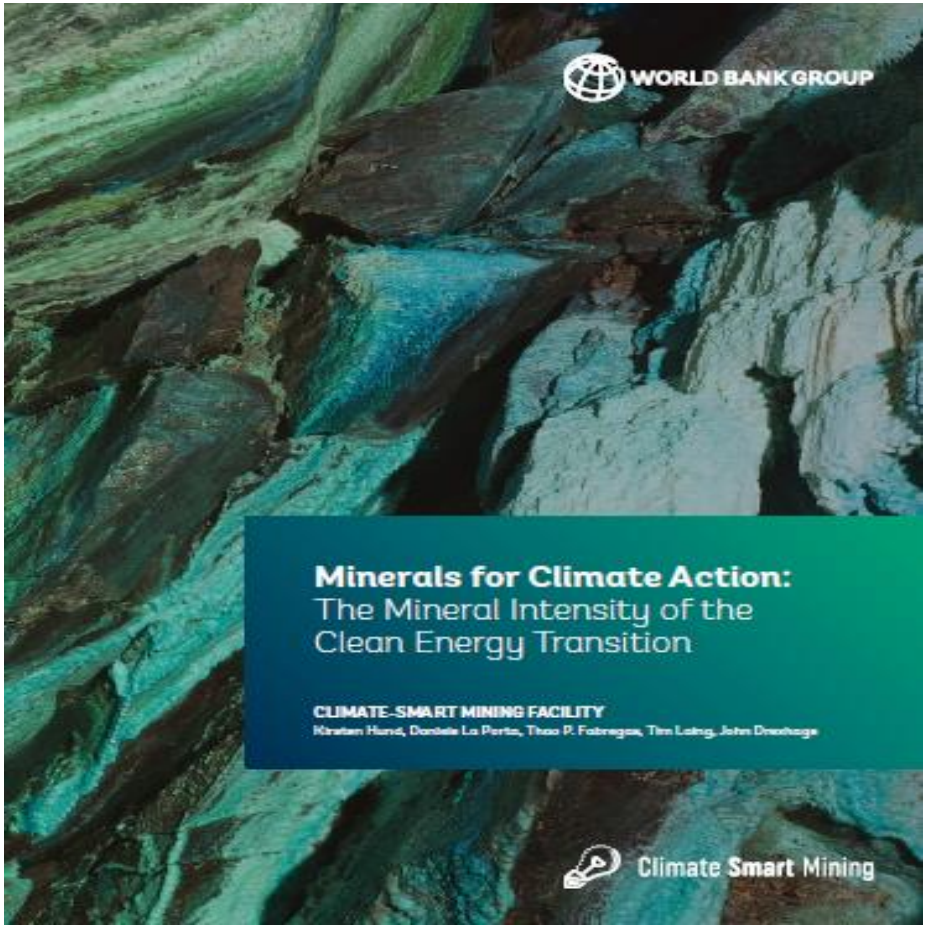
A CIRCULAR ECONOMY APPROACH TO EV BATTERIES: IMPACT ON EXTRACTIVE PRACTICES

- Recent CSM Report ”Minerals for Climate Action” concludes that while a robust circular economy approach should help to mitigate the demand for primary minerals and metals, **the primary mining of critical ‘climate action’ minerals will continue to be necessary to meet the growing demand of clean energy technologies**.



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SOME OBSERVATIONS ON CURRENT STATUS

Opportunities:

- Strategic value of ‘climate action/ minerals/metals
- Economically and environmentally beneficial if repurposed well to provide power back up and support
- Current profile of developing countries (with notable exception of China) is at a very nascent stage

Challenges:

- Sustainable, climate friendly refinement
- Design – coordinated/standards/regulations
- Collection and processing practices
- Capacity – human and institutional
- Liability

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CONCLUSIONS OF REPORT:

Research:

- How best to integrate/balance competing considerations (safety, recycling capacity, economy of design…) in future battery design;
- Availability of appropriate materials to recycle/repurpose;
- Expanding potential of repurposed ‘battery packs’ beyond micro grids and home support; and,
- Developing comprehensive protocols for a ‘circular economy’ approach to batteries.

Policy Recommendations:

- Awareness raising: consumers, producers and recyclers;
- Incentives/penalties based approaches towards full recycling;
- Effective business models;
- Framework for training and upskilling; and,
- International, cooperative regime for future regs/standards and liability provisions.

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GOING FORWARD

- Collaboration with GBA and Faraday (and others) in developing a roadmap for deployment of second life EV batteries and battery recycling/re purposing capacity in Africa

- Other priorities
  - Pilot projects:
    - Africa
    - India
    - Others?
  - Collection and processing
  - Making the business case
  - Regime building – standards, regulations and liability provisions
  - Protocols of a circular economy approach

- **The dialogue has only just begun**…collaboration amongst three critical constituencies: energy, extractives and climate.

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THANK YOU!

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