



Research, Innovation and Circular Economy Solutions

Akanksha Tyagi

Circular Economy Training Workshop for Youth
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Impacting sustainable development at scale with data, integrated analysis, and strategic outreach

TRANSFORMATIONS

Low-carbon Economy

Energy Transitions

Power Markets

Industrial Sustainability

Sustainable Livelihoods

QUALITY OF LIFE

Clean Air

Sustainable Water

Sustainable Food Systems

Sustainable Cooling

Sustainable Mobility

ENABLERS

Sustainable Finance

Technology Futures

Circular Economy

Climate Resilience

International Cooperation

200+

Multidisciplinary team

320+

Peer-reviewed publications

160+

Instances of increased data transparency

460+

Roundtables & conferences

22

Indian states engaged

110+

Bilateral & multilateral initiatives promoted

SPECIAL INITIATIVES

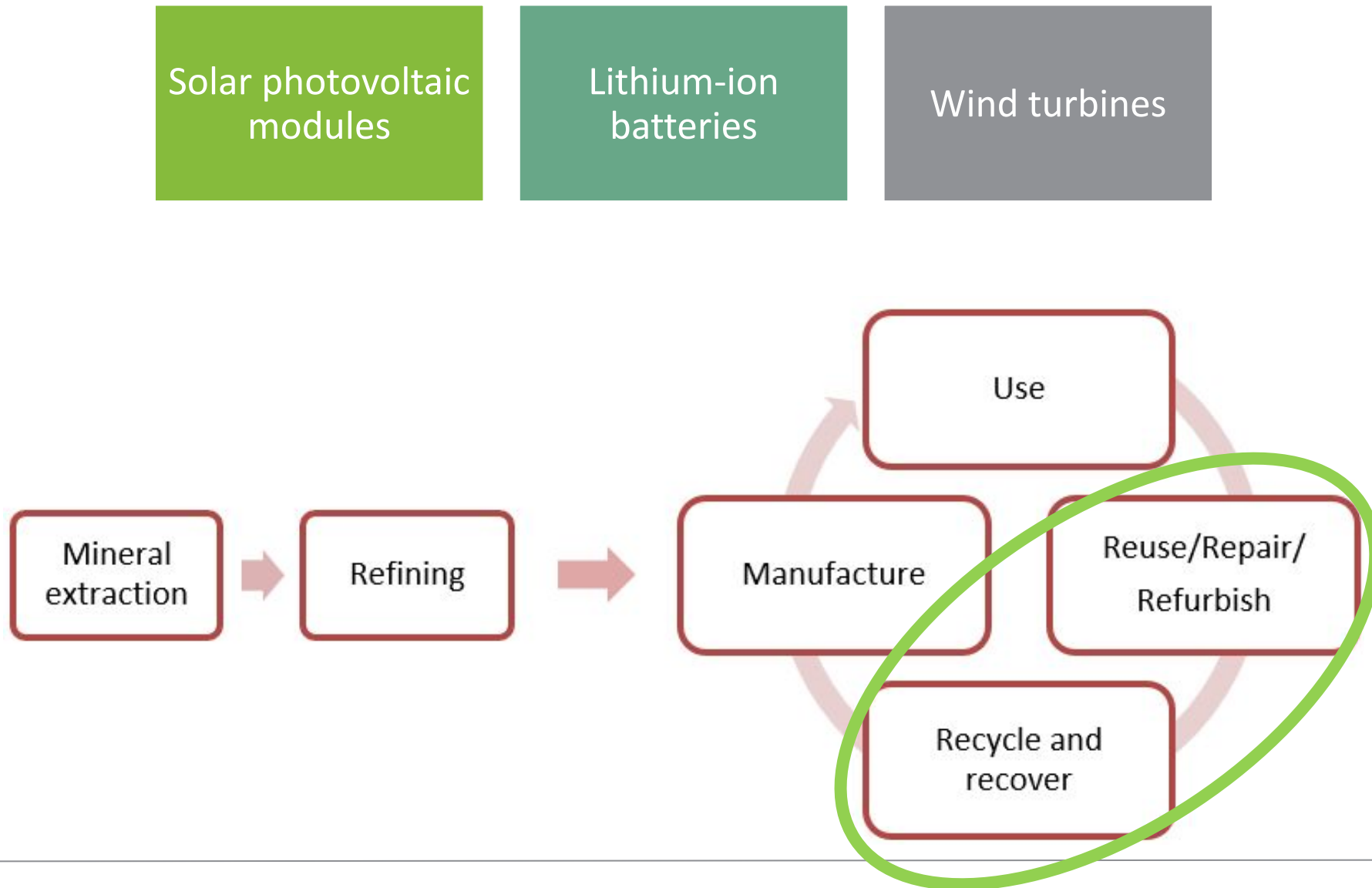
CEEW Centre for Energy Finance

Powering Livelihoods

Emerging Economies

UP State Office

Circular economy of clean energy technologies



- End-of-life: product's discard post its intended use (first/second/third life)
 - Products or components sent to reuse
 - Recovery of materials via recycling

- **Poor End-of-life Recycling Input Rate**
share of secondary sources in total supply
- Battery reuse and recycling alone can **reduce the primary supply requirements of metals** such as cobalt, nickel, and lithium by up to 12, 7, and 5 per cent, respectively in 2040 from the 2020 levels

- Deeply influences the environmental impact over its life cycle
 - choice and use of raw materials, manufacturing, transportation, distribution, installation and maintenance, use and end-of-life treatment
 - Current technologies fair poor
- **High mineral intensity**
 - 200 to 250 kg/vehicle for lithium-ion batteries in EVs, 6800 kg/MW for solar PV, and 10,000 kg/MW for onshore wind
- **lack universal standards** for the composition, size, and other specifications
 - constraints the repair, refurbishing and recycling of the used products

- **Reducing the content of precious and toxic materials**
 - shifting away from such materials by developing lead-free solders for solar PV modules
 - replacing permanent magnets in wind turbines with high temperature superconductors
- **metrics to track and evaluate circularity**
 - European Union's Eco-design directive

- Inherently **not a circular** process
 - generates considerable waste such as waste rock, overburden, emissions, tailings, water treatment sludge, and mine water
- **lack the visibility and transparency** to identify the opportunities for circular economy strategies

Circular economy **strategies adopted** by mining industry include

Reusing the mining waste

- iron-ore tailings to make sand

Developing new mining techniques

- Direct lithium extraction versus brine water evaporation

Using renewable energy for refining

- Steel production using green hydrogen

Thank you

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