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Supporting a Just Energy Transition: an Environmental Life Cycle Perspective

Community engagement: 9 March 2022

Project context and aims

Project Context

- Much work underway on the Just Transition, including in the energy sector
- Focus largely been on socio-economic impacts, including employment
- Less understanding of environmental impacts of new technologies

Aims of the Project

- Explore three frameworks which can help understand and reduce the impacts of renewable technologies:
  - Life Cycle Assessment
  - Circular Economy
  - Resource Efficiency

- Provide an **in-depth** understanding of the **life cycle impacts** of renewable energy technologies and consequently implications for **employees** and **communities**.
- Offer suggestions of policy and other actions that can be taken to reduce the impacts.

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Project Sponsors and Partners

Swedish Society for Nature Conservation

GROUNDWORK
environmental justice action

екодія
ecoaction.org.ua

CFA
Centre for Financial Accountability

earthlife AFRICA

Toxics Link
for a toxics-free world

MOVIMENTO DOS ATINGIDOS POR BARRAGENS
Brasil

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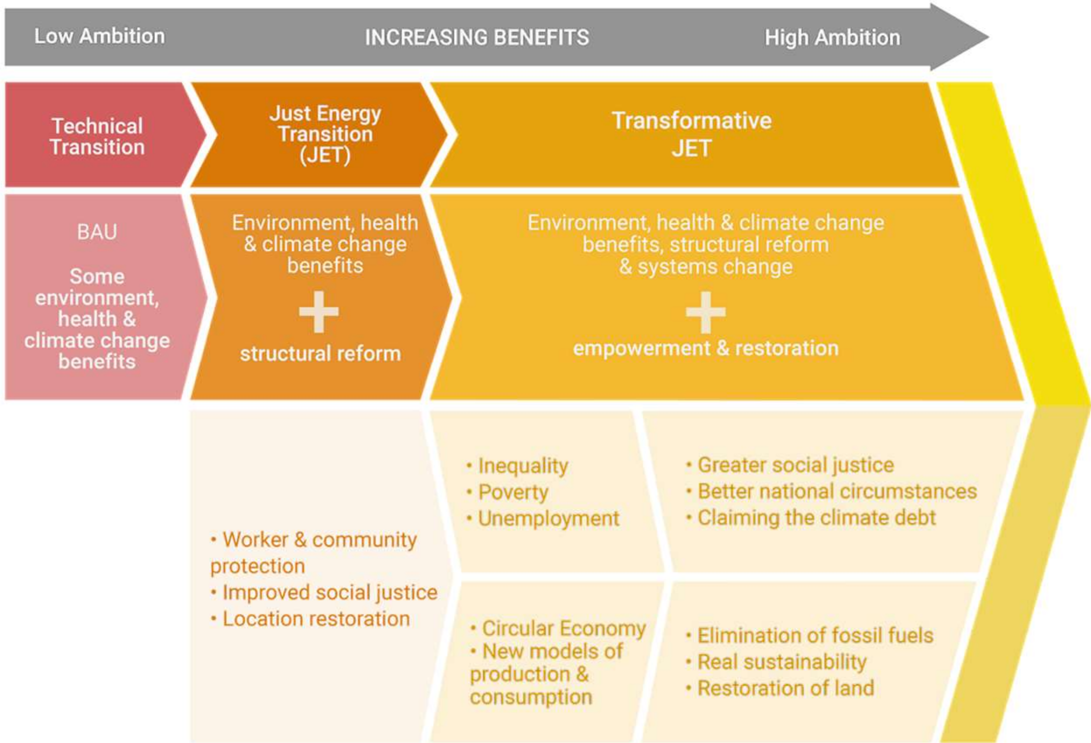
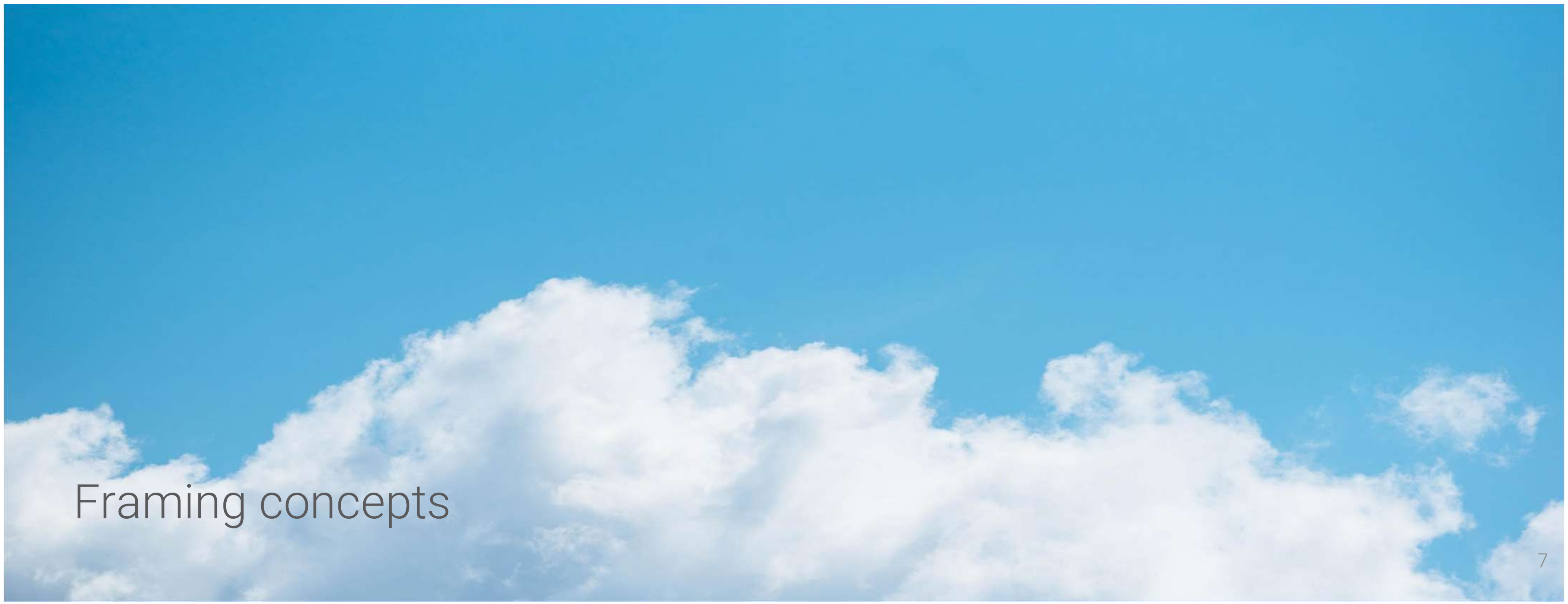
What is the Just Transition?



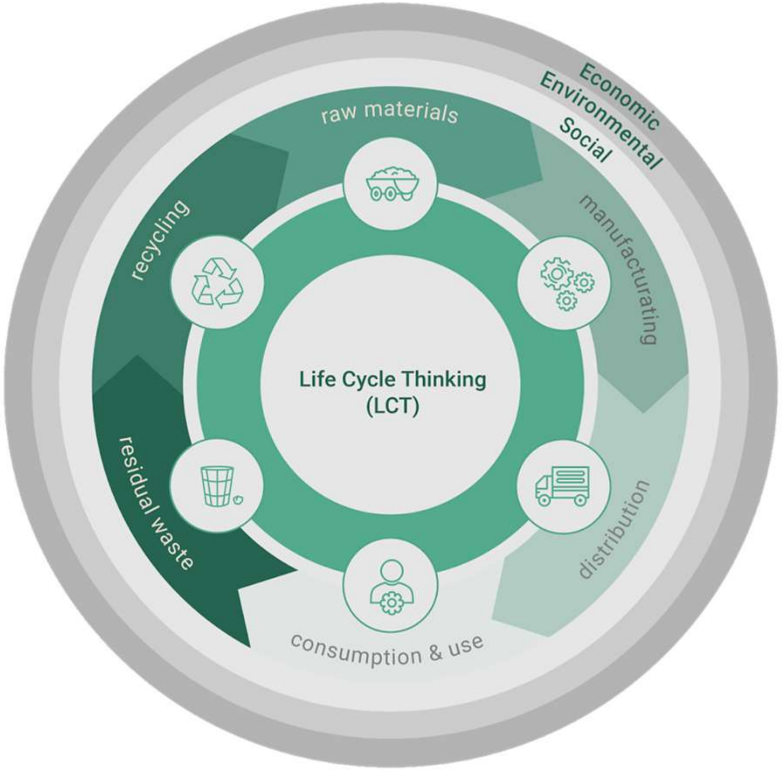
Ambition for a transformative JET is an energy system powered by renewable sources that caters for well-being of all people, whilst remaining within limits of ecosystems.

Harness opportunities to create environmentally and socially sustainable societies.



Framing concepts

Framing Concepts: Life Cycle Thinking



Life cycle thinking (LCT) goes beyond traditional focus on production and manufacturing to include environmental, social and economic impacts of a product over its entire life cycle.

Goal of LCT is to identify ways to reduce a product's resource use and emissions to the environment.

Implications for employees and communities throughout product life cycles

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Framing Concepts: Resource Efficiency

Resource efficiency encompasses using the Earth's limited resources in a sustainable manner while minimizing impacts on the environment.

Resources are elements of the physical world that have the capacity to provide goods and services for humans. Include air, water (marine and fresh) and land

Resource efficiency can lead to both positive and negative outcomes for employees and communities

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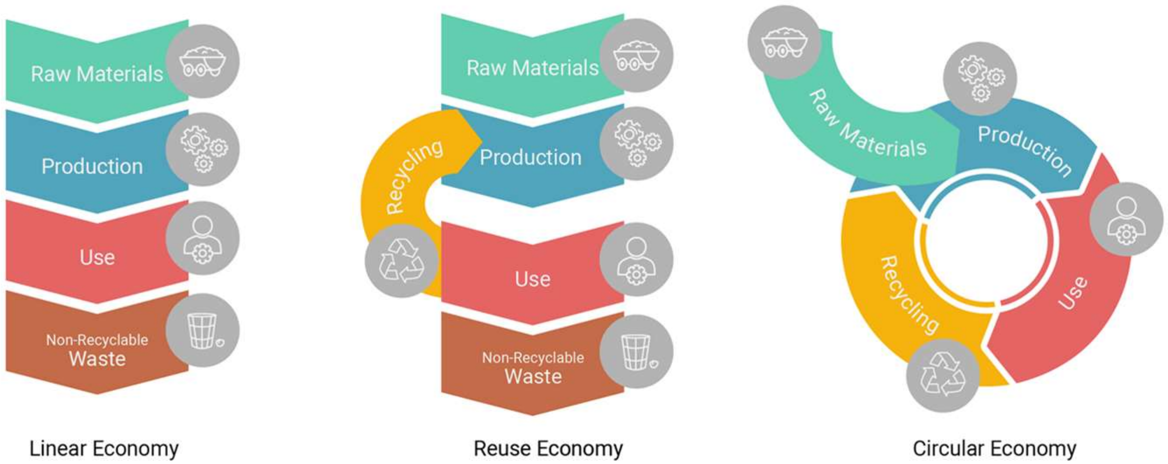
Framing Concepts: Circularity



Departure from “take, make, dispose” linear economic model to model in which materials are retained at highest value possible, for as long as possible

CE can lead to both positive and negative outcomes for employees and communities

CE extend products life spans’ through maintenance & repair, and when products are no longer functional, repurposing, reuse or recycling of their materials.

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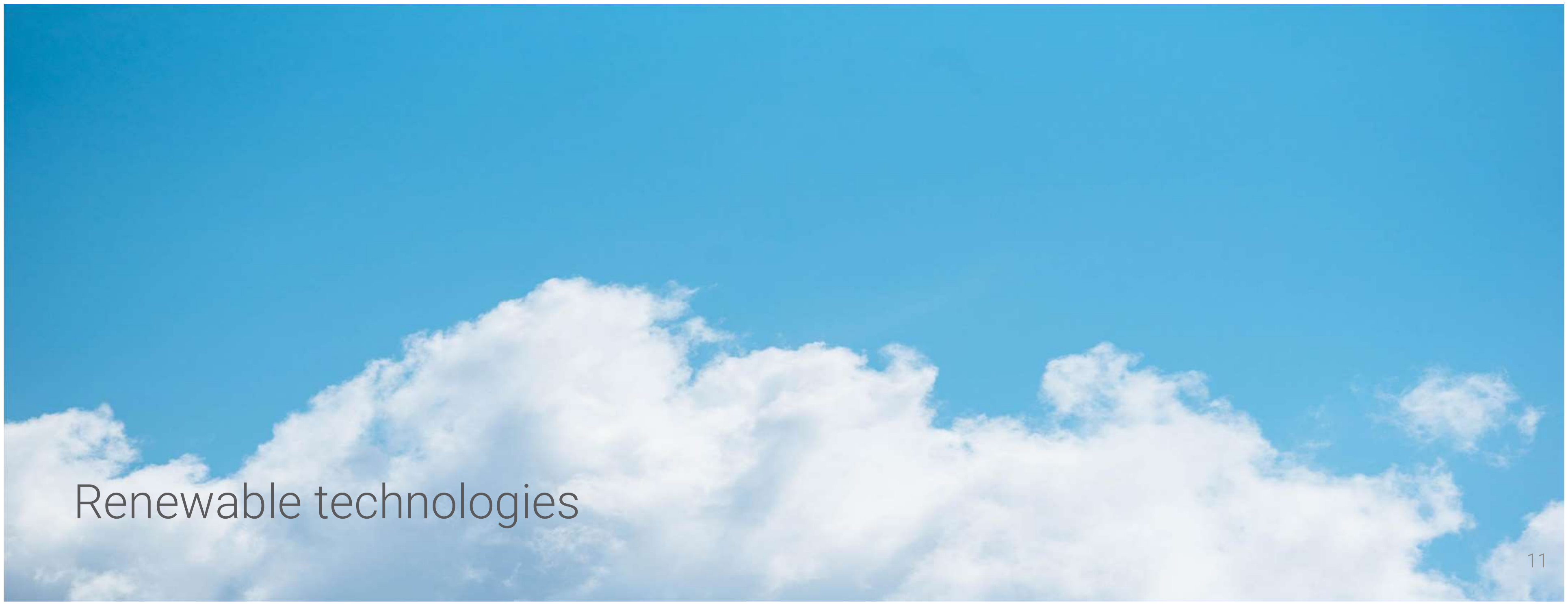
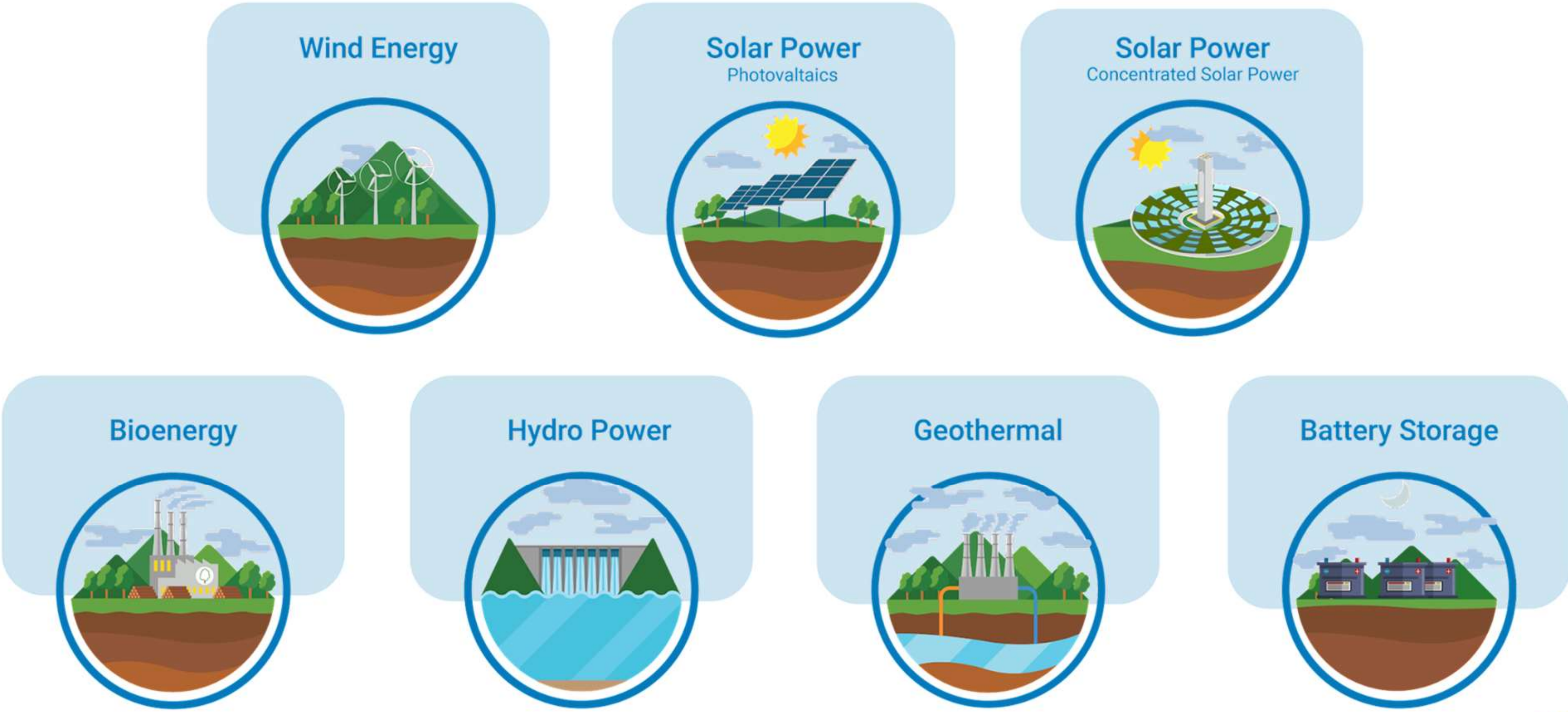


Renewable technologies

Renewable Energy Technologies



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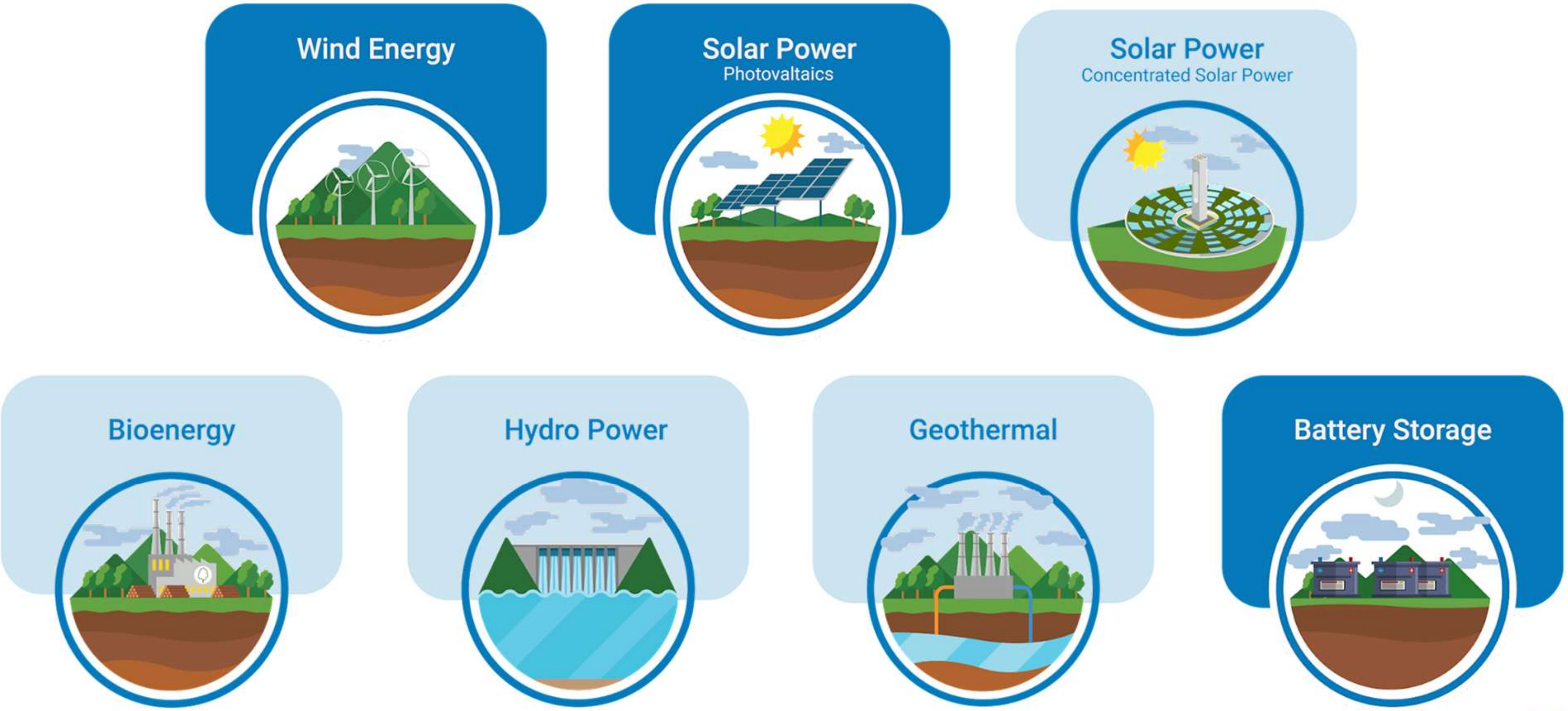
Renewable Energy Technologies



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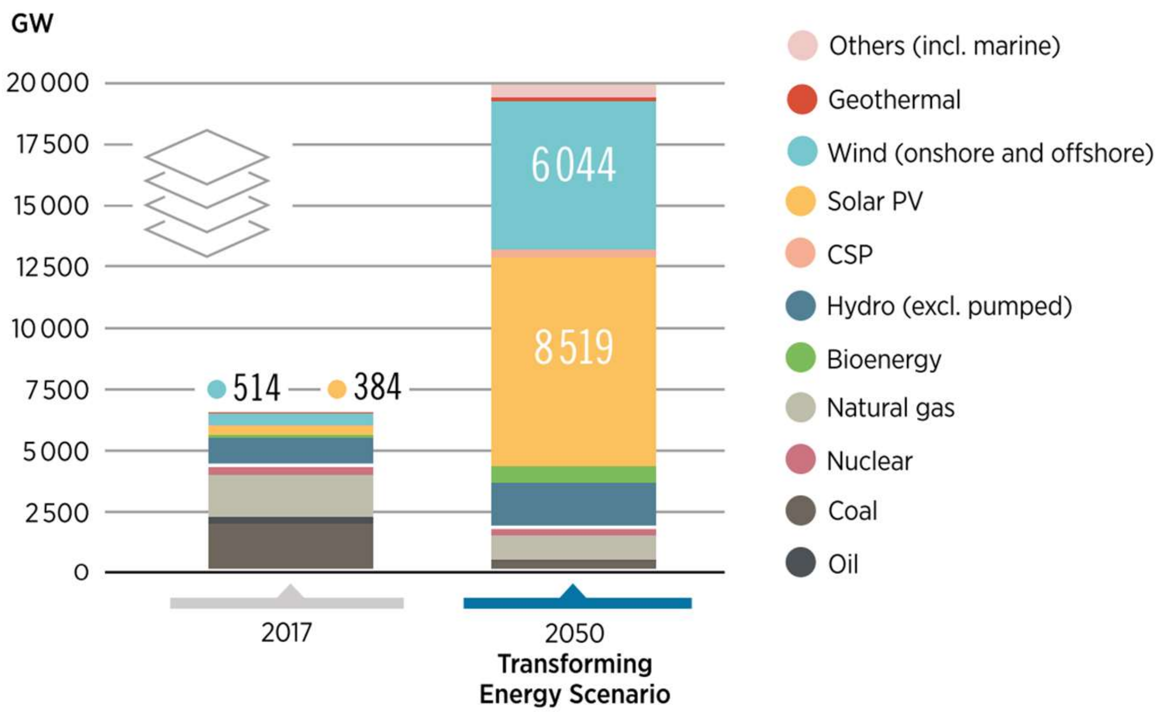
Projected Growth Over Time



Demand for resources
Production inputs
End of life management

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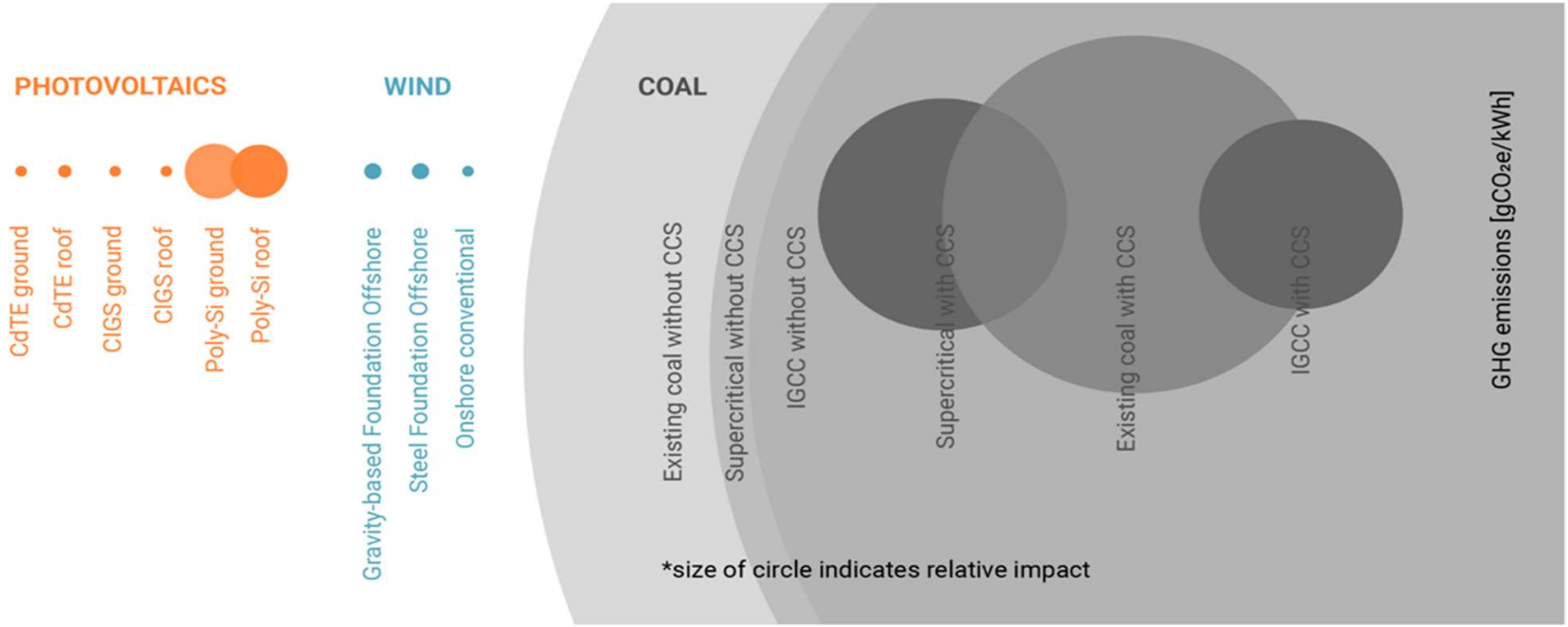
Life cycle impacts of renewables

Life Cycle Impacts

A. Greenhouse Gas Emissions
B. Resource Depletion
C. Ecosystem and Human Health Impacts
D. Land Use

A Greenhouse Gas Emissions

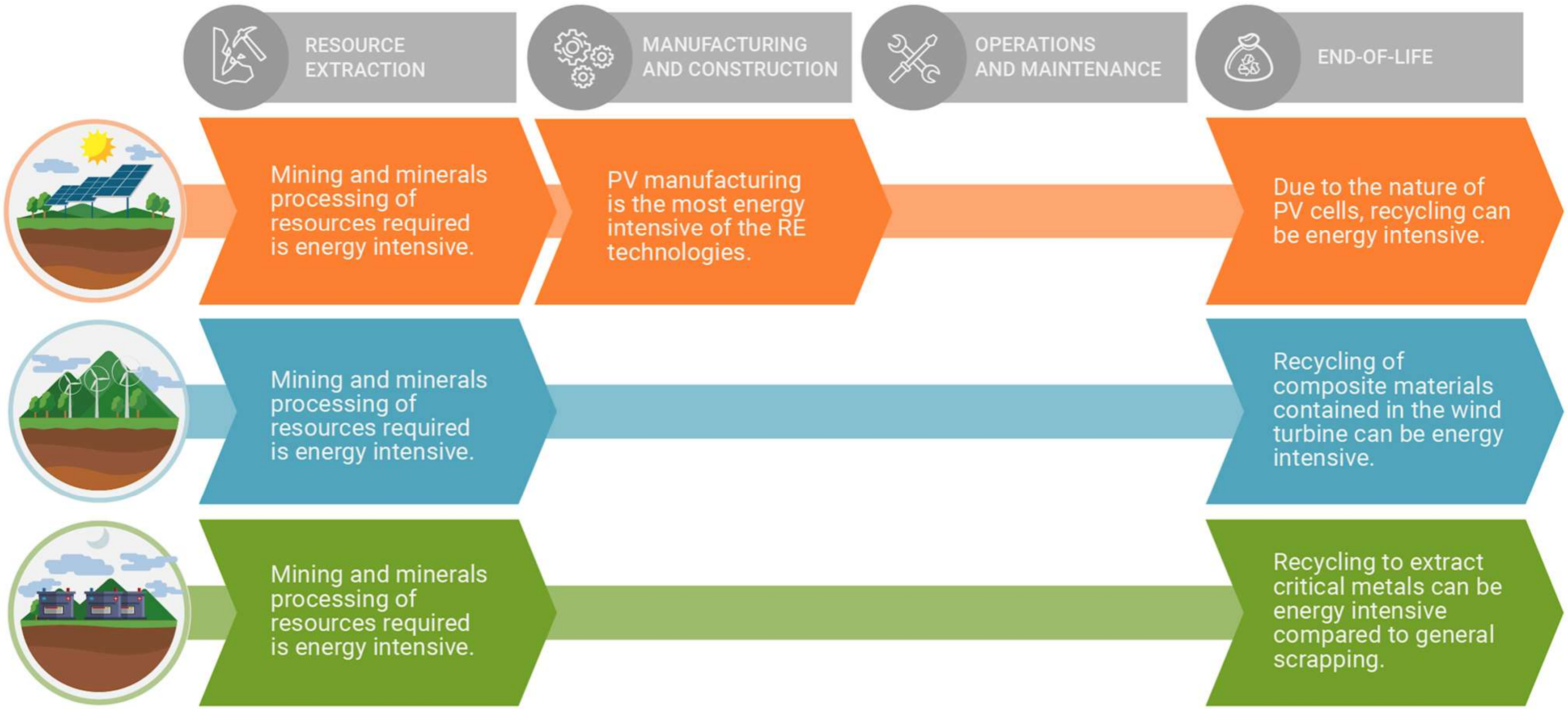


Local emissions, global implications

Life cycle emissions, excludes storage and additional grid infrastructure

UNEP 2016

A Greenhouse Gas Emission Hotspots

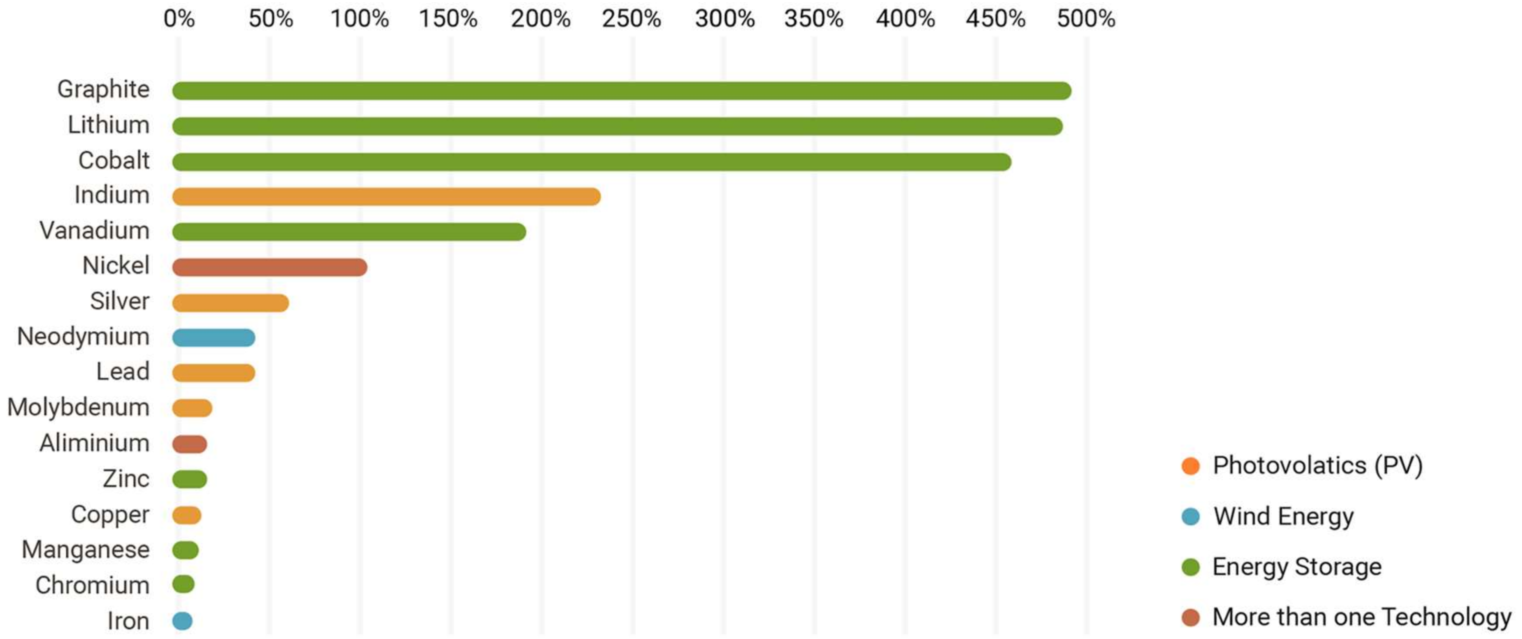


B Resource Depletion

	Wind	Solar PV	CSP	Hydro	Geothermal	Energy Storage
Aluminium	■	■				■
Cadmium		■				
Chromium	■			■	■	■
Cobalt						■
Copper	■	■	■	■	■	■
Dysprosium	■					
Callium		■				
Graphite						■
Indium		■				
Iron	■					■
Lead	■	■		■		■
Lithium						■
Manganese	■			■	■	■
Molybdenum	■	■		■	■	
Neodymium	■					
Nickel	■	■		■	■	■
Selenium		■				
Silver		■	■			
Tellurium		■				
Titanium				■	■	
Vanadium						■
Zinc	■	■		■		■

Dominish, Teske and Florin, 2019; Hund *et al.*, 2020

B Resource Depletion



Measured against 2018
<2°C scenario

Hund *et al.*, 2020

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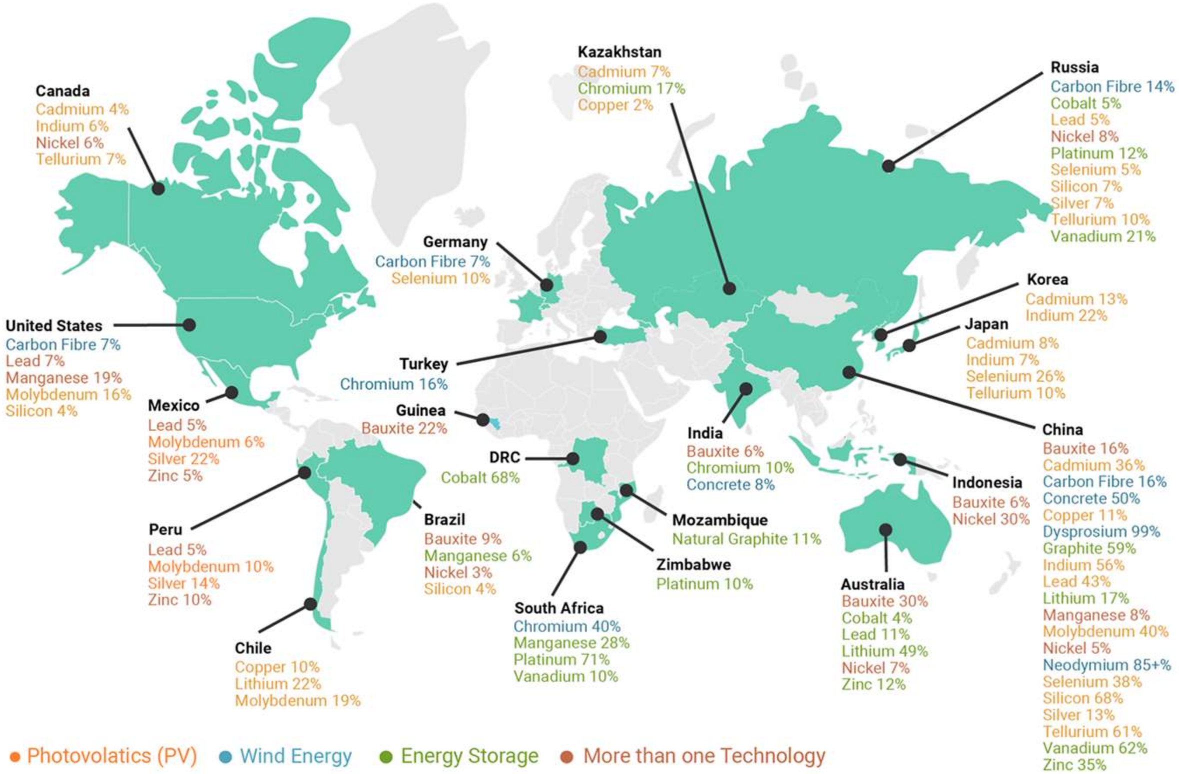
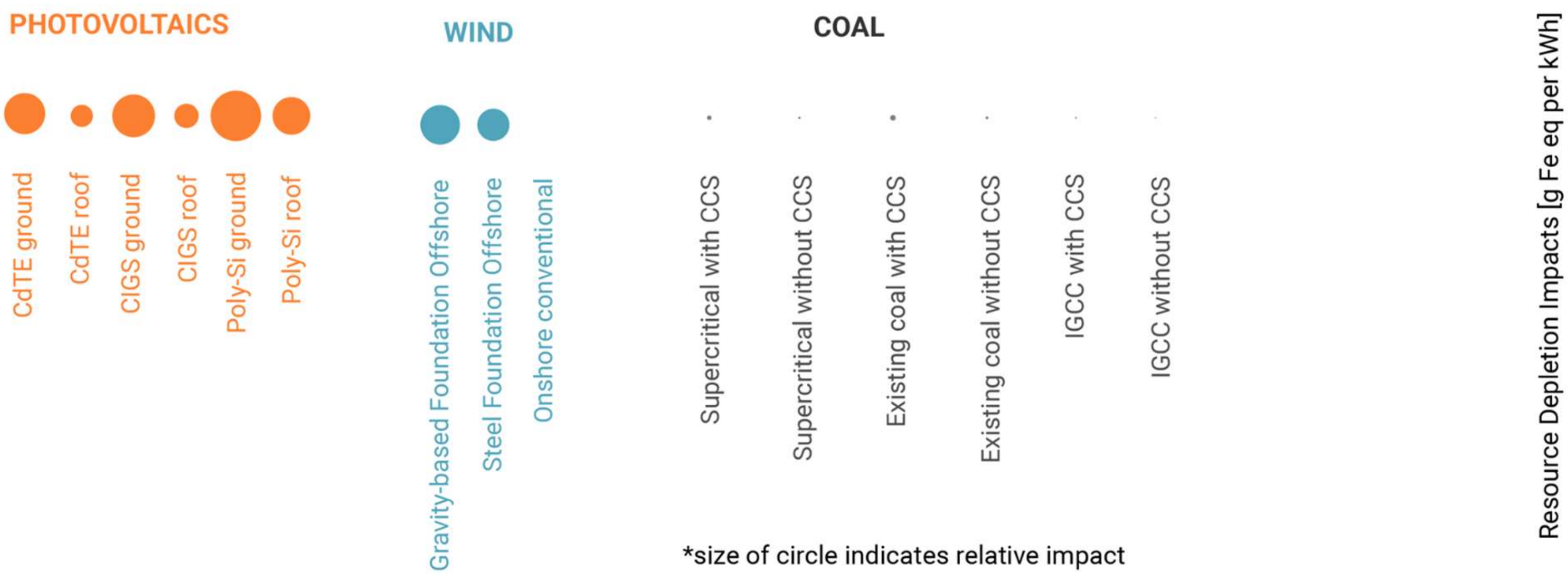
B Resource Depletion



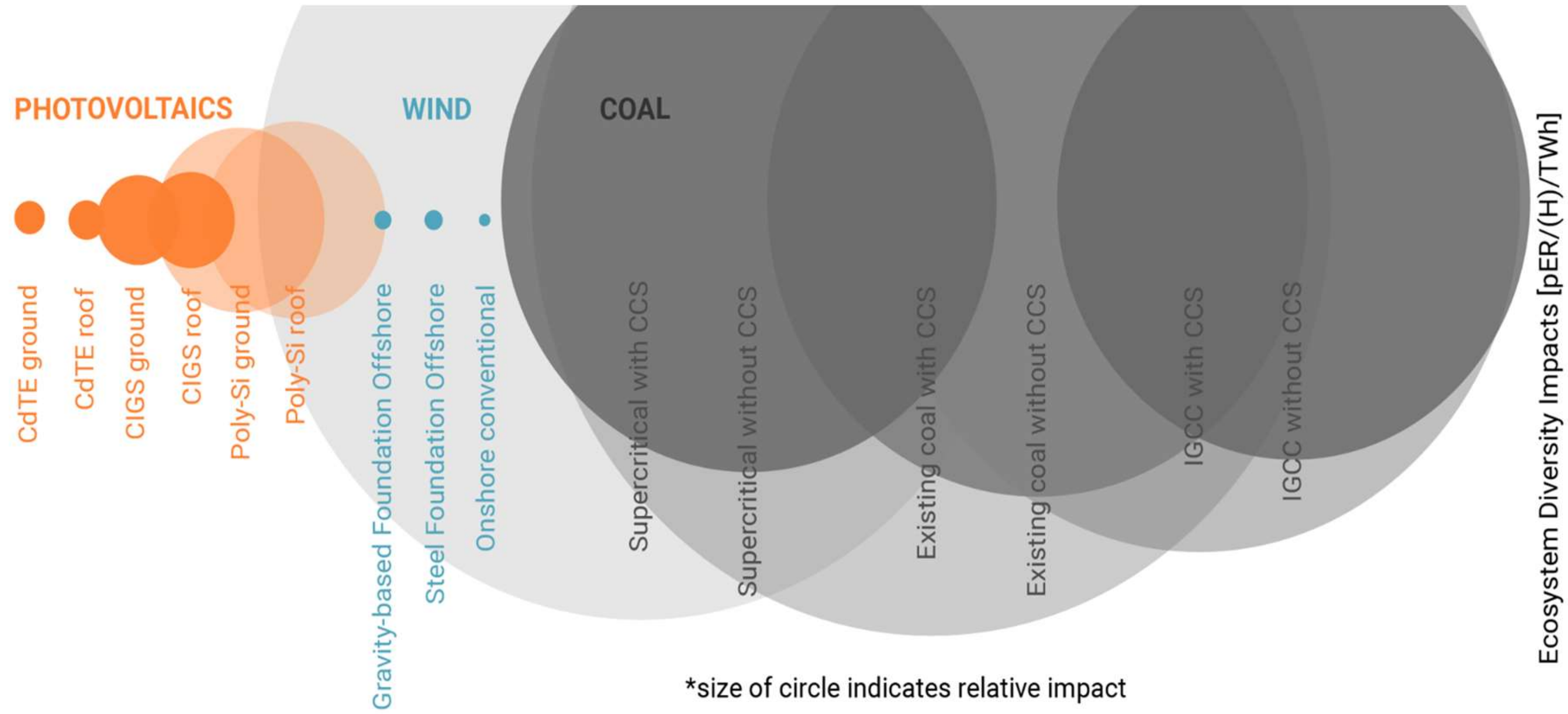
- Many minerals highly concentrated in a few countries
  - Including in a number of developing countries
  - Mining provides opportunities for employment but also exploitation
- Potential geopolitical risk issue
  - Compounded by low substitutability and low recycling rates

B Life Cycle Resource Depletion Impacts



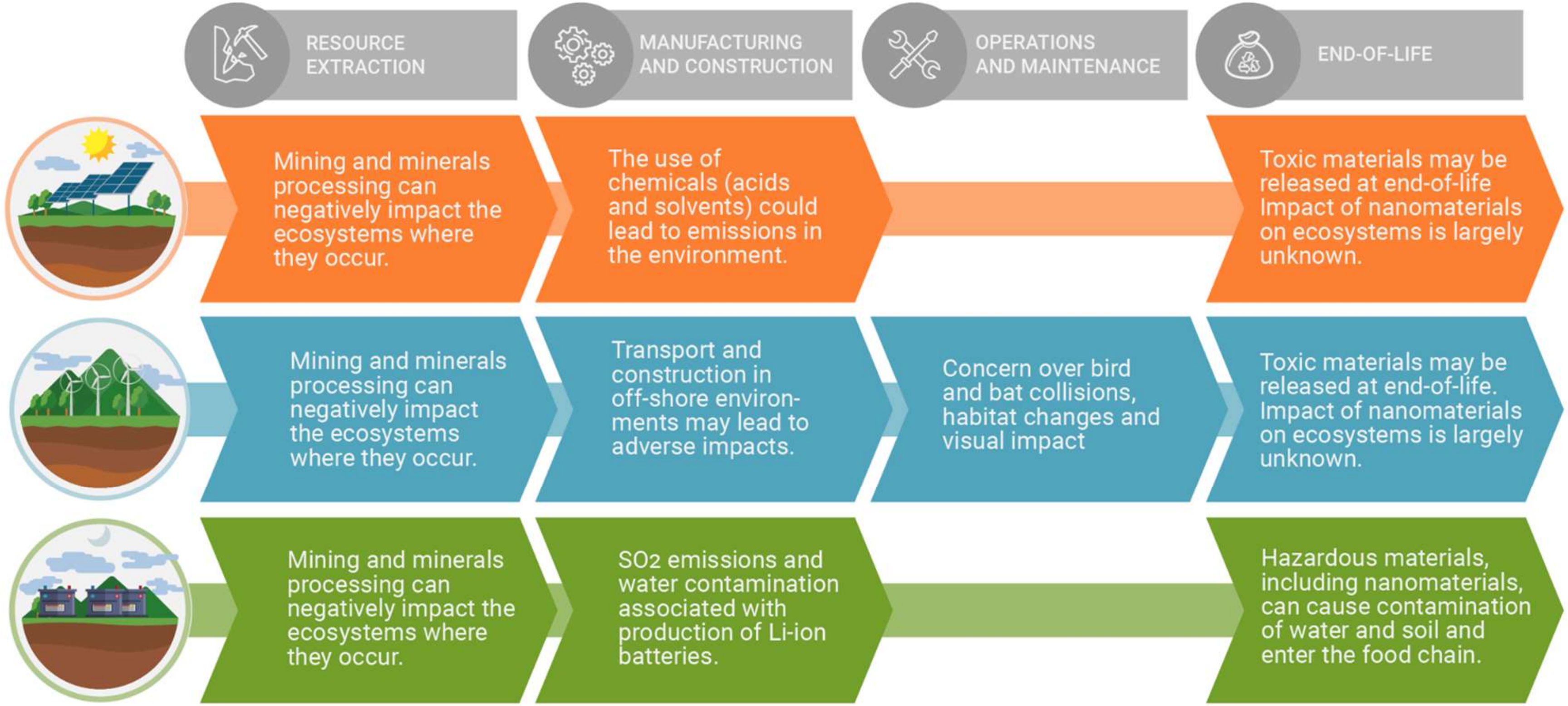
UNEP, 2016

C Ecosystem Impacts

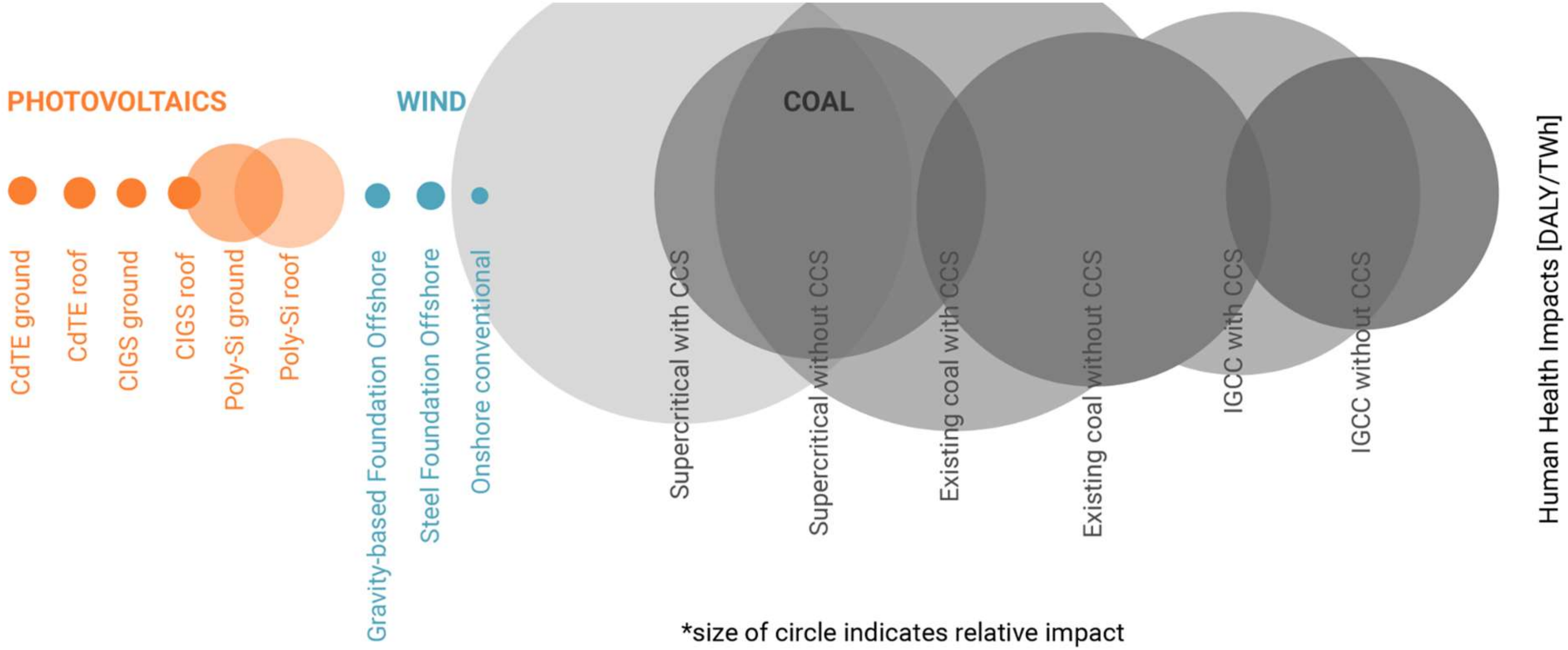


Ecosystem impacts are experienced locally, having implications for communities

C Ecosystem Impact Hotspots

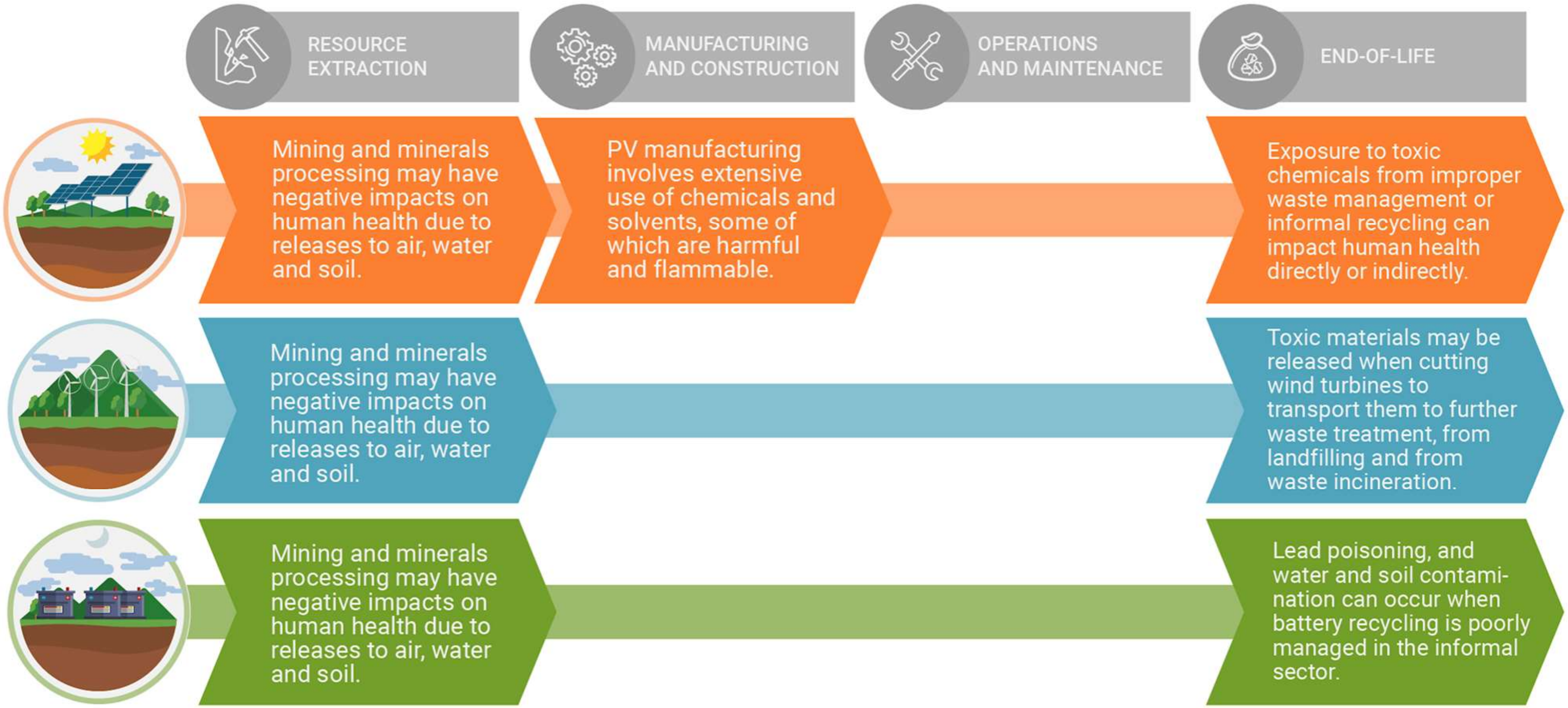


C Human Health Impacts

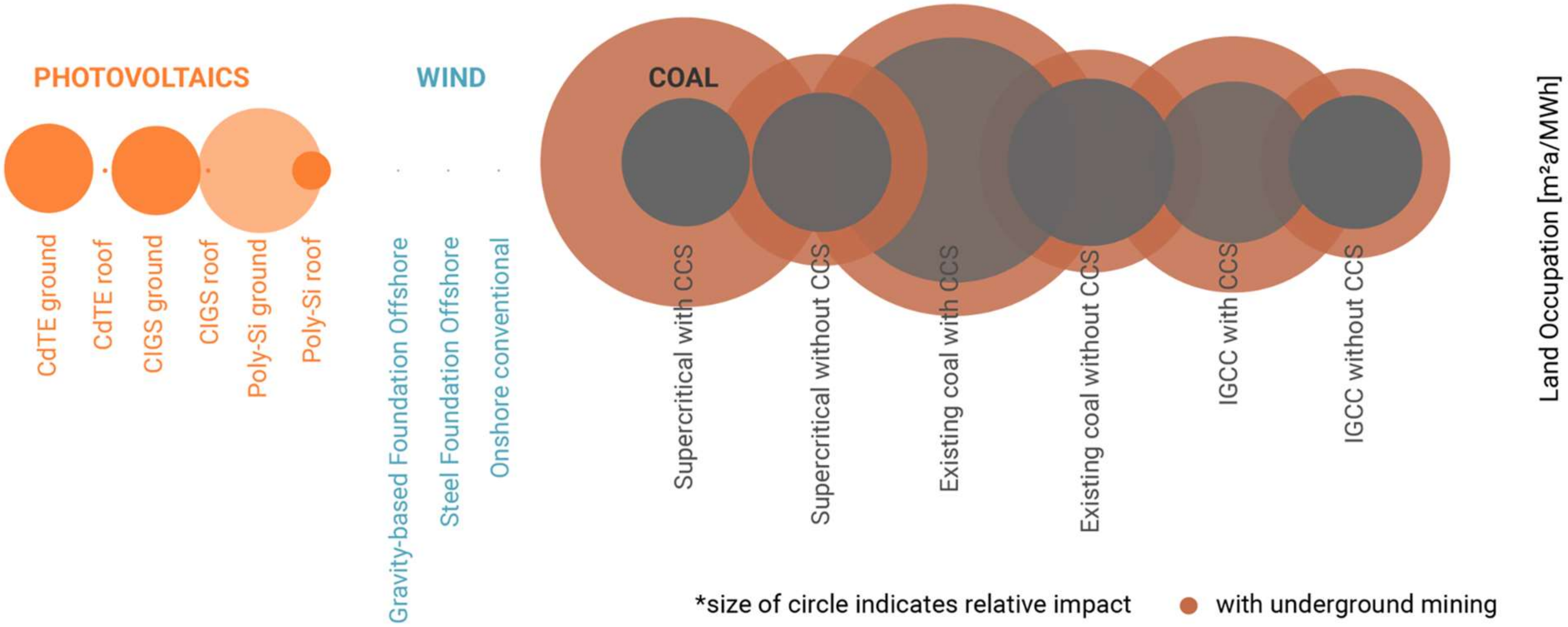


Impacts are all experienced locally, having implications for employees and communities

C Human Health Impact Hotspots



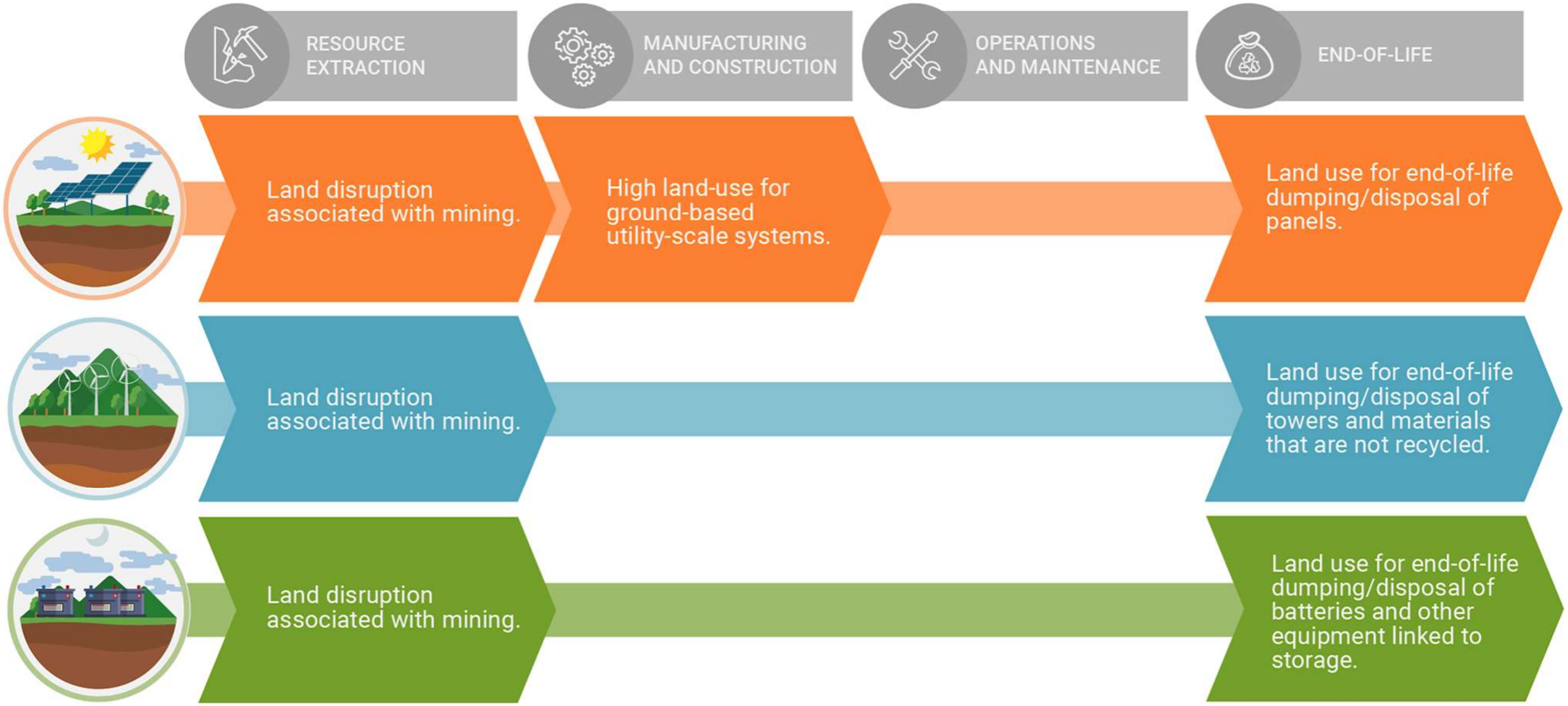
D Land Use

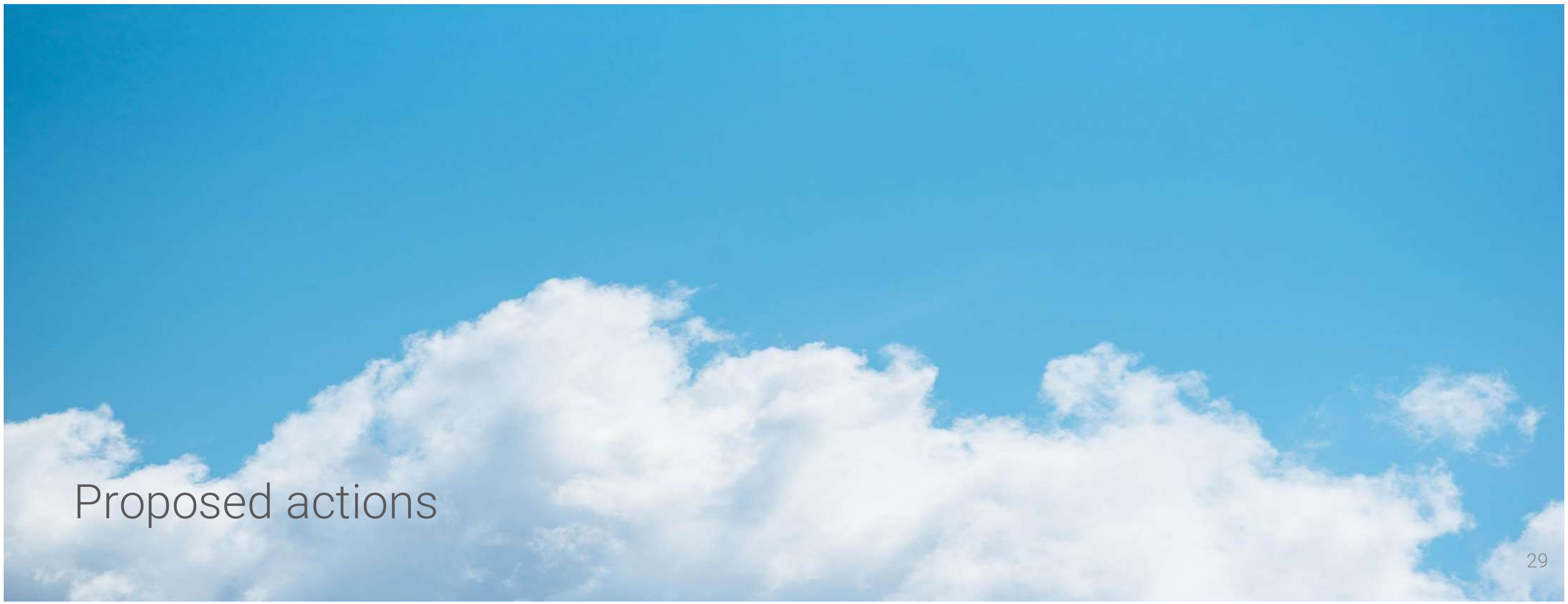


Impacts are experienced locally, having implications for communities

UNEP 2016

D Land Use Hotspots

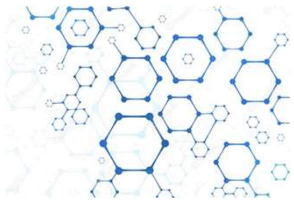




Proposed actions

Chemicals Management Across the Life Cycle

- Chemicals used in RE technologies a key concern, including upstream and downstream, if not managed properly
  - Mining and minerals processing can cause negative impacts on environment, workers and surrounding communities
  - Hazardous chemicals used in manufacture of **PV cells and batteries** potentially impact on workers and surrounding communities
  - Potential releases during maintenance of **wind turbines**, impacting on workers
  - Chemicals in **PV and batteries** pose a risk to environment and people at end-of-life
- Need to ensure that chemicals are properly managed across the life cycle to ensure protection of workers and communities across the value chain



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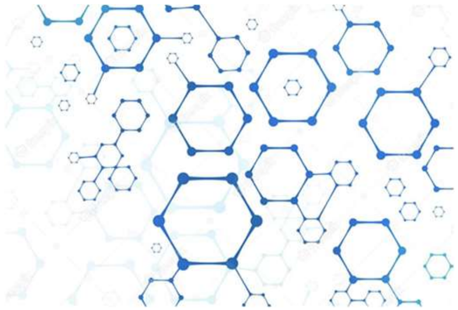
Actions Focusing on Chemicals



- Require sound **management of chemicals** by law

- Require **full disclosure** of chemical composition of materials
  - Includes transparent product labels (product passports)
  - Full disclosure of chemical composition will take time to implement
  - In short-term, hazardous chemicals should be prioritised for disclosure/transparency

- EU's **Substances of Very High Concern (SVHC)** list could be adopted
  - Help create global standardised approaches for human health and environmental protection
  - Simplify trade and communication of hazards in multinational material supply chains

Circular Economy: Actions for Renewables

Action	Potential implications for employees and communities
Reduce primary material use Responsible primary material extraction	More sustainable resource extraction and job creation Reduction in negative impacts of mining on communities
Substitute hazardous chemicals	Worker and community protection from exposure
Change designs of products and processes	Reduced risks to employees and communities, reduced negative impacts on the environment
Minimise impacts of production and distribution	
Management of consumption and stock to extend lifetimes	Reduced negative impacts of wastes
Waste minimisation and design for recycling and ensuring components are recyclable/reparable	Reduced exposure of employees working in waste recovery to hazardous chemicals Reduced negative impacts of waste on the environment

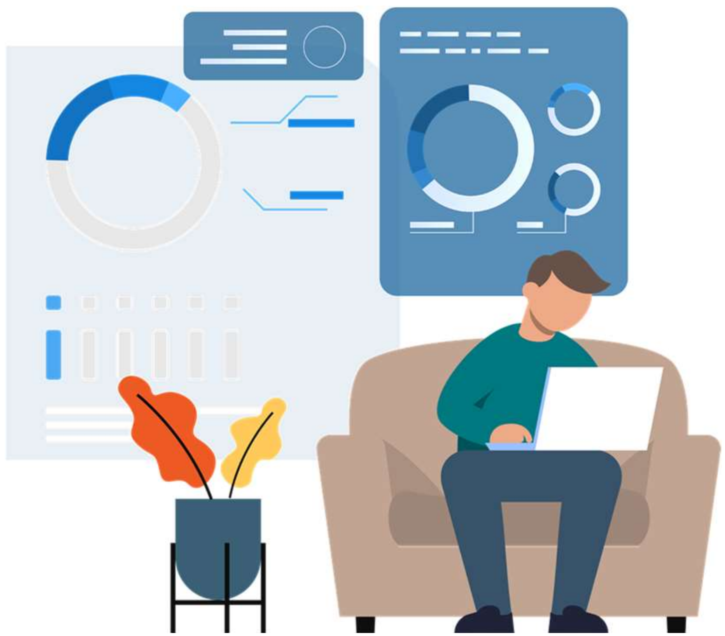
Role of EPR

Policy tool designed to :

- Hold manufacturers accountable for end-of-life impacts products
- Encourage eco-design, design for repurposing/recovery or design for environment

Policies and measures include:

- Product take-back
- Deposit/refund
- Advanced disposal fees
- Product/material taxes
- Combined upstream tax and subsidies
- Minimum recycling requirements



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Role of EPR

- EPR implemented for certain renewables technologies in Europe
  - Solar PV modules and inverters:
    - Manufacturers or distributors required to take responsibility for collecting or taking back used goods and for sorting and treating post-consumer waste
  - Batteries:
    - Reduction of mercury, cadmium and lead content
    - Targets and legislation to support end-of-life recovery and recycling

- Other countries have experience on EPR but little on renewables specifically

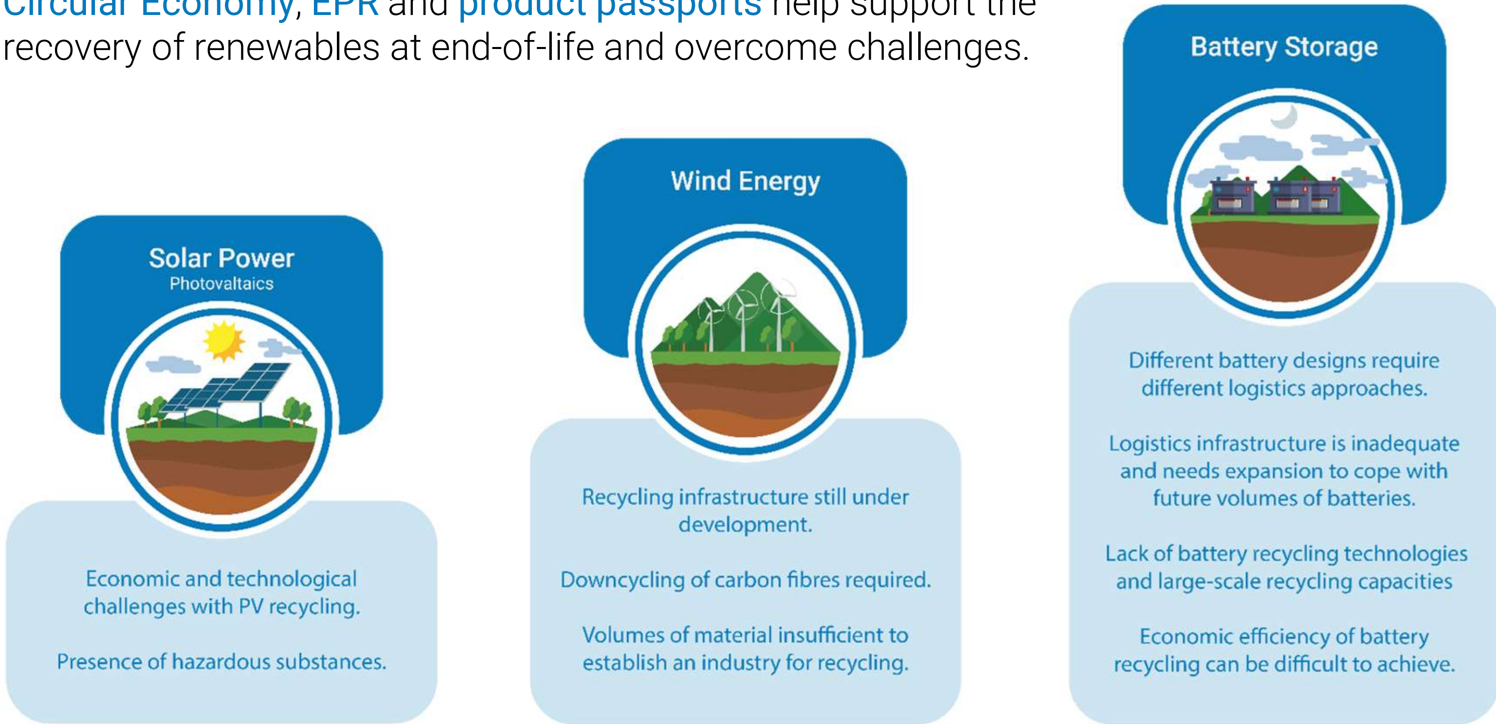
- For global impact, multi-lateral collaboration on EPR is required, including global harmonisation and/or global standards for disclosure of chemical composition and transparency regarding hazardous chemicals

Reducing Mining Impacts

- Policy, legislation and regulation required where minerals for renewables and other purposes are extracted and processed
  - Ongoing enforcement critical to ensure protection of environment and society
- International collaboration required to prevent over-exploitation of resources and negative impacts of resource extraction
- Illegal mining challenging, as it is often linked to organised crime syndicates.
  - Strong and secure land rights, especially of indigenous peoples can help fight illegal mining
  - Formal and secure small-scale miners' rights increase sales through legal channels, enabling government to track minerals origins and prevent them from fueling conflict
  - Global cooperation and development of a global strategy to combat the organised crime aspects of illegal mining is required

Actions for Wastes

- Circular Economy, EPR and product passports help support the recovery of renewables at end-of-life and overcome challenges.



Photovoltaics

1.5 million tonnes
of glass, metals, and silicon

Principal materials

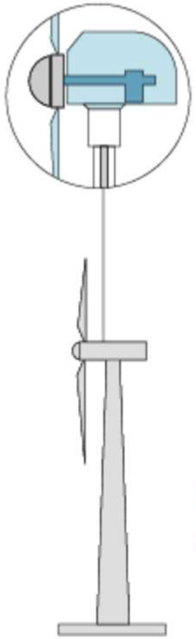
- Aluminium
- Glass and silicon
- Silver
- Copper

Critical raw materials

- Indium
- Germanium

Wind energy

4.75 million tonnes
of concrete, metals and composites



Principal materials

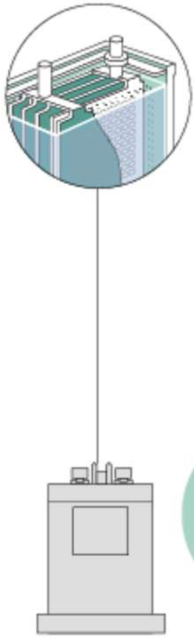
- Steel and iron
- Glass/carbon composites
- Copper
- Zinc

Critical raw materials

- Dysprosium
- Neodymium

Energy storage and mobility

240 000 tonnes
of lithium-ion batteries



Principal materials

- Graphite
- Aluminium
- Copper
- Nickel

Critical raw materials

- Cobalt
- Lithium

Conclusions: Actions for Products

STRATEGIC ACTION	SCALE OF ACTION
Require technologies and materials to be consistent with a Circular Economy.	Best achieved through global and/or trading block level agreements due to the global nature of supply chains.
Require life cycle assessments on renewable energy technologies prior to their release on the market.	National requirement as LCAs are site/location specific.
Require participatory decision-making in the use and management of natural resources, including all those affected or potentially affected by extractive activities.	National level legislation required. Should draw on best practice and guidance from ICMM, IIED and others.

Conclusions: Actions for Chemicals

STRATEGIC ACTION	SCALE OF ACTION
Ensure sound management of chemicals regulated by law, with the necessary laws fulfilling the 11 core elements in the SAICM Overall Orientation and Guidance Document for achieving the 2020 goal of sound management of chemicals.	International harmonization required with alignment of national legislation.
Require full disclosure of the chemical composition of materials, including transparent product labels.	International harmonization required with alignment of national legislation.
Implement a global standard for harmonized global transparency system for priority chemicals identification and management, which could be based on the SVHC list developed in the EU.	International harmonization required with alignment of national legislation.

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Conclusions: Actions for Wastes

STRATEGIC ACTION	SCALE OF ACTION
Implement legally binding rules for full information disclosure on chemical contents in all product components, along with requirements for information transfer between all stakeholders in supply chains.	International harmonization and agreements.
Introduce regulations requiring eco-design, incentivising products that are more easily reused, repurposed or recycled and/or contain recycled content.	National legislation supported by international best practice.
Implement extended producer responsibility with take back schemes for companies producing solar PV panels, wind turbines and storage batteries.	National legislation supported by international best practice.
Involve all stakeholders across the product value chain (raw material production, brands, retailers, waste management, including the informal sector), government, research institutions, finance sector, civil society and consumers.	Global initiatives supported by national legislation and initiatives.

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Way forward for communities?


Q&A
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