

FOR A CIRCULAR ENERGY TRANSITION

Action Plan for Industry, Policymakers and Investors

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Exponential demand for critical materials, driven by the energy transition, may trigger supply chain problems.

The transition to renewable energy, is a major shift from a fuel-intensive to a material-intensive energy system. It drives an exponential demand for critical materials which may trigger major supply chain problems in years to come if no action is taken. In addition, from 2030 onwards, the renewable energy sector will face a "tsunami of waste" from photovoltaic panels, wind turbines and lithium-ion batteries arriving at the end of life.

2

Circular economy business models could help decouple the renewable energy sector from material consumption.

To reduce the overall demand for critical raw materials and minimise supply risks and negative environmental and social impacts, the renewable energy sector should transition toward a circular economy. Three key circular strategies can be harnessed for the renewable energy sector.



Circulate equipment and materials

Products and materials are kept in use and circulated in the economy by **maintaining and repairing, reusing and refurbishing, repowering and recycling** them.



Rethink business models

New business models enable to increase equipment usage by **sharing equipment across users and usages and selling product-as-a-service**.



Rethink material choices

Using fewer materials and substituting materials with renewable or low-carbon materials can reduce emissions, waste and virgin material demand.

Such a framework can unlock economic opportunities and create extra jobs; ultimately, decoupling the sector from material consumption.

3

However, facing major economic, regulatory and financial barriers, the transition of the sector towards a circular economy still has a long way to go.

- ✗ Recycling solar panels, wind turbines and lithium-ion batteries does not yet allow the recovery of most critical materials.
- ✗ Lithium-ion batteries and photovoltaic panels are designed for durability, not to be repaired or refurbished.
- ✗ Prices of second-hand photovoltaic panels are not competitive.
- ✗ Administrative requirements hinder the wind turbines' life extension.
- ✗ Investing in recycling infrastructures remains risky and not always economically attractive.

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An action plan is required for the renewable energy sector to be fully aligned with the principles of a circular economy and reap its benefits.

This action plan is based on three main levers: Design assets for a circular economy; Build circular value chains; Create the right economic and policy conditions. It should be driven by industry players, policymakers and investors.

DESIGN ASSETS FOR A CIRCULAR ECONOMY

- 1 Industry players should consider life extension strategies at the design stage** to derive additional value from their products.
- 2 Investors should require manufacturers to design assets for the circular economy** to reduce upfront operations and dismantling costs of solar and wind projects.
- 3 Policymakers should fund research and development on design for recycling** to decrease recycling costs.
- 4 Industry players should set international design standards** within the battery industry with the support of policymakers to increase batteries' maintenance, repair and repurposing.

BUILD CIRCULAR VALUE CHAINS

- 5 Industry players should build cross-sector partnerships and alliances at scale** to secure critical materials supply.
- 6 Policymakers should incentivise the creation of joint ventures and partnerships** through regulation to ensure the sustainability and competitiveness across value chains.
- 7 Policymakers should promote the exchange of data among key stakeholders** for all renewable equipment through the introduction of product passports.
- 8 Industry players should establish a quality standard** for second-hand photovoltaic panels as well as lithium-ion batteries and wind turbine equipment and components.

CREATE THE RIGHT ECONOMIC AND POLICY CONDITIONS

- 9 Policymakers should introduce Extended Producer Responsibility (EPR) measures** for the entire renewable energy sector to ensure dedicated and sufficient funding for the treatment of end-of-life equipment.
- 10 Investors should rate investments portfolio based on circular economy principles**, considering critical material supply risks and the environmental impacts of the renewable energy sector.
- 11 Policymakers should revise existing policies** that slow the transition of the renewable energy sector to a circular economy.
- 12 Policymakers should fund research and development on recycling technologies** to relieve the existing barriers and spur private investment.
- 13 Investors should increase investments** in the growing battery recycling market and the emerging photovoltaic recycling market.