



What if renewable wind and solar energy became fully circular?

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# Renewable Asset Loop

## UNCERTAINTIES

Collaboration, Technology

## MEGATREND (Most significant)

Evolving Ecosystems

## TRENDS

Cross-Sectoral Partnerships  
International Collaboration  
New Materials  
Sustainable Waste Management  
Transforming Energy

## TECHNOLOGIES

3D Printing  
Artificial Intelligence  
Climate Tech

## SECTORS IMPACTED

Chemicals & Petrochemicals  
Energy, Oil & Gas, & Renewables  
Financial Services & Investment  
Government Services  
Infrastructure & Construction  
Manufacturing  
Materials & Biotechnology  
Metals & Mining  
Utilities

## KEYWORDS

Circularity  
Materials Science  
Renewable Energy  
Solar Photovoltaics (PV)  
Wind Turbines

Within Reach

Transitional

Visionary

A global consortium advances circular standards for solar and wind assets, promoting sustainable design, recycling technologies and policies to maximise resource use and eliminate waste.





## WHY IT MATTERS TODAY

The global energy transition will push **demands for renewable energy** to

**\$150  
trillion**

in investment globally  
by 2050

The global energy transition will push demands for renewable energy, requiring \$47 trillion in global investment by 2030, with \$15.7 trillion allocated for renewable power generation and grid infrastructure.<sup>1088</sup> By 2050, the required investment will rise to \$150 trillion globally, with \$61 trillion needed for renewable power generation and grid infrastructure.<sup>1089</sup> While investment in offshore wind and other renewables (such as bioenergy and geothermal) is growing, these technologies remain underfunded.<sup>1090</sup> Renewable electricity's share of global power generation is expected to increase from 30% in 2023 to 46% in 2030, driven by solar and wind, which will account for the majority of growth.<sup>1091</sup> Solar photovoltaic (PV) panels are set to become the largest renewable electricity source by 2029.<sup>1092</sup>

Rapid expansion in renewable energy use will bring with it sustainability challenges. Wind turbines from the 1990s and 2000s are nearing the end of their life, and although much of a turbine can be recycled, components such as composite blades are typically sent to landfill or incinerated.<sup>1093</sup> Current projections indicate that, globally, 78 million tons of PV panels<sup>1094</sup> and 43 million tons of wind turbine blades<sup>1095</sup> will become waste by 2050.

Materials science and circularity may be key parts of the solution. Currently, 80–85% of wind turbine components<sup>1096</sup> and up to 95% of solar panel glass<sup>1097</sup> can be recycled. For example, the glass from solar panels can be reused in windows.<sup>1098</sup> Wind turbine blades can be used as supplementary building materials.<sup>1099</sup> Additionally, mobile grinding units would allow on-site recycling for the foundations for new turbines<sup>1100</sup> and blades have been used in rural applications, such as building walls and fences.<sup>1101</sup>





Systems Optimised

Renewable Loop



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THE OPPORTUNITY



BENEFITS

Global alignment; new market opportunities and job creation; a more sustainable renewable energy sector.



RISKS

Implementation complexity; perceived lack of urgency regarding recyclability; limited suitable recycling technologies.

A global consortium brings industry, governments and academia together to **establish standards for recycling and circularity in renewable energy assets**

A global consortium brings industry, governments and academia together to establish standards for recycling and circularity in renewable energy assets, beginning with solar and wind technologies. The focus of the consortium includes advancing materials science, integrating sustainable designs inspired by biomimicry, and deploying innovative recycling technologies powered by advanced machine intelligence to optimise designs<sup>1102</sup> and 3D printing of needed components on demand.<sup>1103</sup> By advocating policies to prohibit landfill disposal, mandate reuse, and encourage public–private partnerships, the consortium aims to create an all-encompassing framework for sustainable renewable energy asset management.

