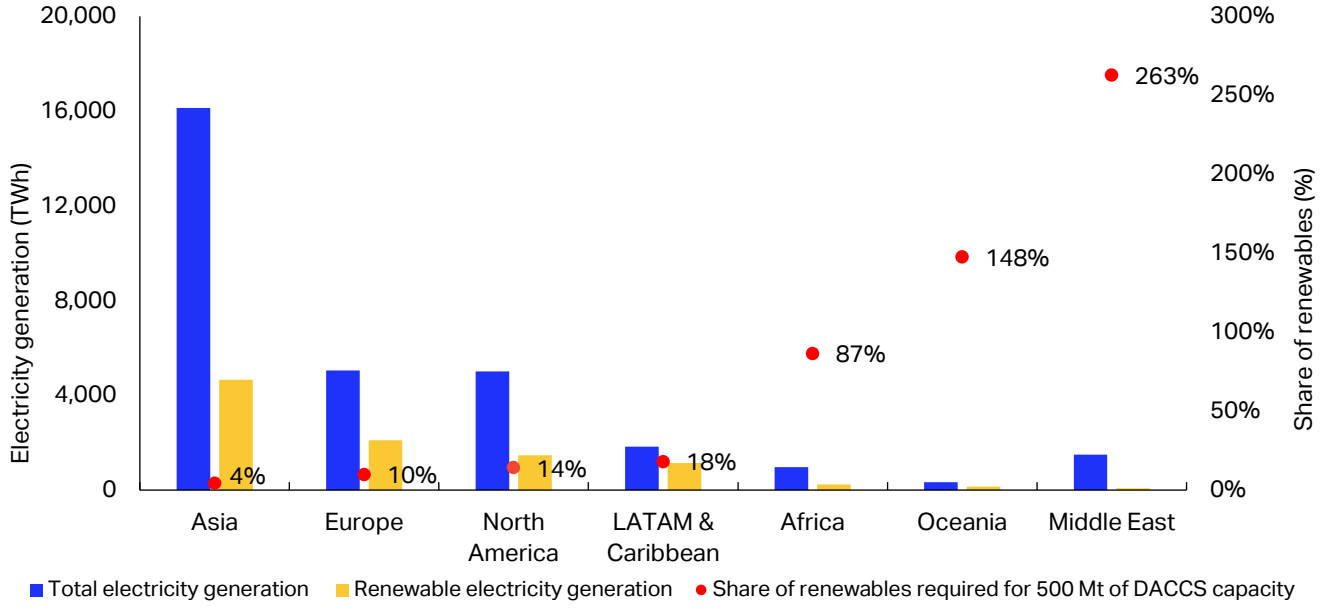
Chart of the Week

11 July 2025

Powering DACCS: The Electricity the World Needs

Share of 2024 renewable electricity generation to power 500 Mt of DACCS in each region



Source: IATA Sustainability and Economics, Ember Energy, Eke et al. (2025)

- The air transport sector will require about 500 Mt of CO_2 addressed through market-based measures (MBMs), which includes carbon dioxide removals technologies (CDR), such as direct air carbon capture and storage (DACCS), to reach net-zero CO_2 emissions in 2050. The electricity required for common DACCS technologies is typically between 130 and 700 kWh per tonne of CO_2 removed, making DACCS among the most energy-intensive CDRs today. To power ~500 Mt of CO_2 removed via DACCS, a median value of approximately 207.5 TWh of electricity is required, and renewable electricity is the preferred option to achieve optimal life-cycle carbon intensity.
- The ability to use the electrical grid is key to allowing DACCS project developers the flexibility to source electricity outside of individual power purchase agreements. Asia, Europe, North America, Latin America, and the Caribbean regions are in an advantageous position to integrate DACCS thanks to their more developed renewable electricity generation capacity and the greater capability to expand their renewable electricity generation in an efficient and agile manner.
- Africa, the Middle East, and Oceania are less well positioned to do so as these regions would require from close to 100% to far beyond their current renewable electricity generation to power 500 Mt of DACCS capacity. This is due to less overall electricity generation and to a much lower share of renewable electricity of the total, as in the Middle East. Less energy-intensive MBMs would be a better option for these regions.
- The key factors that influence the degree to which regions with less access to renewable electricity should opt for developing DACCS are thus the access to the electricity grid, optimization of grid operations, investment in energy storage capacity, development of CO_2 transport and storage infrastructure, and the viability of less electricity-intensive alternatives to DACCS, potentially including bioenergy with carbon capture and storage (BECCS) and biochar.

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