

Wind farm and solar park effects on plant-soil carbon cycling: uncertain impacts of changes in ground-level microclimate

Meeting globally increasing energy demands in a **sustainable** manner is one of the largest challenges we face today, yet **renewable energy** sources can provide us with the sustainable power we need.

Definitions

Sustainable: conserving an ecological balance by avoiding depletion of natural resources

Renewable energy: energy from a source that is not depleted when used

Ecosystem: a community of organisms interacting with their physical environment

Land use change: modification and management of land for human use

Microclimate: local climate near to the ground influenced by either topography, vegetation, soils, landforms or structures

Evapotranspiration: loss of moisture from soil and plants to the air

Albedo: reflectivity of Earth's surface

Plant-soil processes: biological processes that regulate the uptake and loss of carbon in an ecosystem

Ecosystem services: ways that humankind can benefit from an ecosystem

Host environment: an environment in which a land-based renewable energy source operates

Deployment of land-based renewable (LBR) technologies, such as wind turbines and ground-mounted solar panels, is increasing. However currently, we do not fully understand the effect LBRs could have on the **ecosystems** in which they are built and operate.

LBRs represent a substantial **land use change** and have the potential to affect **microclimates** due to changes in:

- wind speed
- wind turbulence
- temperature (soil, air)
- precipitation (rain, snow)
- evapotranspiration
- surface albedo

Climate is a strong determinant of **plant-soil processes**. Microclimatic changes may therefore alter terrestrial carbon cycling directly, or indirectly due to microclimate-induced changes in plant and soil microbial community composition and activity.

Given the speed and scale of land use change associated with LBRs, it is important that we understand the effects of LBRs on their **host environments** and their ability to control critical **ecosystem services** better.

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