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## Optimising solar park design and management to boost pollinator abundance

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Solar photovoltaics (PV) is projected to become the dominant renewable, with much capacity being installed as ground-mounted solar parks. Land use change for solar can affect ecosystems across various spatial scales and solar parks offer a unique opportunity for ecological enhancement. One compelling potential benefit put in practice by the solar industry is management for insect pollinators. Specifically, solar parks can provide refuge for pollinators through the provision of suitable habitat, potentially contributing to halting and reversing widespread declines recorded in a number of pollinator groups. There is scope to both manage and design solar parks for pollinators, but understanding is limited. Using a combination of GIS and a process-based pollinator model, we explore how solar park size, shape and management could affect ground-nesting bumblebee abundance inside solar parks and surrounding landscapes in the UK. We show that within solar parks, the floral resources provided by different management practices is a key factor affecting bumblebee abundance, but the impacts are dependent on landscape context. In comparison, solar park size and shape have a lesser impact. Moreover, the effects of both solar park management and design extend into the surrounding landscape, affecting bumblebee abundance up to 1 km away from the solar park. If designed and managed optimally, solar parks therefore have the potential to boost local pollinator abundance and pollination services to surrounding land. Our results demonstrate how incorporating biodiversity into solar park design and management decisions could benefit groups such as pollinators and contribute to the wider environmental sustainability of solar parks.