



Solar Park Impacts on Biodiversity and Ecosystem Services

East Hertfordshire District Council Members Briefing
1 September 2022

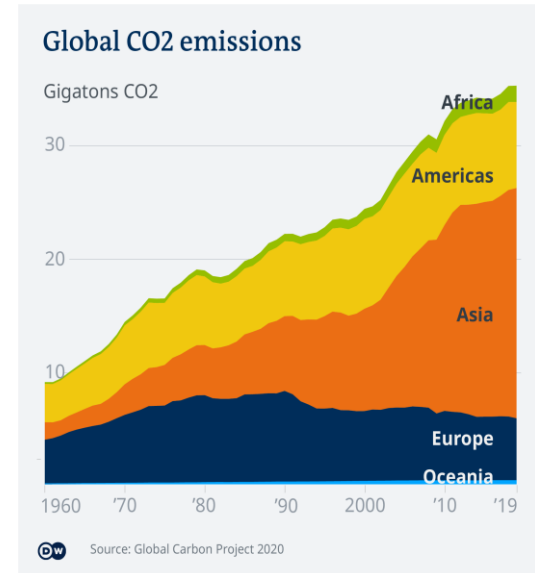
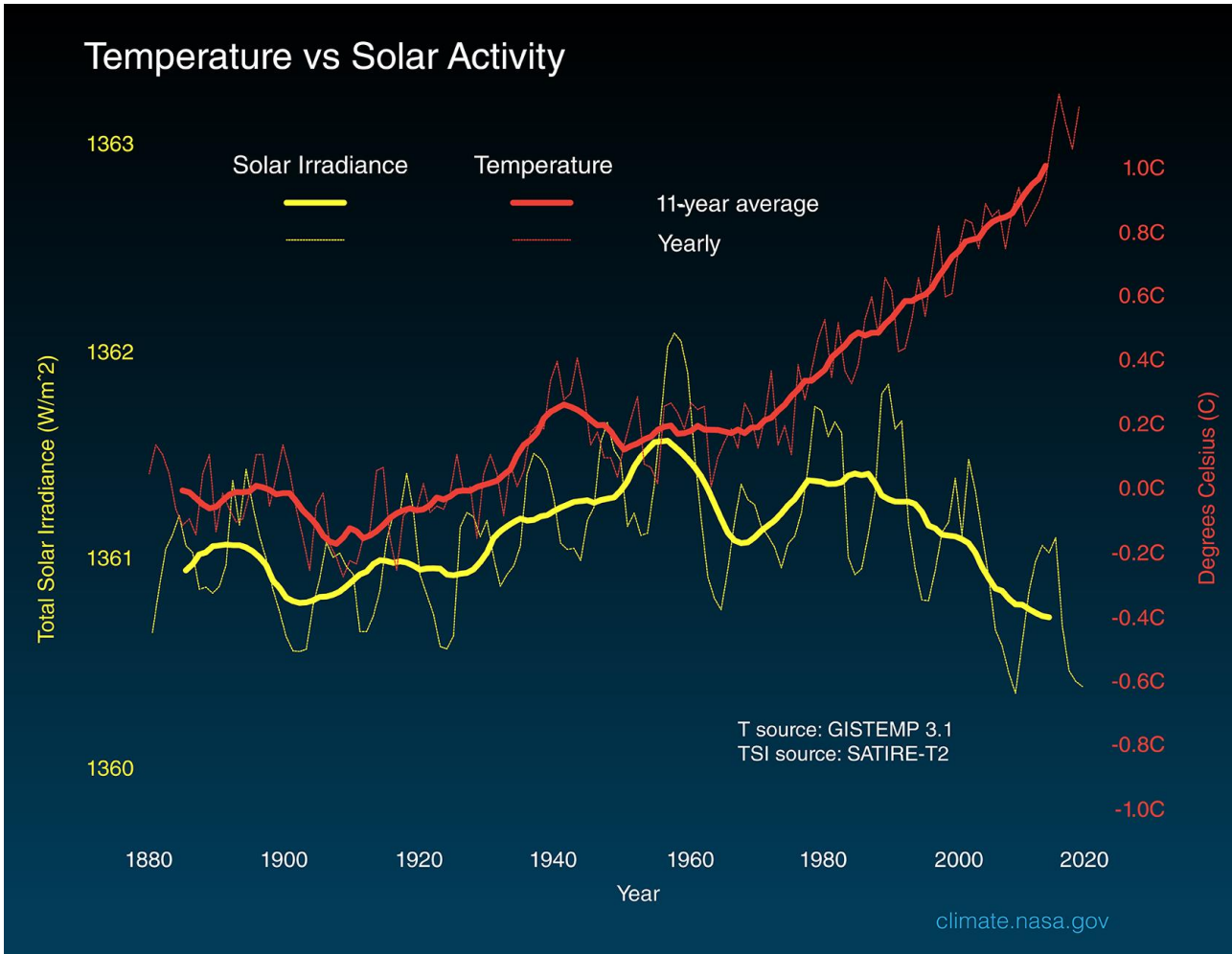
Professor Piran White and Dr Alona Armstrong

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 - Climate and biodiversity change
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The context: climate change and biodiversity loss



Sources: Nasa and
Global Carbon Project

The context: climate change and biodiversity loss

VISUAL CAPITALIST DATASTREAM

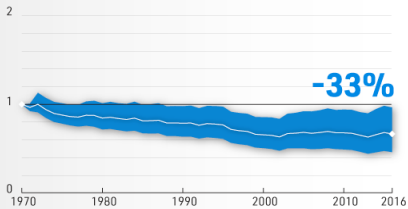
VISUALIZING THE REGIONAL DECLINE OF EARTH'S BIODIVERSITY

The Living Planet Index (LPI) tracks the abundance of mammals, birds, fish, reptiles, and amphibians across the globe.



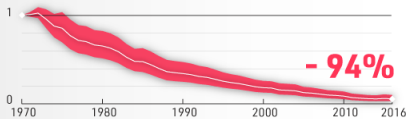
Between 1970 and 2016, vertebrate population sizes dropped by 68% on average worldwide. However, this rate of this loss varies from region to region.

NORTH AMERICA

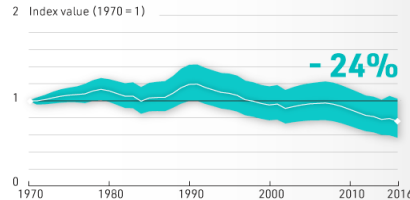


LATIN AMERICA & CARIBBEAN

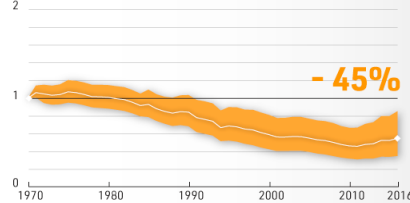
Latin America & Caribbean has seen the largest drop in biodiversity at 94%, mainly driven by a significant decline in reptile, amphibian, and fish populations.



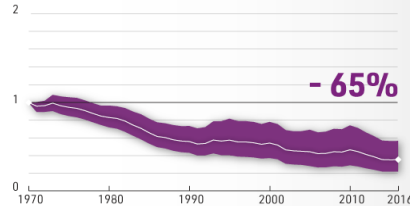
EUROPE



ASIA



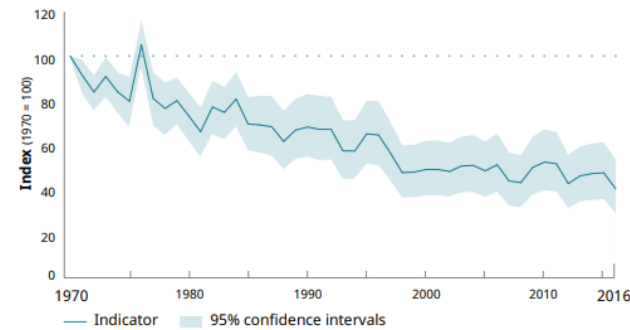
AFRICA



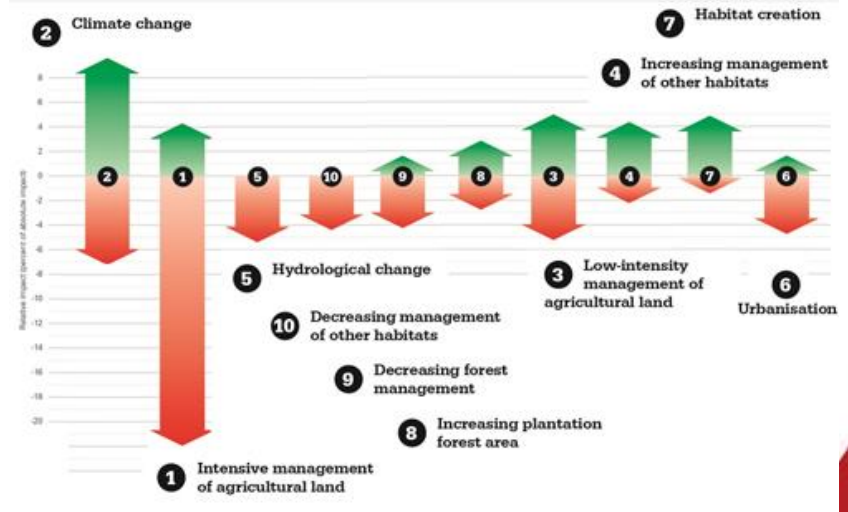
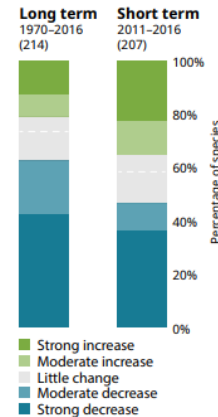
Source: Living Planet Report 2020

UK Biodiversity Indicator: Change in the relative abundance of UK priority species, 1970 to 2016

Abundance indicator (214 species)

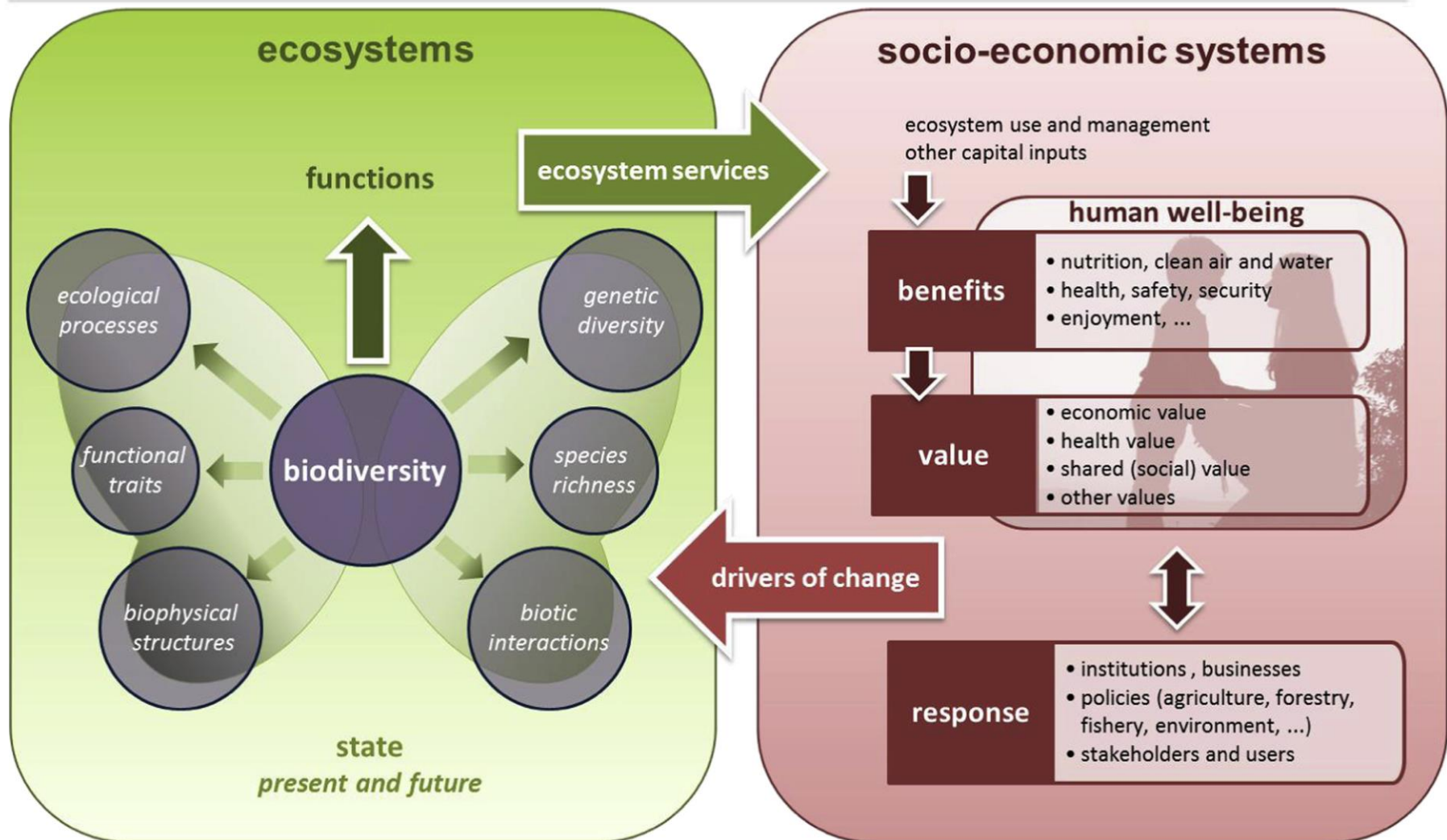


Source: jncc.gov.uk/ukbi-C4a



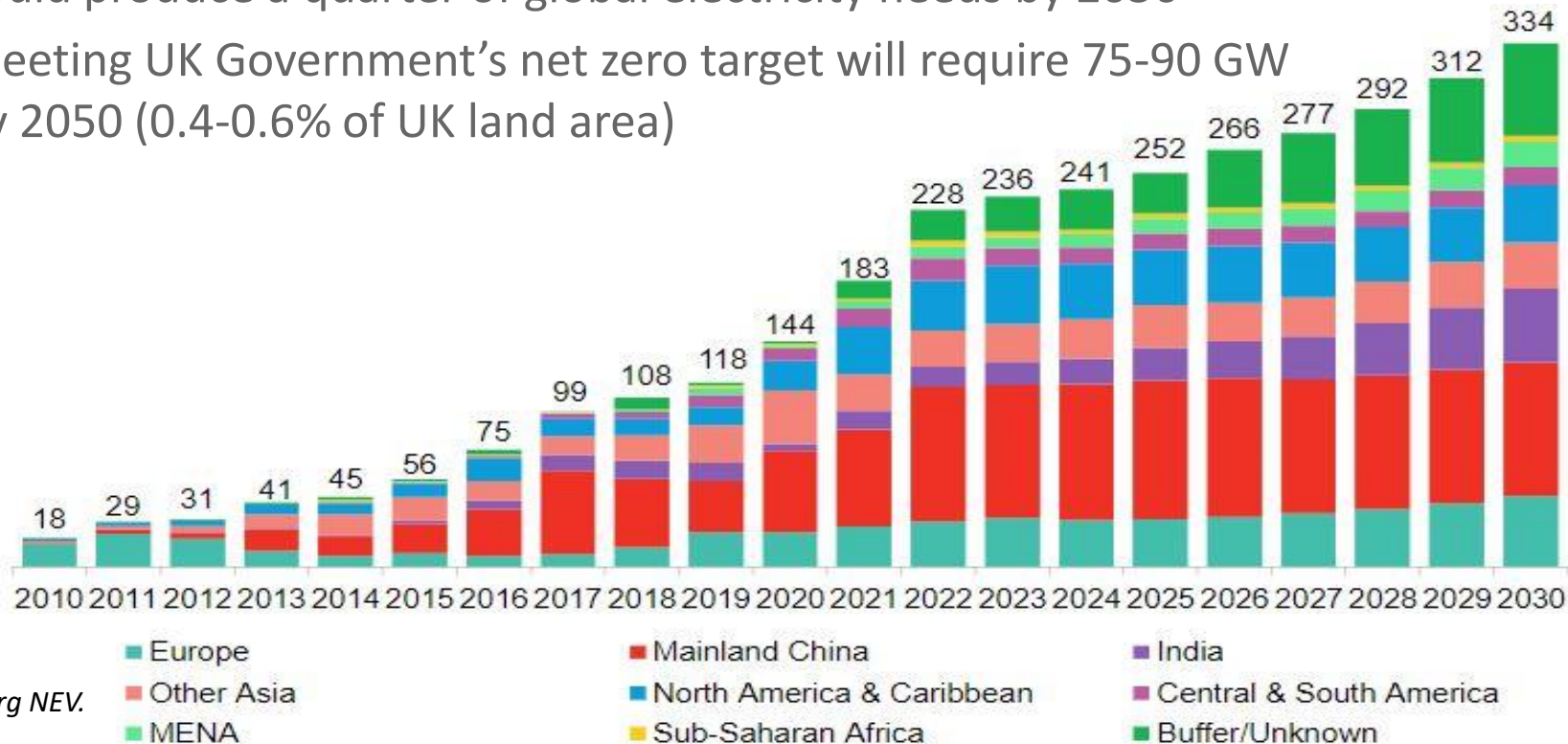
Sources: Living Planet Index and State of Nature 2019.

Why does biodiversity matter?



Global trends in solar PV

- Solar PV will increase in future
 - installations doubled between 2018-2021; now >1TW globally and 15 GW in UK (<0.1% of land area)
 - could produce a quarter of global electricity needs by 2050
 - Meeting UK Government's net zero target will require 75-90 GW by 2050 (0.4-0.6% of UK land area)



Opportunities from solar PV

- Can we design and manage solar parks to increase environmental and other co-benefits?
- Could solar parks contribute to reducing both the climate and biodiversity crises, help restore soil quality, and meet policy commitments for the environment?



HM Government

The Natural Choice:
securing the value
of nature



Solar parks: evidence for benefits to biodiversity and ecosystem services



UNIVERSITY
of York

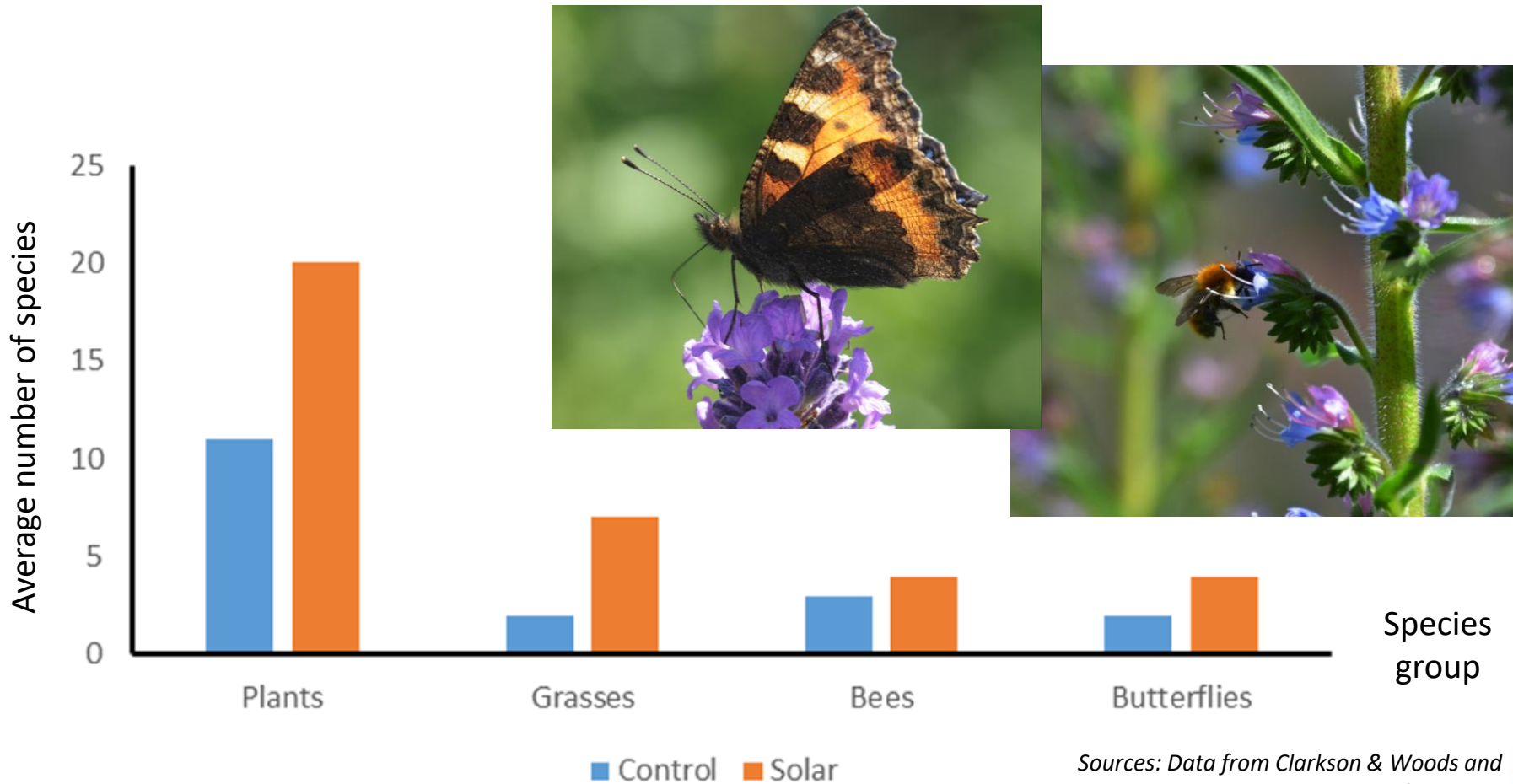


Lancaster
University

- The UK solar industry is a world leader on ecologically-sensitive developments
- Extensive data collected by industry and researchers demonstrate nature-positive benefits from well-managed solar parks
- Benefits extend to the surrounding landscapes



Solar parks can deliver biodiversity benefits compared with existing land uses



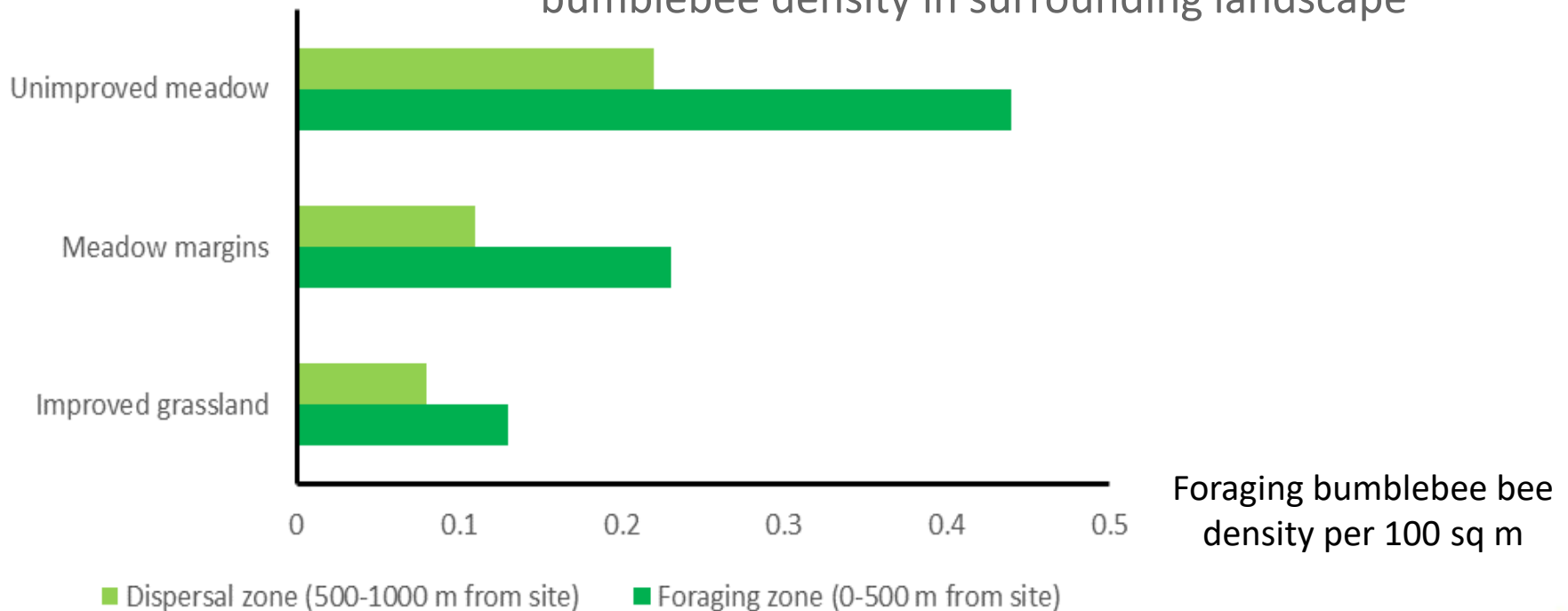
Sources: Data from Clarkson & Woods and Wychwood Biodiversity; images from OPAL project (Imperial College) and Butterfly Conservation



Biodiversity benefits extend to surrounding landscape

- Bumble bees benefit both within and beyond solar parks
- Solar park management is most important determinant of bee nesting and foraging numbers
- Larger solar parks more effective at increasing bumblebee density in surrounding landscape

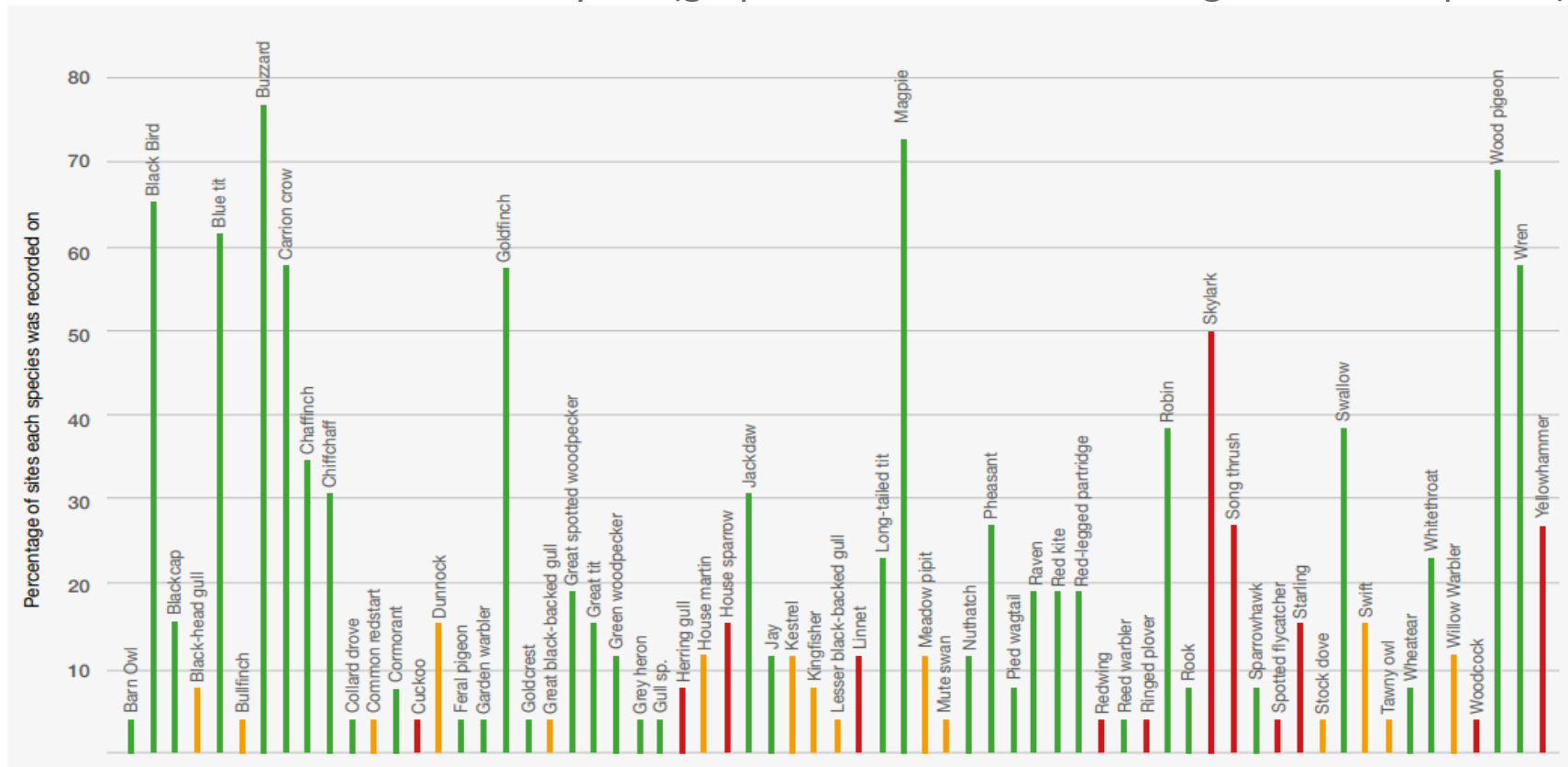
Management of solar park





Solar parks impacts on birds

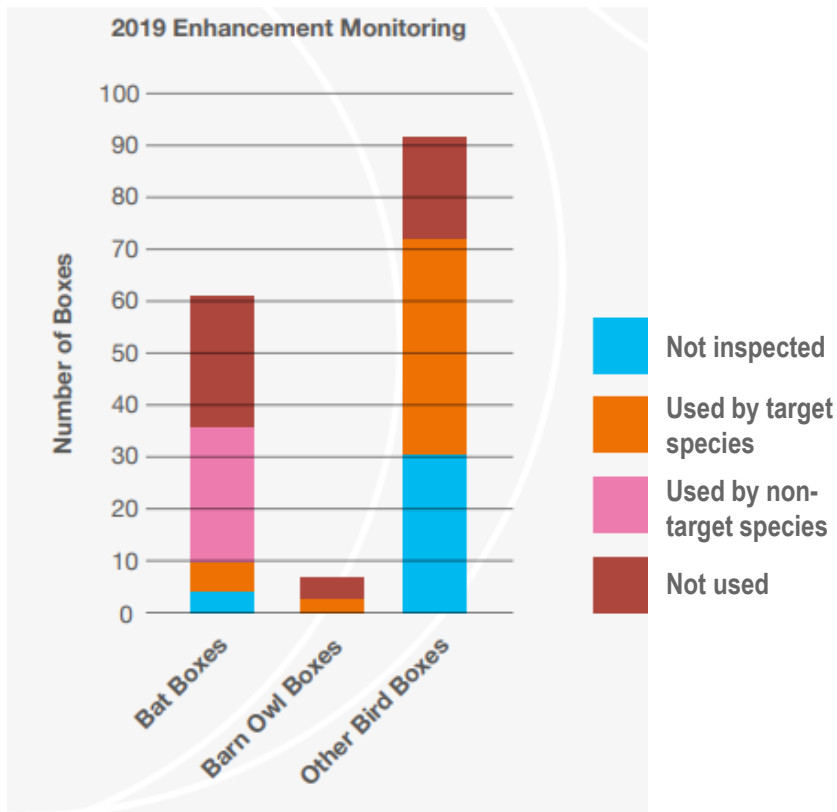
- Birds use solar parks for foraging and sometimes nesting
- Across 59 solar parks monitored by Clarkson and Woods, most common species of conservation concern was skylark (graph shows red, amber and green-listed species)





Solar parks provide opportunities for habitat enhancement for species

- Solar parks can be enhanced by bird and bat boxes
- Uptake rates observed by Clarkson and Woods:
 - bat boxes: 10% by bats, 44% by birds
 - bird boxes: 68% used, of which 70% were by tit species

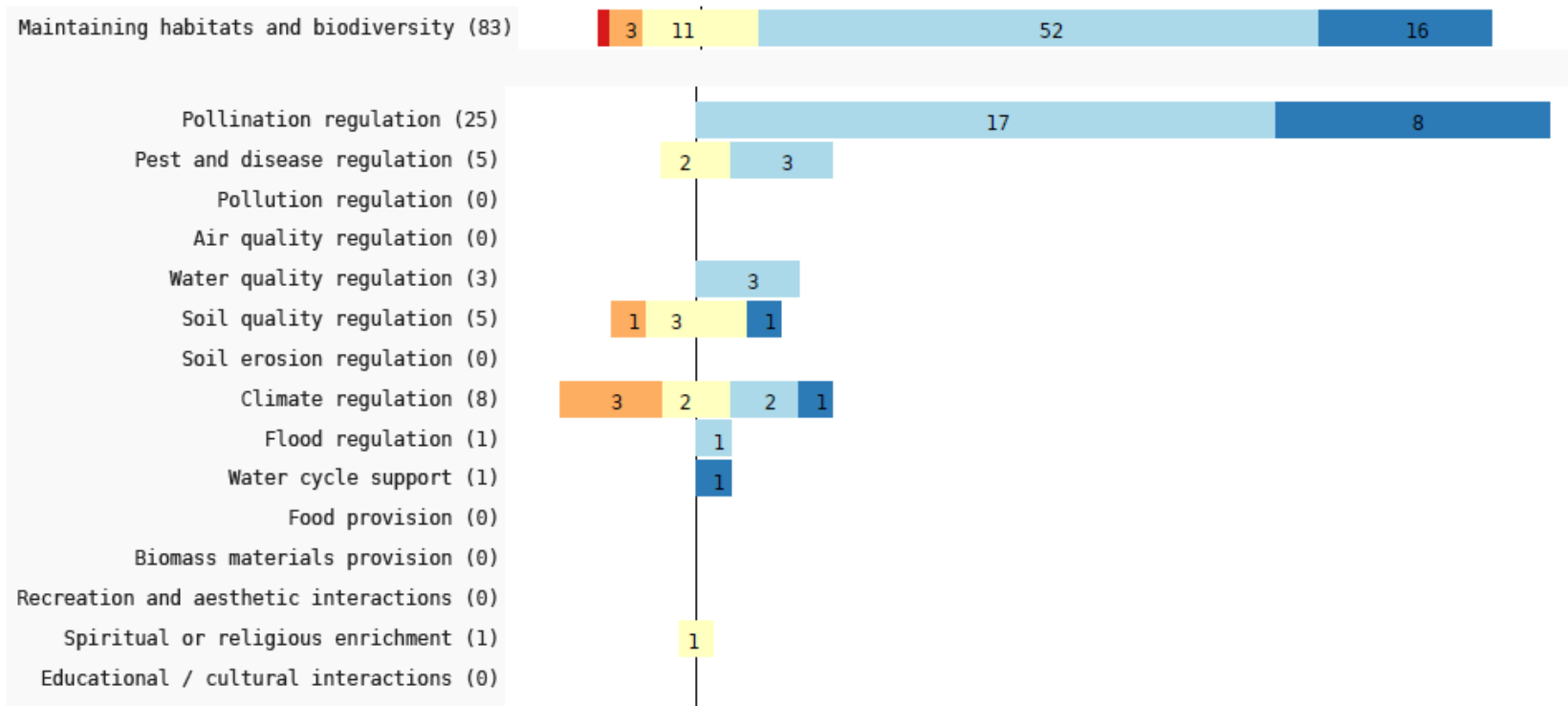


Sources: Data from Solarview, Clarkson and Woods, 2019; image from British Solar Renewables

Well-managed solar parks can enhance multiple ecosystem services



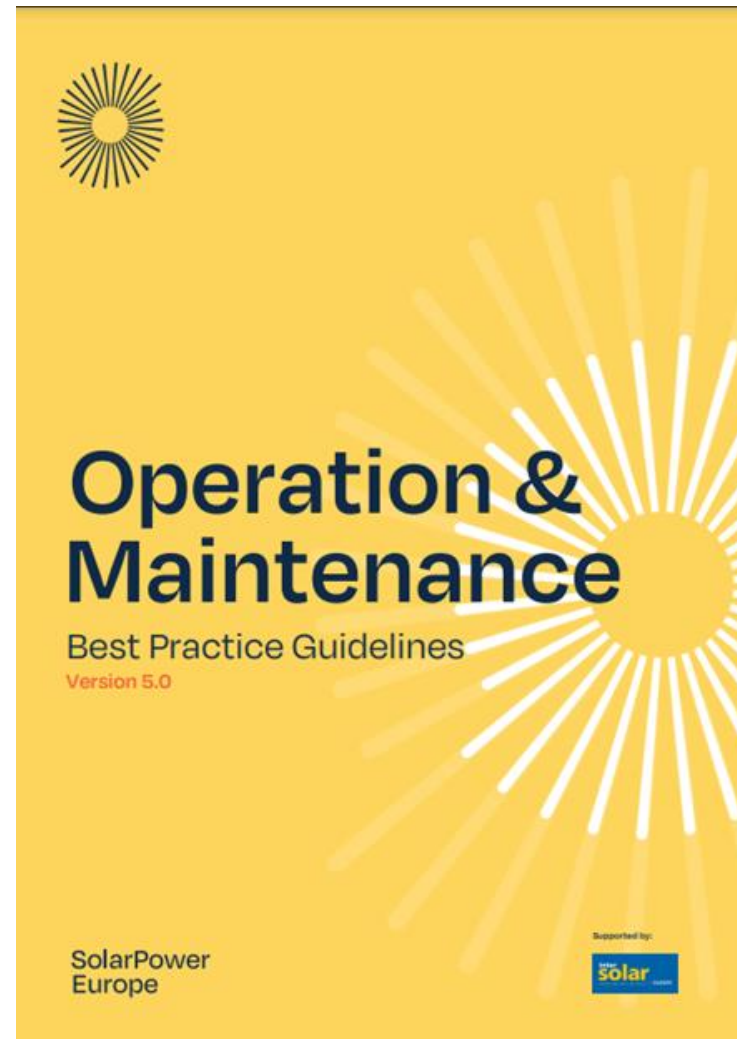
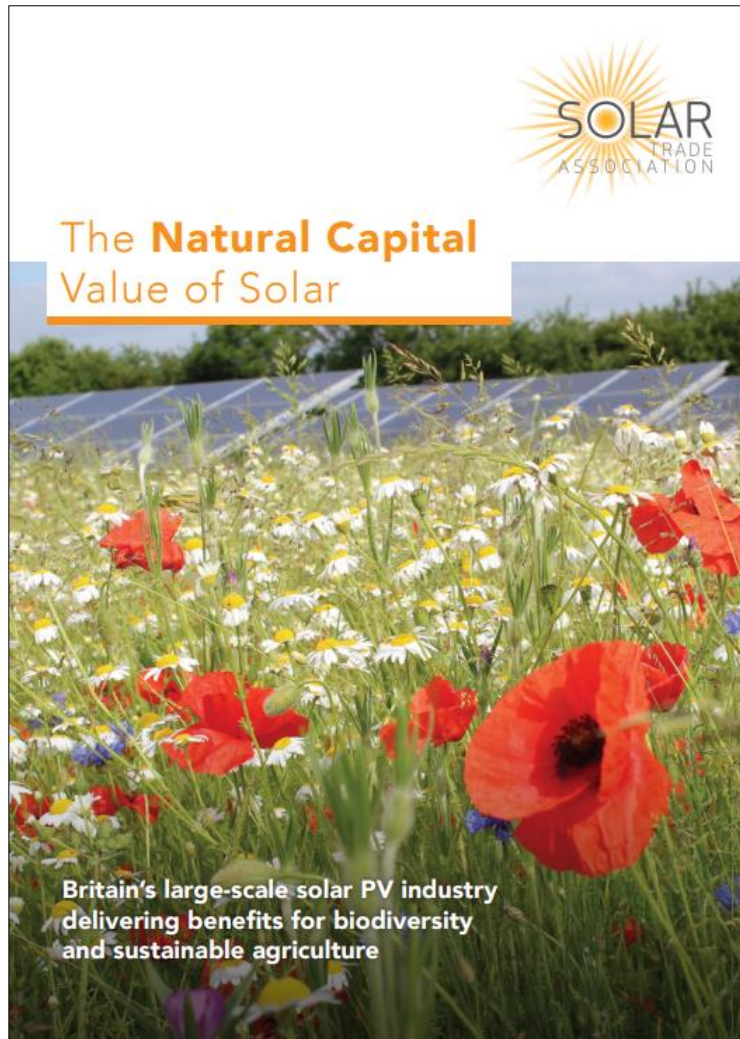
- Predicted ecosystem service changes through following management actions:
 - sow wild flower mix; create marginal habitat; install bird and bat boxes; cease fertiliser and pesticide use



Number of Pieces of Evidence

Source: Solar Park Impacts on Ecosystem Services, A Armstrong & P. White, www.spies.simomics.com

Industry uptake



Summary



- The climate and biodiversity crises need urgent solutions.
- Solar parks, when managed well, provide opportunities for enhancement of biodiversity.
- They can deliver increases in plant diversity, and invertebrates including butterflies and bees, and provide foraging habitats for birds and bats.
- They can also provide significant increases in ecosystem services, especially pollination.



Thank you to collaborators:

- Fabio Carvalho and Hollie Blaydes, Lancaster University
- Guy Parker, Wychwood Biodiversity
- Hannah Montag and Tom Clarkson, Clarkson and Woods



Please send any comments to: piran.white@york.ac.uk

Further reading:

Solar Energy UK (2022) *Natural capital best practice guidance: increasing biodiversity at all stages of a solar farm's lifecycle*. STA.
Solar Trade Association (2019) *The natural capital value of solar*. STA.

