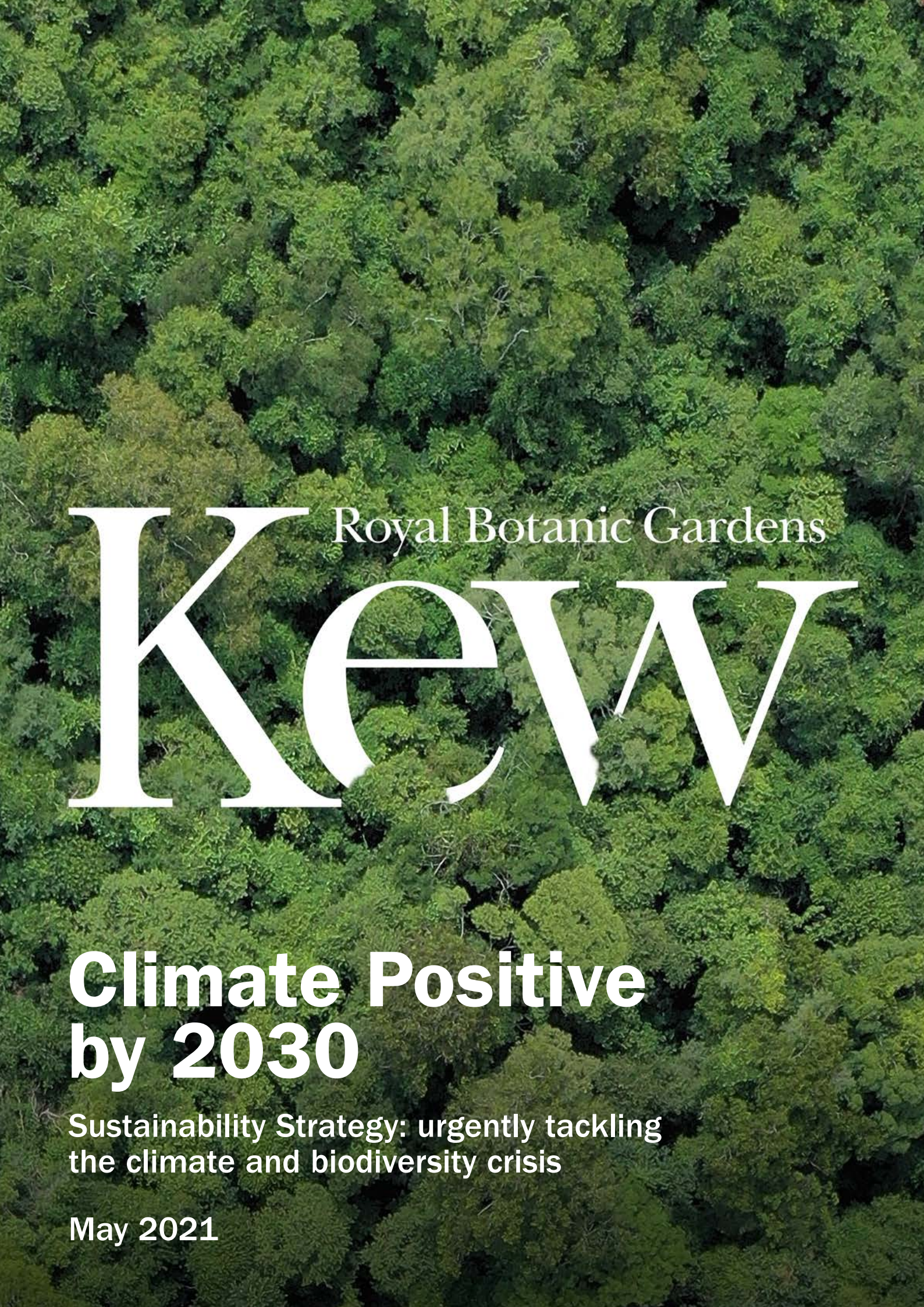
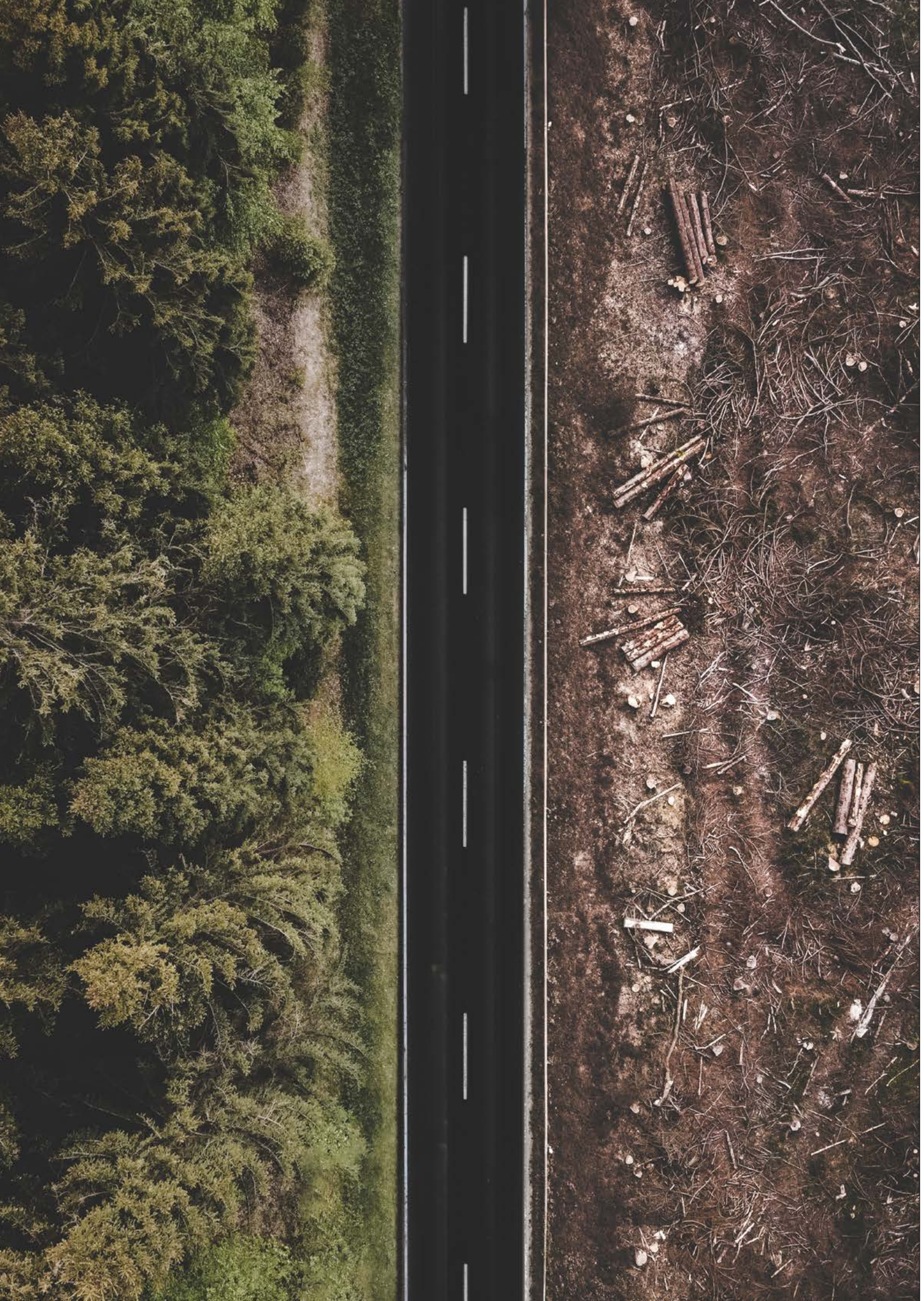


Climate Positive by 2030

Sustainability Strategy: urgently tackling the climate and biodiversity crisis

May 2021



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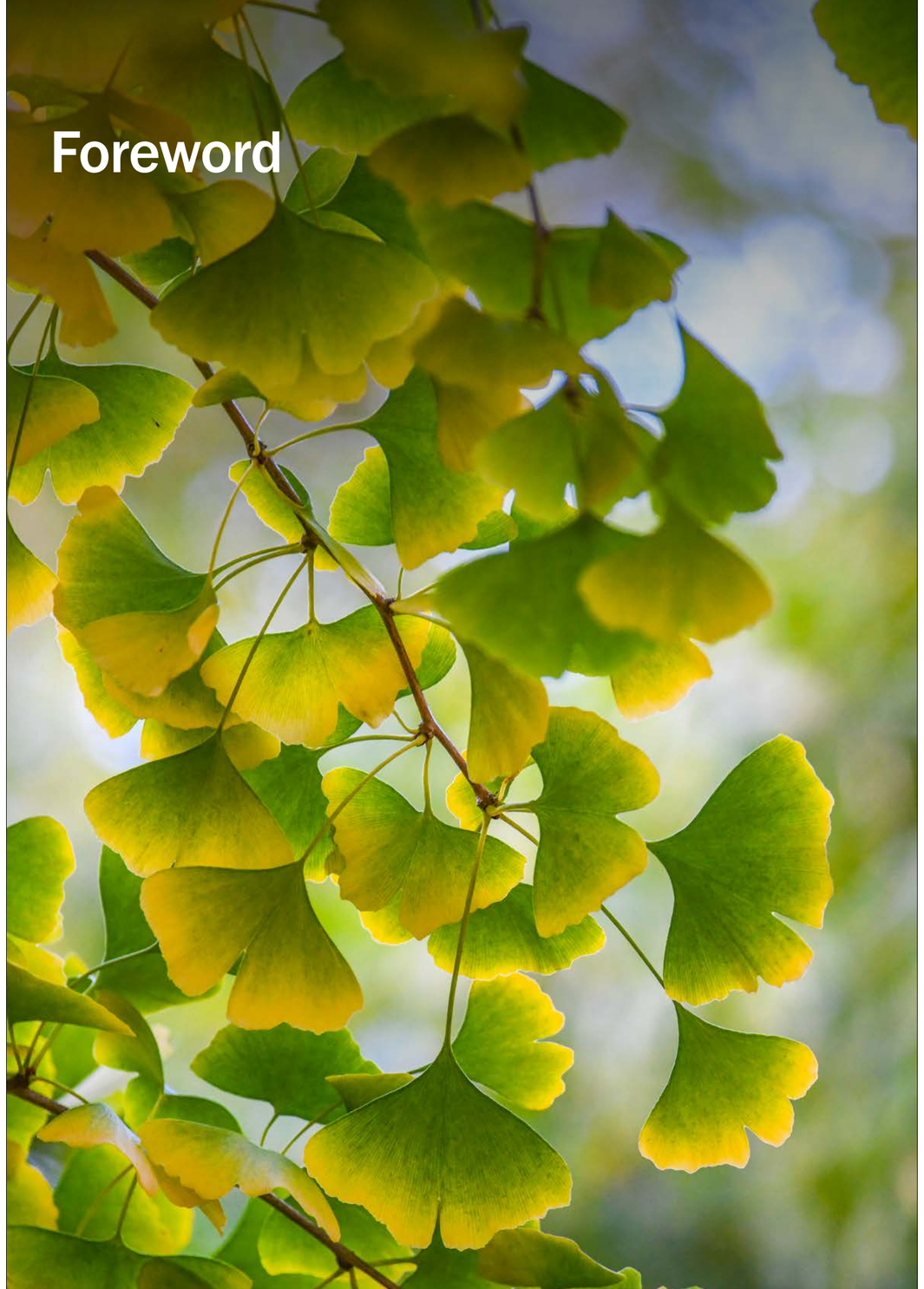


Foreword

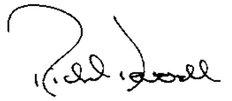
The scientific evidence is clear: our planet faces twin crises of climate change and biodiversity loss, both caused by humanity. The risk is acute and current. Many of Earth's natural systems, and the huge benefits they provide to humankind, are in the process of being disrupted, degraded and destroyed. The consequences for our planet, and humanity, are daunting.

However, we also know a great deal about what needs to be done to address these challenges. In many cases there is scientific consensus on the actions required. What contribution will the Royal Botanic Gardens, Kew make?

This is a question we have considered carefully; our response is summarised in three documents published this year. Our 'Manifesto for Change' is our corporate strategy and sets out an ambitious programme to refocus all of our actions towards ending biodiversity loss and mitigating the impact of climate change. Our Scientific Priorities, also covering the period to 2030, set out in more detail our research, conservation and science-education goals. This Sustainability Strategy details our commitment to becoming an exemplar for environmental responsibility in all that we do.

RBG Kew commits to ensuring that our own operations and activities will be climate positive by 2030. Furthermore, we will use our scientific and horticultural expertise and our voice to advocate for sustainable action, to shape policy and influence behaviour. This document sets out what we intend to do, and how we will deliver this.

It is essential that we act now, and with ambition and urgency. As many leading experts have made clear, delay exacerbates the problem. I believe it is essential that Kew is seen to be an exemplar of environmental best practice. Therefore, despite the many challenges we face, including the need to fund these changes, I am determined that we deliver this strategy in full, and I am confident we will do so.



Richard Deverell
Director of RBG, Kew

'I want you to act as if the house is on fire, because it is.'

Greta Thunberg, 2019

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Tackling the environmental emergency

Climate change and biodiversity loss are an incalculable and immediate threat to our health, safety and well-being. Humanity stands at a crossroads. We must choose the urgent path to sustainability – protecting and restoring our natural world – if we are to avoid crossing potentially irreversible tipping points. The choices we make in this decade will have impacts for thousands of years to come.

The race to zero carbon, and to protect and restore vital ecosystems, will require major societal and organisational change. But acting to protect our climate and natural resources can also bring transformative benefits to human health, well-being and livelihoods. This urgent transition has huge potential for positive transformation across all aspects of our lives.

The Royal Botanic Gardens, Kew is in a unique position to catalyse change towards a better path for humanity: one where we thrive in balance with our planet and its precious web of life.

Three pathways to sustainability

This strategy sets out three pathways to sustainable change: through our Action, Expertise, and Voice, we will work to tackle the climate and biodiversity crisis and support progress towards the UN Sustainable Development Goals.

Action

Operating in a sustainable manner: minimising climate and resource impacts in the actions we take, to ensure we are climate positive by 2030.

Expertise

Using our world-leading expertise to shape and evidence sustainable practices, and support nature-based solutions for climate, biodiversity and sustainable livelihoods.

Voice

Using our respected voice to shine a spotlight on the importance of environmental sustainability, inspiring and empowering our audiences to celebrate and protect nature, and take action to tackle climate change.

Headline sustainability commitments

- ☑ We will become climate positive by 2030 and reduce carbon emissions below science-based limits for 1.5 °C warming.
- ☑ We will develop a detailed carbon-reduction pathway, and a carbon offsetting policy for our future investment in high-quality nature-based offsets.
- ☑ We will establish site-wide strategies for energy, water and waste.
- ☑ We will work with our suppliers to understand and minimise negative impacts of our supply chains.

Throughout this strategy we set out the tangible actions we will take to respond to the environmental emergency within each area of our operations and our work. These commitments are identified with a ☑ at the base of each section of the strategy, plus a complete list in the *Appendix*.

Our 2030 vision

- We are climate positive by 2030, with science-based absolute emissions reductions
- We transparently share our journey and collaborate to support others to reach their sustainability goals
- We lead discussion on global sustainability challenges and solutions
- We manage our land for net environmental gain including carbon, biodiversity and well-being
- Every visitor and partner has a strong sense of how they can join us in fighting for a sustainable world
- CO_2 We will measure and increase nature-based carbon storage in our sites and conservation projects
- We support growing global investment in high-quality nature-based solutions
- Our buildings, sites and collections will have plans for climate resilience and adaptation

To reach climate positive, we will

- Transition away from fossil fuels on our sites
- Travel less, and choose low-carbon transport wherever possible
- Measure and reduce emissions from our supply chains
- Report transparently on our sustainability performance
- Implement an energy strategy to support low-carbon electrification
- Use resources efficiently and transition towards a circular economy
- Invest in nature-based carbon sinks
- Maintain our ISO14001 certification

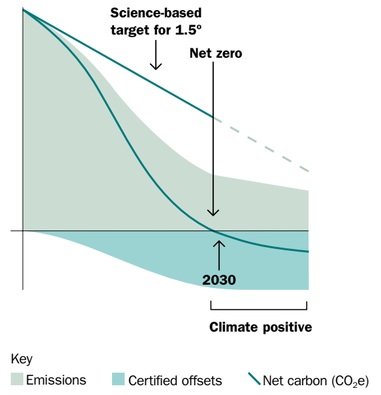
Climate positive by 2030, with science-based emission reductions

We have set a science-based absolute carbon reduction target (or carbon budget). Our priority is to reduce our carbon footprint (scope 1, 2 and 3 emissions) as rapidly as possible and in line with climate science (science-based target).
We have established RBG Kew's baseline emissions, including core and wider scope 3 emissions. Core scope 3 emissions are those we could estimate with reasonable confidence, while wider scope 3 emissions have a greater uncertainty.

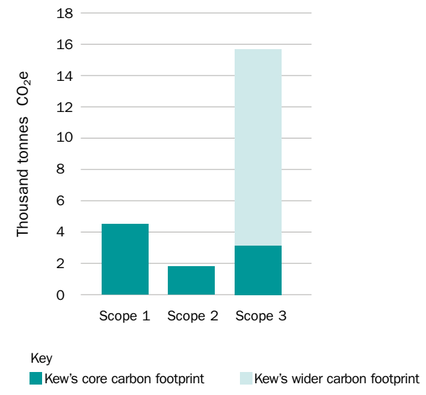
We will develop a decarbonisation plan to rapidly reduce emissions within our direct control, and work closely with our supply chain to better understand and accurately quantify value-chain emissions, encouraging our suppliers to set their own science-based targets. This collaboration will be essential to enable us to more accurately quantify our wider scope 3 emissions, and include them within our absolute reduction target by 2025.

We will develop a rigorous offsetting policy, selecting high-quality, certified, nature-based carbon offsets to more-than-balance our unavoidable emissions and become climate positive by 2030.

Illustrative pathway to climate positive



RBG Kew GHG emissions 2019–20



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Who we are

Our mission is to understand and protect plants and fungi for the well-being of people and the future of all life on Earth.

The Royal Botanic Gardens, Kew (RBG Kew[1]) fights to protect global biodiversity and illuminate the crucial importance of plants and fungi in sustaining our lives, moderating our climate and providing ecological balance for the benefit of all life on Earth. Human actions have created a global emergency, placing nature at risk of irreversible damage. Now, we have an invaluable opportunity to be a leader. We stand at a collective crossroads, and this strategy sets out our choice to take the urgent path to sustainability.

Our sites, collections and people
RBG Kew manages two extraordinary UK sites – Kew Gardens, a UNESCO World Heritage Site, and Wakehurst in Sussex – and a conservation centre in Madagascar. In our living collections at both UK sites, we protect over 27,000 species and varieties. In addition, the Millennium Seed Bank at Wakehurst preserves over 39,000 species. Between these sites we manage 565 biodiverse and treasured hectares of land (including two conservation areas) and maintain over 300 structures (including 56 listed buildings and structures). Our wider collections include 8.25 million preserved plant and fungal specimens, and 200,000 scientific drawings. Kew employs over 1,000 staff, including 350 scientists and 150 horticulturists, working passionately to protect and promote the value of plants and fungi. We inspire over 2 million visitors a year to connect with nature.

Environmental emergency
We will tackle the interwoven climate and biodiversity crises not just through our work, but also the way we manage our sites, and through our supply chains and partnerships. Kew is proud to have received ISO14001 Environmental Management System certification for the past 15 years[2], recognising our commitment to continual improvement in environmental management and performance. However, in keeping with the scale of these crises, this strategy marks a step-change. Along with organisations around the world, tackling the environmental emergency must sit at very heart of everything we do. This shift will not always be easy. It will involve detailed scrutiny, and difficult choices. In some cases that may involve changing our plans if we cannot deliver them in a fully sustainable manner – for example, prioritising investment in efficient and resilient infrastructure on our sites. We are committed to fully assessing climate impacts in deciding what we do and how.

Manifesto for Change
RBG Kew's new Manifesto for Change sets out our clear, vital role in striving to reverse environmental destruction and restore our planet to health. Our aspiration is to end the extinction crisis and to help create a world where nature is protected, managed sustainably, and valued by all. We will work in partnerships nationally and globally to maximise our impact. And we will act with the utmost urgency and agility.
You can find the Manifesto for Change on our website: *kew.org*

Kew strategies
In addition to the Manifesto for Change, the Sustainability Strategy will support and be supported by strategies and plans across Kew, including but not limited to:

- 2019 Living Collections Strategy
- Science Strategy 2021–2030
- World Heritage Site Management Plan
- Estates' 10-year maintenance plan
- People and Culture Strategy, and Equality, Diversity and Inclusion Strategy
- ISO14001 Environmental Management System

For 260 years, RBG Kew's goal has been to further humanity's understanding of plants and fungi. Now our purpose is to understand, protect and find ways to sustainably use the natural resources that support life on Earth, while fighting biodiversity loss and the climate crisis.

RBG Kew Manifesto for Change, 2021

[1]RBG Kew is a non-departmental public body sponsored and regulated by Defra, and an exempt charity. 'RBG Kew' or 'Kew' are used within this strategy to refer to our organisation as a whole (including Kew Enterprises), but where we are referring to a single site only we state 'Kew Gardens' or 'Wakehurst'. RBG Kew Enterprises Limited is a trading company wholly owned by RBG Kew, which operates commercial activities including venue hire, retail, trademark licensing, and some events. All profits are gift-aided to Kew and used to support Kew's work.
[2]ISO14001 certification since 2005 at Kew Gardens and 2008 at Wakehurst; UKAS accredited certification body.

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Urgent action: from global to local

Figure 1. The UN Sustainable Development Goals

From local to global, RBG Kew plays an important role in leading and supporting the transition to new ways of doing things, in balance with nature and the planet. Below we set out the context of this transition.

Sustainable Development Goals
The Sustainable Development Goals (SDGs) are a framework of 17 global goals across the three pillars of sustainability: economic, social and environmental. They are the blueprint for coordinated global actions to support an equitable and sustainable future.

The SDGs set out a global path for sustainable development which governments, organisations and individuals can support. They also provide a key framework through which Kew's work links to global progress towards sustainable livelihoods, equality and the protection of nature.

Global warming and the destruction of nature could push millions towards poverty and greater inequality[3]. There is a high risk that the costs of climate change and the actions to mitigate it are likely to fall disproportionately on the global poor. In tackling the climate and biodiversity crisis, we must therefore prioritise actions that promote equality, participatory decision-making and global sustainable development – acting to reduce the burden falling unfairly on those least able to afford it.

Kew's work contributes directly to many areas covered by the 169 targets and indicators set out by the SDGs, but also indirectly: at least eight of the SDGs are undermined by nature's decline[4]. The Global Goals are interconnected – protecting and restoring nature can deliver a huge range of consequential benefits for people and planet. Throughout this strategy we will spotlight support for various SDGs using these icons at the start of each section:

Biodiversity loss and natural capital
The recent Dasgupta Review[5] on the economics of biodiversity, published in February 2021, starkly highlights the failures of global systems to manage the vital global asset that is biodiversity – and the losses of natural capital that have driven human prosperity, especially in the last half-century. In order to transition to a sustainable relationship with nature, we must transform our economic systems to avoid further degradation of natural capital, minimise loss of biodiversity and its natural assets, and account for the value of nature.

[3]World Bank: Impact of Climate Change on Extreme Poverty
[4]Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 'Biodiversity and Nature's Contributions Continue Dangerous Decline'.
[5]The Economics of Biodiversity: The Dasgupta Review (2021)

Global carbon targets
The 2015 Paris Agreement set out an international commitment to limit global warming to well below 2°C above pre-industrial levels, and to pursue efforts to limit warming to 1.5°C. In 2018, the International Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C highlighted the significant reduction in climate risk if warming can be limited to 1.5°C compared to 2°C[6]. To achieve this, global carbon emissions must reach net zero around mid-century. This transition to zero carbon will be harder for some than others, and leadership is required from developed countries and responsible organisations to pave the way to net zero well before the 2050 deadline. Over two thirds of global GDP is covered by a net zero commitment[7]. Many countries and organisations have set targets earlier than 2050.

Climate Emergency
In 2019 the UK government declared a Climate Emergency, legislating a requirement to reach net zero by 2050. The Climate Change Committee, which sets the UK's carbon budgets, recommended this legally binding target: 'net zero is necessary, feasible and cost-effective'. In 2020 the UK government committed to an emissions reduction of 68% by 2030, and the sixth carbon budget requires a 78% cut by 2035, across all UK sectors[8].

2020s: a crucial decade
Significant progress towards net zero must begin this decade. Globally, emissions must fall by 8% every year between 2020 and 2030, to achieve 45% emissions reduction by 2030[9]. This is approximately the same scale of annual emissions reduction as was caused by the initial COVID-19 lockdown[10].

2021 must serve as a crucial 'super-year' for the environment, setting out the path for a green recovery and for organisations and governments to deliver on the 'Race to Zero'. RBG Kew is working to support two globally important conferences taking place this year, COP26 (on climate change) and COP15 (on biological diversity). We are backing the negotiations on new biodiversity targets, providing examples and metrics to support new initiatives, and building public engagement around key issues such as biodiversity loss, green economic recovery and nature-based solutions.

Greening Government Commitments
The Greening Government Commitments (GGCs) set five-yearly targets to improve the environmental sustainability performance of the government's estate and operations. Kew has reported against these targets since 2012[11]. A new round of targets, delayed due to COVID-19, is due to be launched in spring 2021. These will serve as specific, measurable, medium-term targets across a wide range of topics from emissions reductions, to resource use, to nature recovery. Kew aims to meet, if not exceed, the 2021–2025 targets, and pave the way by making decisive changes that encourage others to follow. The commitments within this strategy align with the direction and intention of the GGCs but are mostly non-numerical to avoid duplication.

Local government
Both of our local councils (at Kew Gardens, the London Borough of Richmond upon Thames; at Wakehurst, West Sussex County Council) have set 2030 targets – for carbon neutrality and net zero respectively. We will work with both councils wherever possible to support climate action within our local borough and county regions – particularly on matters such as transportation and regional energy infrastructure.

We must start [to decarbonise] immediately – the longer we put it off, the more expensive and difficult it will be.

Lord Deben, Chairman of the Committee on Climate Change, 2020

[6]IPCC Special Report on the impacts of 1.5°C warming.
[7]Energy and Climate Intelligence Unit 'Taking stock: a global assessment of net zero targets'.
[8]Visit gov.uk for the UK's Nationally Determined Contribution and the Climate Change Committee for the UK's 6th carbon budget.
[9]United Nations Environment Programme Emissions Gap Report.
[10]International Energy Agency Global Energy Review.
[11]Kew reports GGC performance quarterly to Defra – the summary annual report can be found at www.gov.uk.

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Our changing climate

Human activity has so far led to an average global temperature rise of over 1°C since pre-industrial levels, and significant impacts are being felt. Even if global emissions stopped today, we are locked in to future warming – changes we are already seeing in our climate are set to get much more severe.

Tipping points

Human activity, such as greenhouse gas emissions and habitat destruction, is pushing our planet's natural and biophysical systems over their limits. Up to a certain point, many of these systems are resilient, acting to balance these human impacts – forests and oceans absorbing more CO_2 as atmospheric levels increase, for instance.

However, as we continue to force change upon natural systems, we run the risk of triggering potentially irreversible tipping points, such as the loss of sea ice, melting permafrost, or rainforest ecosystems experiencing a 'regime shift', transforming to savannah vegetation. Some research suggests we are already dangerously close to the threshold for several tipping points, although mitigating greenhouse gas emissions could still slow down the inevitable accumulation of impacts[11].

Climate adaptation: local

In south-east England it is likely that climate impacts in the near future will include the following:

- Summer and winter average temperatures will increase.
- Winter precipitation will increase, and arrive in more intense bursts.
- Summers will become drier, and heatwaves will get much more frequent.
- Spring and summer will arrive earlier, affecting plants, fungi and ecosystems.

[11]Lenton et al, 2019. Climate Tipping Points

Changes to our climate, and weather extremes, are likely to impact RBG Kew in many ways. This includes undermining the health of our living collections, the quality of our soils, the availability of water, the health of our rivers and ponds, human health and well-being, the reliability of our infrastructure and buildings, and our ability to protect our heritage and cultural assets, as well as bringing about an increased occurrence of pests and diseases, and an increased risk of flooding.

We will assess climate change vulnerabilities and integrate this knowledge into site management decisions, including our landscape planting and the design of new buildings, to prepare for future impacts and protect our collections and sites. We plan to undertake a Climate Risk Assessment, and will investigate the possibility of joining the Climate Change Adaptation Reporting process under the National Adaptation Programme. We also aim to make use of the Climate Change Alliance of Botanic Gardens' new Climate Risk Assessment Tool for living collections. The World Heritage Site Management Plan for Kew Gardens also sets out our need to consider climate change risk in all aspects of site management and build climate resilience into all future developments.

Climate adaptation: global

Climate change will also affect Kew's supply chains – our partners and suppliers will be challenged by the greater weather extremes around the world. Wherever possible we will engage with our suppliers to plan for these impacts and reshape our value chains adaptively to meet future conditions.

We can choose a path of reconstruction and regeneration, and at least diminish the negative impacts of climate change to something that is manageable.
But we can only choose it this decade. Our parents did not have this choice, because they didn't have the capital, technologies and understanding. And for our children, it will be too late. So this is the decade and we are the generation.

Christiana Figueres, 2020

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Nature-based solutions for climate

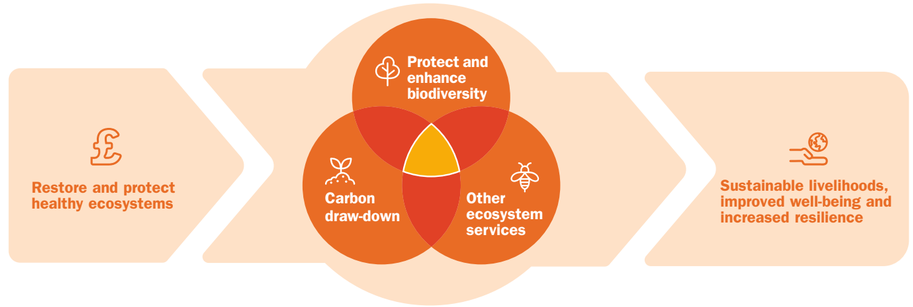
Nature-based solutions (NBS) are actions to protect, sustainably manage and restore natural or modified ecosystems, which tackle societal challenges such as climate change in ways that benefit biodiversity and human well-being. NBS are a crucial element of climate mitigation and climate adaptation (see *Glossary*), and NBS for climate are sometimes known as natural climate solutions. There is rapidly growing investment by companies and governments around the world into natural climate solutions such as tree planting or peatland restoration.

Solutions must be deployed to meet the urgent need to remove carbon from the atmosphere. Natural habitats are currently the cheapest way to draw-down and store (sequester) carbon. The concept of NBS recognises that natural systems can provide multiple, simultaneous, often cascading benefits, including a stabilised climate, protected biodiversity and sustainable development.

The restoration and regeneration of nature is not an option that we have the luxury merely to consider. It is a necessity, an imperative, to ensure our survival.

HRH The Prince of Wales, February 2021

Figure 2. Nature-based solutions
Nature-based solutions are an opportunity to direct investment in carbon offsetting towards restoration and protection of healthy ecosystems. These can provide overlapping benefits including: increased carbon capture and sequestration (climate mitigation); conservation and enhancement of biodiversity; other ecosystem services such as water purification, flood protection, food, provision of raw materials, pollination, soil stabilisation and protection, cooling and shading.



While technological solutions may also form part of the response to the climate crisis, they will not provide the wide-ranging co-benefits available from nature.

Investing to protect and restore healthy ecosystems and habitats can provide the simultaneous solutions we need: a stable climate, precious biodiversity and sustainable development. However, there is potential for conflicts between objectives, especially where the impacts of an intervention are not fully understood.

Poorly delivered NBS, such as planting the wrong trees in the wrong place, can have unintended negative consequences – damaging biodiversity and livelihoods or releasing previously stored carbon. RBG Kew will use its expertise and voice to highlight the importance of using the right NBS in the right location (see ***Box 8: Reforestation to optimise carbon sequestration, biodiversity recovery and livelihood benefits***). Scientific expertise has a crucial role to play in directing both policy and the wave of investment in carbon offsetting, to prevent these unintended consequences and maximise co-benefits.

Kew will support nature-based solutions across all three pathways in this strategy: Action, Expertise and Voice. We work to identify and understand plant and fungal diversity and its contribution to maintaining a healthy and sustainable planet. We will also work with local partners to deliver these solutions, protecting and restoring habitats to deliver wider-ranging benefits locally and globally. We will use our trusted voice to discuss the challenges and opportunities, and use our unique position to call for high-quality NBS for climate, biodiversity and sustainable livelihoods.

- RBG Kew's Manifesto for Change identifies an important role for Kew in working with others to support the implementation of science- and nature-based solutions.
- We will facilitate understanding and support of nature-based solutions for climate, biodiversity and well-being, helping public audiences and corporate investors understand the importance of high-quality nature-based solutions.

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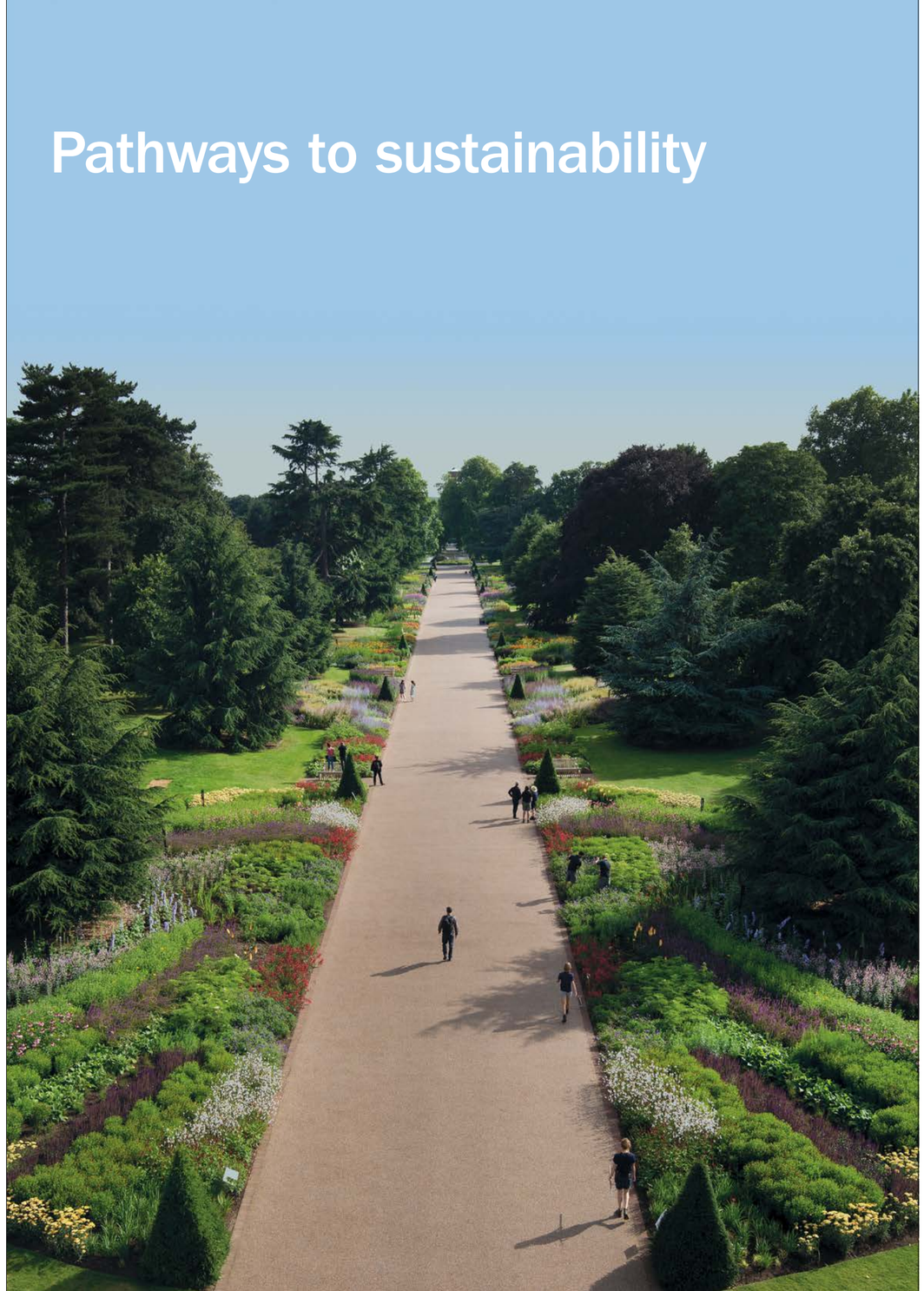

Three pathways to sustainability

RBG Kew has a role in tackling the climate and biodiversity emergencies beyond managing the ways we operate. Working with partners worldwide, we also use our world-leading organisational expertise to deliver and evidence sustainable practices and nature-based solutions, and we use our respected voice to inspire, empower and advocate for sustainable action from our wide-ranging audiences.

We will set out our commitments to champion sustainability under these three pathways.

By 2050, there will be two billion more people on the planet. We will need to find ways to sustainably feed and house everyone, under changing climatic conditions, while revitalising nature. If we are to succeed, we have no time to lose.
RBG Kew Manifesto for Change, 2021

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To become climate positive across RBG Kew's operations by 2030, we will act to minimise climate and resource impacts across our work. This will involve changing the ways we travel, heat and power our buildings and glasshouses, use resources, and work with suppliers. Some of these changes will have rapid and significant carbon implications, but others represent broader or more gradual contributions to a transition to sustainable systems. We will need to invest in sustainable infrastructure and solutions – but failing to take urgent action is the higher-cost pathway, one in which we are not prepared for the interconnected challenges of the decades to come.

1.1 Climate positive by 2030

SDGs

Overview

RBG Kew has taken its first steps on the crucial path to becoming climate positive (***Fig 3***) – a commitment to go beyond net zero carbon emissions. In 2020 we conducted an analysis of our carbon footprint across all activities, including our indirect (scope 3) emissions (***Fig 5***). We have established our emissions boundaries (***Fig 6***) and set a science-based absolute carbon reduction target (***Fig 7***). We will work to urgently develop the detail of Kew's carbon reduction pathway scenarios and the implementation plans on the path to climate positivity (***Fig 8*** & ***Fig 9***).

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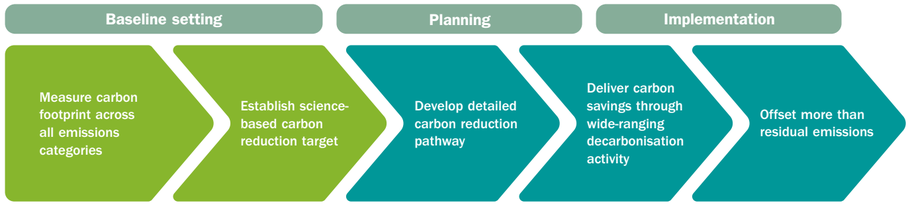
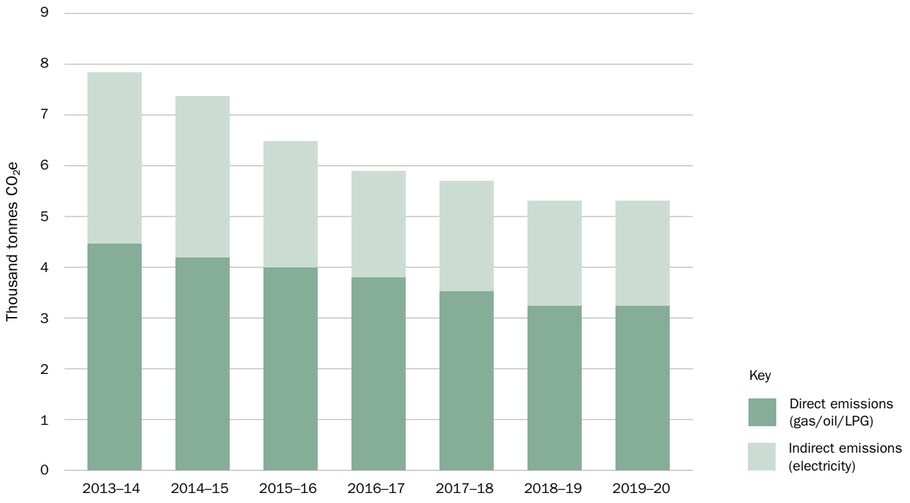
Figure 3. The five point plan to become climate positive



1.1.1 Baseline setting

Kew has reported carbon emissions from buildings (electricity and heat) within our Annual Report and Accounts for nearly ten years – and these emissions have been steadily reducing (***Fig 4***). These reductions have been achieved through investment in our estate, such as draught-proofing and insulation measures, Combined Heat and Power (CHP) installation, LED lighting, voltage optimisation and upgrade of other electrical infrastructure, and the installation of a biomass boiler within the Temperate House. The emissions from electricity use have also steadily declined during this period due to the rapidly reducing carbon intensity of the UK electricity grid.

Figure 4. GHG emissions as reported annually in 'RBG Kew Annual Reports and Accounts'.
Previous years' figures include heat and power of buildings and glasshouses but exclude some scope 1 categories (CHP emissions, vehicle fuel, fugitive emissions).



[12]Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard.
[13]Scope 2 emissions are reported using location-based emissions factors. If we choose to also report market-based emissions factors in future this will be via a dual reporting approach (see glossary for definitions).

Scope 1, 2 and 3 emissions
Carbon emissions (CO_2e) come from many organisational and value chain activities, as set out in the Greenhouse Gas Protocol[12]. Scope 1 and 2 emissions (direct emissions from on-site activities, and indirect emissions from generation of electricity) can be quantified with reasonable accuracy. However, many categories of scope 3 (indirect, or 'value-chain') emissions can be very challenging to measure.

- Scope 1 – direct emissions such as gas heating and vehicle fuel.
- Scope 2 – indirect emissions from purchased energy, such as electricity generation.
- Scope 3 – indirect emissions from our value chain: upstream and downstream emissions from activities that we do not directly control.

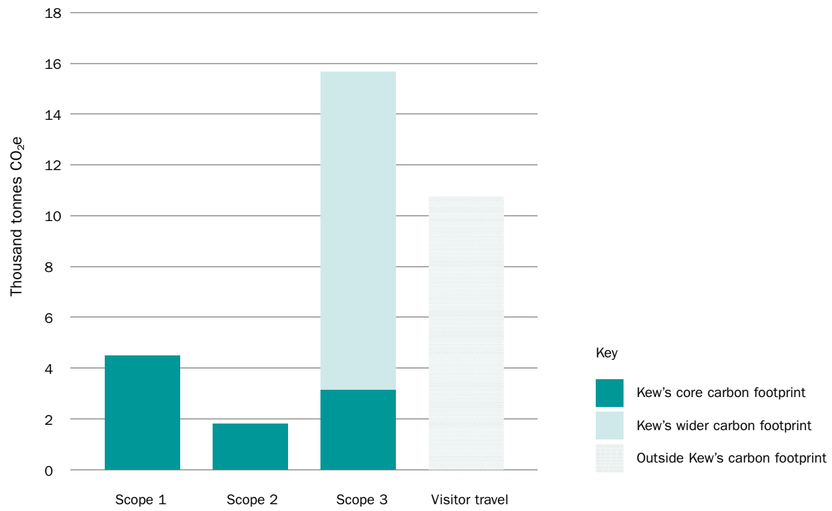
We have estimated our 2019–20 baseline emissions using GHG Protocol methodologies for scope 1, 2 and 3, verified by a consultant (***see Fig 5***)[13]. Kew will continue to take action to reduce scope 1 and 2 emissions from on-site activities as rapidly as possible.

Scope 3 emissions are estimated to form ~70% of Kew's emissions. It is common for scope 3 to represent a dominant proportion of organisational emissions. This identifies the vital importance of collaboration: we must work with suppliers across our value chain to accurately quantify and reduce indirect emissions.

Core scope 3
We have included scope 3 categories within 'core' emissions where we are confident that the quantification is reasonably accurate, and actions to reduce these emissions will deliver quantifiable reductions. Core scope 3 emissions categories include business travel, emissions from employee commuting, energy-related scope 3 emissions, waste, water and investments.

Wider scope 3
Several significant scope 3 emissions categories, such as purchased goods and services, and capital goods, are challenging to quantify, and the error margin on our baseline estimate is large. For these categories where lack of data or clarity limits our confidence in emissions reduction pathways, our priority will be to establish strong partnerships with our suppliers. Our focus will be to measure the carbon emissions from our value chain, and seek quantifiable reductions as soon as we are able. Emissions from downstream leased assets are included within our wider footprint – this likely to be a very small proportion of our footprint (<0.5%), but it is not currently measurable with accuracy due to lack of sub-metering data.

Figure 5. RBG Kew baseline emissions for 2019–20
Scope 1, scope 2, and core scope 3 GHG emissions can be quantified with reasonable accuracy. We also show an estimate of our wider scope 3 GHG emissions and visitor travel emissions – these categories have a much wider margin of error.



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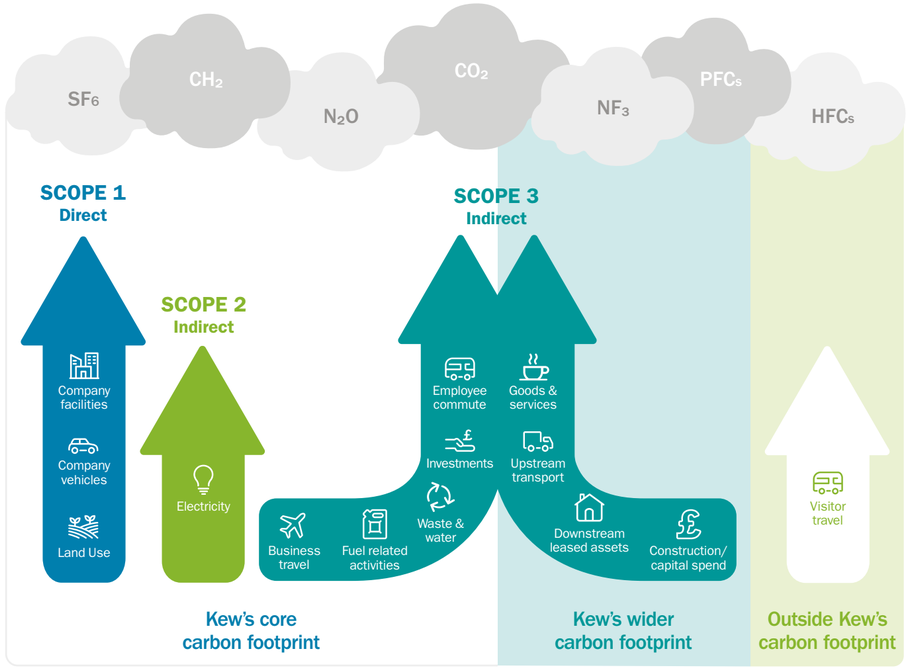
Visitor travel
Emissions from visitor travel to Kew Gardens and Wakehurst fall outside our organisational emissions boundary. However, we can estimate these emissions, and we will track this annual estimate. We will continue to encourage and enable sustainable travel to our sites to influence a reduction in emissions from visitor journeys (see ***1.4.2 Travel to our sites***).

Figure 6. RBG Kew organisational emissions boundaries.
This shows the categories that fall within our core GHG emissions, our wider GHG emissions, and those emissions outside our organisational boundary which we will try to influence.



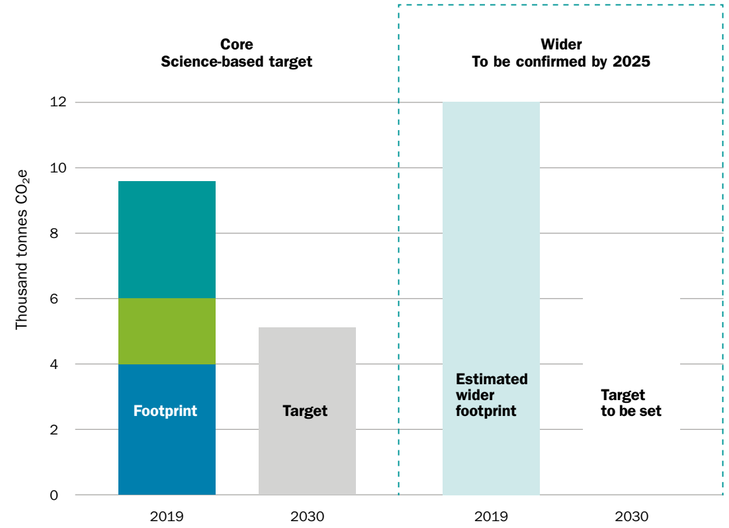
- We will report scope 1, scope 2 and core scope 3 emissions annually.
- We will work to measure more accurately our wider scope 3 emissions, and include these categories within our organisational emissions reporting and science-based target by 2025.

1.1.2 Science-based targets

A science-based target (SBT) is an absolute emissions reduction pathway, or a 'carbon budget' as established by climate science. The methodology sets a limit on allowable emissions to avoid warming over catastrophic thresholds. Kew has used the Science-Based Targets initiative (SBTi) methodology[14] for a warming limit of 1.5 °C to calculate our SBT, which represents an upper limit on our absolute emissions by 2030. Our SBT requires us to emit 46.2% less CO_2e in 2030 than our 2019/20 baseline – as shown in ***Fig 7***.

Until we are able to better quantify our wider scope 3 emissions, this SBT applies to our core carbon footprint (scope 1, 2 and core scope 3). We will also engage with our supply chain and encourage them to set their own SBTs and seek emissions reductions as urgently as possible within our wider footprint.

Figure 7. Emissions reduction by 2030
Our science-based absolute emissions reduction target requires a 46% decrease by 2030. We have not yet set a SBT for wider scope 3 emissions, due to the wide margin of error in the baseline estimate, but we will work to do so by 2025.



- We will reduce our core carbon footprint as rapidly as possible, below our science-based emissions reduction target.
- We will encourage our suppliers to set verified science-based emissions reduction targets.
- We will include wider scope 3 emissions within our science-based emissions reduction target by 2025

[14]Visit sciencebasedtargets.org.

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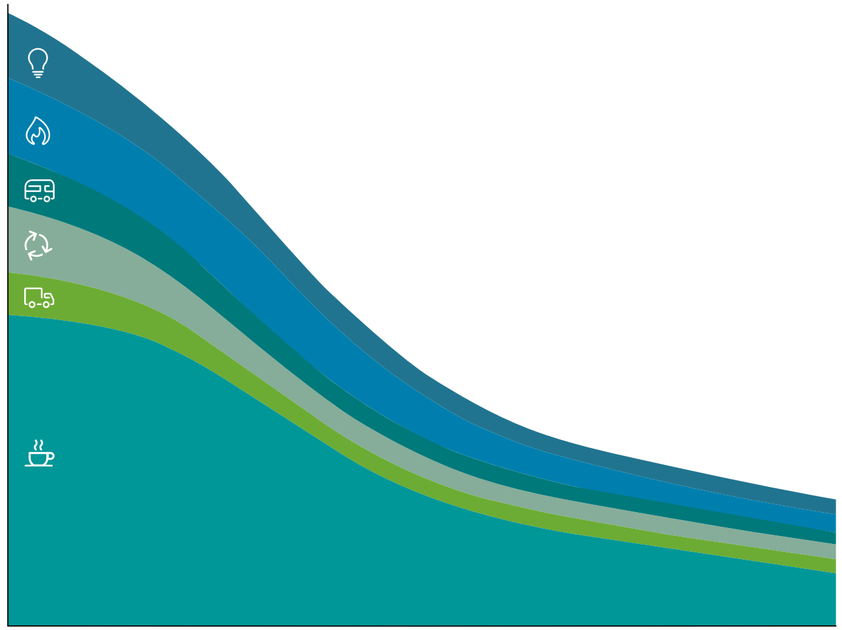
1.1.3 Planning emissions reductions

Kew has reduced scope 1 and 2 emissions from energy and buildings over the past decade (***Fig 4***), but additional reduction across wider emissions sources will be necessary to meet our science-based reduction target.

Carbon reductions will continue to be delivered through the decarbonisation of electricity, the installation of energy efficiency measures (including our ongoing LED lighting replacement programme), the transition to electric vehicles, and the uptake of more sustainable behaviours (such as video conferencing and reduced commuting). We also have work underway to introduce automatic meter-reading equipment, which will vastly increase our ability to monitor, understand and further reduce energy use across our buildings and glasshouses.

Figure 8. Illustrative decarbonisation pathway
This figure shows an example decarbonisation pathway, identifying the sources of emissions that we will need to reduce, and the types of actions we must take to reduce our emissions as rapidly as possible.



Electricity:
Energy efficient buildings. Maximise renewable energy.

Commuting:
Reduce emissions from journeys to work.

Travel and transport:
Transition to electric vehicles. Low-carbon travel choices.

Fuel use:
Transition away from fossil fuels to low carbon heating.

Efficient use of resources:
Reduce water and waste. Transition to circular economy.

Purchased goods and services:
Reduce emissions across supply chains and construction.

We will also require new projects and investment to reduce our carbon emissions – such as the installation of on-site renewables, and the transition to electric heat. Specific areas of activity are discussed in more detail over the following pages of this strategy. Starting in 2021 we will work to develop our detailed decarbonisation pathway, identifying our carbon reduction priorities and timescales. An example pathway, identifying the emissions sources that we will need to reduce over time, is shown in ***Fig 8***.

We will develop our planned carbon reduction pathway, identifying reduction scenarios and setting key priorities for carbon reduction.

1.1.4 Carbon offsetting

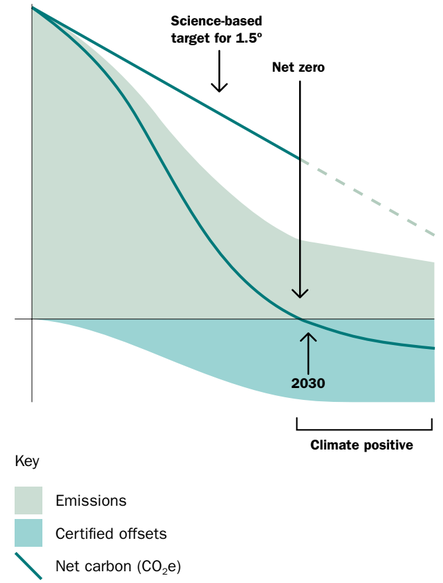
Avoiding emissions must always be prioritised over continuing to emit greenhouse gases and offsetting them. However, there are some emissions that cannot be avoided, such as the essential flights taken by Kew scientists to support international conservation. There are other emission sources that may take us longer to reduce than we would like: constraints such as our historic estate and the complex needs of our collections may make it hard to adopt new low-carbon technology across our buildings and glasshouses by 2030.

Carbon offsetting must never be used as an alternative to preventing avoidable emissions. But that does not make offsetting a 'last resort', to be delayed as long as possible. We will invest in certified offsets in the form of high-quality nature-based carbon sinks to more-than-balance residual emissions from all sources by 2030, if not sooner. Certain categories of emissions, such as flights, will be offset by 2025, if not sooner.

We will develop a carbon offsetting policy identifying our selection of certified offsets. We will set rigorous requirements for the offsets we select. We will invest in a portfolio of nature-based offsets (nature-based solutions) which offer valuable co-benefits in addition to long-term carbon sequestration, and we will be completely transparent about the offsets we select.

Where possible we will also maximise carbon sequestration on our own land (see ***1.3 Managing our land***) and through projects with our partners (see ***2.1.1 Scientific priorities***). Where sufficient quantification, permanence, and additionality can be evidenced for this sequestration to be certified as an offset we will seek to do so, but much of the carbon that is drawn down and stored within our own land or partner projects is not likely to meet the rigorous standards required for a certified carbon offset (see ***Box 7***). Where sequestration within our land or conservation projects is not externally certified it will not be counted as an offset against Kew's residual emissions, and would only be reported separately as a wider contribution towards climate positivity.

Figure 9.
Illustrative pathway to climate positive, with science-based target



We will invest in high-quality nature-based offsets which maximise biodiversity and well-being co-benefits. We will offset more than our residual emissions by 2030, if not sooner, and report transparently on the offsets used.

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1.2 Energy, buildings and glasshouses

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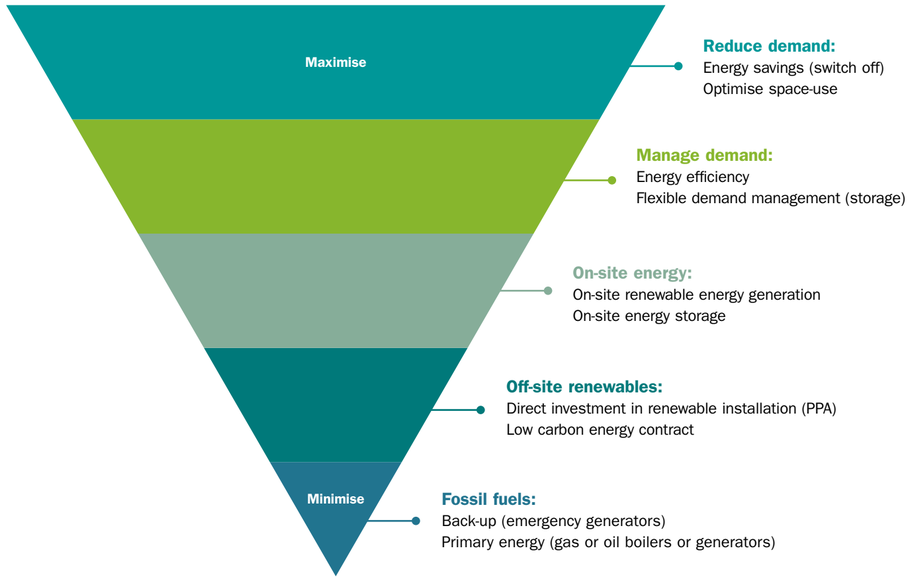
Heating and powering RBG Kew's buildings and glasshouses makes up a large proportion of our total energy demand, and around 60% of our core carbon footprint. At Kew Gardens and Wakehurst we manage many invaluable buildings and structures, of which 56 are listed. Our buildings and glasshouses also serve a vital function in protecting Kew's unique collections. As Kew Gardens is a UNESCO World Heritage Site, we have a responsibility to manage risks to the Outstanding Universal Value of the site and its rich architectural legacy.

1.2.1 Energy and renewable generation

Kew will develop an Energy Strategy, setting out how we will transition to zero carbon energy systems across our sites. We will investigate opportunities for energy and heat storage, heat recovery, and flexible or demand-side energy management. We will seek investment to maximise renewable generation on-site, and in addition aim to work directly with renewable generators to purchase renewable energy generated off-site (preferably via Power Purchase Agreements or similar).

Figure 10. Energy hierarchy



1.2.2 Heating

Within the Energy Strategy, we aim to identify the technology and infrastructure requirements to allow us to meet the year-round heating requirements of our two sites using low-carbon heat. This is likely to involve significant electrification and installation of heat pumps, requiring upgraded site-wide electrical infrastructure to replace traditional (fossil) fuel heating. Due to the nature of our sites and collections, the transition away from the use of gas, oil and LPG for heat will take time, investment and careful planning. We are currently installing our first Air Source Heat Pump (ASHP), along with Kew Gardens' first solar panels on our new Arboretum Headquarters (see ***Box 2***).

1.2.3 Laboratories

Kew scientists already take many steps to reduce the environmental impact of scientific work in our laboratories at Kew Gardens and Wakehurst. Building on this, we will also partner with universities taking active steps to develop sustainable laboratory best practice, and adopt frameworks to support progress in this area of impact. This will include addressing energy, waste, water and reuse opportunities within our laboratories.

1.2.4 New buildings

RBG Kew's new buildings are built to BREEAM Excellent or Outstanding standard[15], most recently the timber-framed Arboretum Headquarters and Family Kitchen & Shop at Kew Gardens, both opening in 2021. A BREEAM Excellent or Outstanding rating recognises significant environmental features in a building. However, the standard has not always driven the highly efficient building design and operational performance required to achieve the necessary energy and carbon reductions for the path to climate positivity. We will go further to seek truly exemplary environmental performance from our new buildings.

There are myriad new net-zero building standards. We will set benchmarks and rigorous targets, such as those identified in the UK Green Building Council Net Zero Framework, LETI Net Zero Design Guide, and RIBA 2030 Challenge[16]. Where feasible we will achieve Passivhaus standards for our new projects.

We will work to measure and report the whole-life carbon of our capital projects (embodied and operational carbon emissions), and apply the following principles to our design and construction processes:

- Minimise full life-cycle carbon impacts, seeking cradle-to-grave assessments of the impacts of materials used in our projects, and using natural, recycled or recyclable materials where possible.
- Minimise energy demand, taking a fabric-first approach.
- Establish processes to minimise the performance gap[17], including setting operational energy targets.
- Use 'net-zero ready' sources of heat such as heat pumps.
- Maximise renewable energy generation from each project.
- Take a site-wide approach if net zero cannot be achieved within the bounds of an individual project.
- Build flexible buildings that can be adapted to future needs and operate successfully under the demanding climatic conditions predicted in the future.
- Design buildings that enhance health and well-being.
- Use a soft-landings approach.
- Minimise the necessity for certified off-site carbon offsetting to achieve net zero.

We will conduct a review of the developing net zero and embodied carbon building standards and develop a framework for rigorous targets for sustainable building outcomes, based on the principles above.

- ☑ **We will develop energy strategies for Kew Gardens and Wakehurst, analysing our energy needs and infrastructure constraints, and mapping out a pathway to low-carbon electricity and heat for our buildings and glasshouses.**
- ☑ **We will build new buildings to a net-zero standard, utilising a site-wide approach where net zero cannot be achieved within the bounds of the project.**

[15]BREEAM is a sustainable building standard that accredits the environmental, social and financial sustainability credentials of building design – scoring certified projects from 'Good' to 'Outstanding'.
[16]Other standards and frameworks include WELL certification and RIBA Sustainable Outcomes.
[17]The performance gap: on average, non-domestic buildings use 3.6 times more energy than predicted by their designers.

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Box 1. Davies Alpine House – keeping cool using innovative thermal storage

The Davies Alpine House stores Kew's collection of alpine plants, many of which are rare and threatened. Alpine plants have many adaptations which allow them to grow in some of the most remote and hostile regions on Earth – but not the long and wet English winters. The Davies Alpine House is designed specifically to provide the necessary bright, cool and dry conditions in an energy efficient manner.

Unlike the other glasshouses at Kew Gardens, the Davies Alpine House must keep its inhabitants cool. Several ingenious design features allow this glasshouse to remain cold without using energy-intensive air conditioning systems.

Its specialised arched shape acts like a chimney, funnelling hot air towards the roof where it can escape through vents, while cooler air is drawn in at the bottom. When the temperature is too high, extra shade can be provided by four fan-shaped curtains which fold out to protect the plants. These block out the light and allow the internal temperature to cool again. Finally, a low-energy air circulation system takes room temperature air and passes it through a maze of underground pipes. Thus, thermal storage is used to provide chilled air from vents in the Alpine House, cooling the plants down using night-day thermal storage.

Box 2. Arboretum Headquarters

Opening later in 2021 at Kew, this BREEAM Excellent building (or potentially Outstanding – pending certification[18]) will be a fantastic new facility for our hard-working Arboretum teams. Through generous philanthropic support we have been able to maximise the renewable generation of the building through the installation of 39 photovoltaic panels. These solar panels will generate enough energy over the course of a year to fully support the fixed building services, and this energy generation will be displayed in real-time within the building.

Arb HQ is a 'net-zero ready' building, with high levels of insulation, heating from an Air Source Heat Pump, and a cross-laminated timber frame to reduce environmental impact and store carbon for the lifetime of the building. We are producing a full embodied carbon analysis to measure the whole-life carbon footprint of the building – the first time we have analysed these impacts at Kew – and we hope this will enable us to implement similar or greater lifetime carbon savings in future developments at Kew Gardens and Wakehurst.

[18]Awaiting building completion and final BREEAM certification at the time of publication.
[19]See e.g. Dallimer 2012, and Fuller 2007.

1.3 Managing our land

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Diverse living collections and innovative horticulture give Kew a valuable opportunity to manage resilient and sustainable landscapes. Through land management, we aim to deliver environmental net gain and be adaptable to changing climates and developing threats.

Our plant selections for designed and wild spaces will be ecologically attuned to our growing environments, using species and plant community selections capable of thriving in both current and future climate scenarios, with minimal horticultural inputs.

Our land will be managed to maintain a balanced range of ecosystem services: optimal carbon sequestration, hydrological regulation, pollinator provision, microbiome health, and well-being services. This will include support for local biodiversity, and we will measure and report our contributions such as provision of pollinator-friendly habitat, additional natural regeneration and tree establishment, and support for the UK Nature Recovery Network. Additionally, landscapes that are spatially and biologically diverse can have positive impacts on human well-being[19].

Our research into carbon in our landscapes will provide rich evidence of the interaction between our above- and below-ground biodiversity and carbon sequestration. Longitudinal research can inform our management practices, underpinning a commitment to a net gain in our estate's carbon stocks.

A biologically focused approach to soil health in our gardens, designed landscapes and habitats will minimise inorganic inputs (fertiliser, synthetic herbicides and pesticides). We will minimise monocultures whilst maximising continuous ground cover and use of indigenous organic matter. Kew Horticulture, Wakehurst and Science teams will work together to develop a biological baseline for our soils and base future management on a net gain principle.

Our future irrigation use will be minimised through selecting species with high fitness for our horticultural habitats, informed by biogeographic data. Planting systems and garden designs will focus on ecological establishment methods (i.e. directly seeded base layers, plug-planted design layers) to achieve maximum resilience and minimal dependence. Our irrigation systems will be underpinned by hydrological modelling, accounting for transpiration and shifting local meteorological norms, and use a scientific approach to maximise water capture and calibrate storage to site needs. See also ***Box 11 – Enhancing biodiversity at Wakehurst*** and ***Box 14 – Carbon Garden***.

We will maximise ecosystem services, including carbon sequestration, biodiversity and well-being, when making choices about how we manage our land.

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1.4.1 Business travel

Travel is very important to RBG Kew's international work, delivering scientific research and conservation in more than 110 countries around the world. This essential travel will continue, but Kew will minimise travel especially in the context of conferences and meetings. We will report the emissions from travel on an annual basis and implement a travel hierarchy which prioritises sustainable modes, avoiding domestic flights. We will update our travel policies, which will require rail travel to be preferred, where available, as an alternative to planned flights within Europe, and offset the flights we must take (see ***1.1.4 Carbon offsetting***).

- We will encourage and enable visitors and staff to use sustainable modes of travel to reach our sites.
- We will develop a new flexible working policy to support long-term reductions in commuter emissions.
- We will offset emissions from business travel by 2025, if not sooner.

1.4.2 Travel to our sites

In 2019, a travel survey was conducted and a Sustainable Travel Plan was developed for Kew Gardens, setting targets to increase the proportion of sustainable travel options (by foot, bicycle, public transport or car share) to site for Kew staff, contractors and visitors.

Our Sustainable Travel Plan can be found on ***kew.org***. Our World Heritage Site Management Plan also sets out our commitment to promote and encourage the use of sustainable forms of transport, both on-site and getting to Kew Gardens. Kew Gardens has established a Travel Plan Working Group to deliver progress towards these targets and coordinate measures to encourage and enable sustainable travel. As part of upcoming development plans for Wakehurst we plan to develop a Sustainable Travel Plan for the Wakehurst site, which will be made public when available.

1.5 Vehicles

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RBG Kew owns around 30 road vehicles, in addition to many horticultural vehicles (tractors, diggers, cherry pickers) and smaller buggies for transportation of people and goods around our sites. Many of our on-site buggies are fully electric (see ***Box 3***), and a number of our road vehicles are hybrids, but further progress adopting electric vehicles will be necessary to meet the government fleet targets of 25% Ultra-Low Emission Vehicles (ULEV) by 2022, and 100% by 2030 if not sooner.

We will develop a fleet policy to ensure that when replacing fleet vehicles we purchase ULEV or 100% electric wherever possible. At present, ultra-low emission options are not readily available for some our specialist vehicles and equipment, but we will work with suppliers to source electrified machinery wherever available.

- Fleet vehicle replacements will be ULEV compliant, and we will purchase 100% electric vehicles wherever possible, for a fully ULEV fleet by 2030 or sooner.
- We will install electric vehicle charging facilities for visitors and staff at our sites.

Box 3. Electric vehicles on-site

In 2019, Estates purchased seven electric buggies, which joined other electric buggies in use on-site, and replaced previous diesel buggies used to transport people and equipment around our sites. These electric vehicles have reduced emissions and noise, proving a huge success with visitors and staff alike – although their peaceful powertrain has required us to introduce a bell to inform visitors when they're trying to get through!

We are also very pleased that from 2021 the Kew Explorer – a popular land train which transports guests on a fantastic guided tour – will be a fully electric vehicle, for a smooth, silent and low-carbon journey around our expansive gardens.

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1.6 Waste and the circular economy

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RBG Kew acts to minimise waste to landfill and support the waste hierarchy. At present we divert the vast majority of waste from landfill, and less than 5% sits at the bottom rung of the waste hierarchy (disposal).

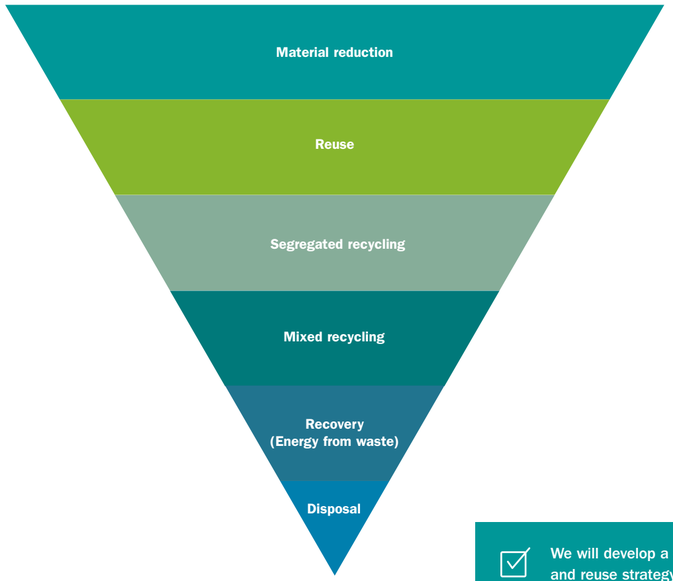
Kew Gardens composts a large amount of green waste on-site for reuse within the Gardens. We also use signage that can be reused many times, simply replacing the vinyl wrapping, and regular events such as the orchid festival reuse their signage and materials from year-to-year wherever possible. At both Kew Gardens and Wakehurst, we have also introduced a disposable cup 'levy', whereby customers pay a small cost for the use of a disposable and are encouraged to bring their own reusable alternatives. See ***Box 5*** for more information about the measures taken to reduce single-use plastics across our sites.

Waste strategy

There is more we can do to apply circular economy principles and send less waste to energy recovery, therefore moving further up the waste hierarchy. We will take expert advice towards developing and implementing a waste strategy. Within this strategy we will aim to design-out waste and prioritise sharing, reuse and repairability. We will also develop enhanced recycling strategies for back-of-house and post-consumer recycling across our sites. This is likely to require investment and so we will work hard to develop the best strategy rather than prioritising the implementation of short-term changes.

Figure 11. Waste hierarchy

The waste hierarchy sets out clear priorities for the management of waste, from the most favourable option – to eliminate or reduce the waste material produced – through reuse, recycling and recovery to the least favourable option – disposal.



☑ We will develop a site-wide waste, recycling and reuse strategy that will set out a pathway to reduce waste, reuse more, segregate more valuable material streams, minimise energy from waste and reach zero-to-landfill.

1.7 Water

SDGs

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Water is a crucial resource for RBG Kew: a significant proportion of our precious living collections require irrigation throughout the year. Historic infrastructure has limited the amount of rainwater used on-site in recent years, so this is a key area for us to improve. We will seek investment to develop our irrigation and rainwater harvesting systems.

As periods of summer drought become more frequent, we will work to store more rainwater for use in irrigation, reducing our dependency on potable water for irrigation. Increasing water stress in the south-east of the UK is likely to increase water costs, as well as increasing the likelihood of water-use restrictions (such as hosepipe bans). While these do not apply to watering our scientific collections, they do apply to ornamental bedding.

Read more about improvements to irrigation practices within *1.3 Managing our land*.

☑ We will develop site-wide water and irrigation strategies.

☑ We will seek every opportunity to maximise the use of rainwater to irrigate our precious living collections at Kew Gardens and Wakehurst.

Box 4. Effective use of water for outdoor irrigation

Kew Gardens is likely to suffer increasingly long and intense summer periods of drought pressure as the UK climate changes. Kew's horticulture teams take a number of measures to ensure our plants thrive, while using the minimum of potable water during summer periods of reduced rainfall:

- We do not water lawns (which naturally green up within a few days of rainfall) unless they are required as key components of a culturally important historic landscape.
- We use 'treegator' watering bags – a slow-release water container that is zipped around the trunk – to top up supply in younger trees.
- We also use a lot of our on-site compost to mulch around our plants, which suppresses weed growth and retains water by reducing evaporation.
- Wherever possible we avoid the use of sprinklers in the heat of the day.

Kew also has an emergency action plan in case of water shortages, with actions including turning off water features around site and ceasing watering of all non-core collections, protecting only our valuable scientific collections during times of extreme shortage, which we know will become more common in the south-east as the impacts of climate change set in.

1.8 Investments

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1.8.1 RBG Kew assets

Kew does not hold any significant equity investments, but we have sought to measure the carbon impacts of our small institutional investments. We will continue to measure fund-based carbon intensity data, and seek to minimise the carbon intensity of these investments over time.

1.8.2 Pension funds

RBG Kew is a member of the Civil Service Pension Scheme (CSPS), and since 2019 a Group Personal Pension Plan administered by Royal London. Kew will seek to understand the climate impacts of the investments made via these pension funds and influence a move away from investment in industries incompatible with science-based targets (such as oil and gas extraction) where possible. This is in line with wider trends within the pensions industry seeking to align with the Taskforce on Climate Related Financial Disclosures (TCFD) and avoid losses in the form of stranded fossil fuel assets[20].

☑ We will monitor and seek to minimise the carbon intensity of our investments.

[20]See Gov.uk guidance on the TCFD alignment.

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1.9 Procurement

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RBG Kew has a sustainable procurement policy which sets out how we purchase goods, services and works, taking into account the social, economic and environmental impact. Purchasing has enormous potential to support people, communities and the environment. We aim to achieve social and environmental good through every pound that we spend – as well as good value for money.

We make procurement decisions that are outcome-focused with well-defined deliverables, covering environmental, social and economic issues. Wherever possible we work with organisations that have sustainability credentials, such as ISO14001 or the Science-Based Targets initiative, and we will deliver to such standards at our sites. We also prioritise purchasing through procurement frameworks or consortia which have additional rigorous environmental sustainability criteria. Kew adopts relevant government buying standards within our specifications, and we will actively participate in cross-sector sustainable procurement working groups and initiatives to encourage further development of these criteria.

We will work in partnership, collaborating with our suppliers to transition to low-carbon, socially responsible, climate-resilient supply chains, and to more accurately measure and manage the full impacts on people and planet.

We will ensure that sustainable procurement is linked to Procurement Team objectives and work closely with suppliers to maximise supply chain transparency, in order to understand the true climate, biodiversity and human livelihood impacts of our supply chains. Understanding these impacts is not simple and will take time, collaboration and investigation, but this is a challenge we are committed to tackling.

- **We will ensure that appropriate contracts have specific sustainability KPIs which are subject to systematic monitoring and review.**
- **We will have measurable sustainable procurement practice embedded within our procurement processes, specifically ensuring that sustainability criteria are built into the specification writing and tender evaluations.**
- **We will work to integrate whole-life costing into our purchasing processes and decisions.**

1.10 IT

SDGs

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RBG Kew has a reasonably large IT footprint, with some particular areas of impact, such as our high-performance computing requirements within the Science Directorate.

The IT Directorate has taken significant steps to monitor and reduce the environmental impact of our electronic equipment, producing an annual IT sustainability report. Actions taken so far include: consolidation of equipment to reduce the number of end-user devices; selection of energy efficient equipment; power consumption audits and switch-offs; consolidation of deliveries to site; analysis of Carbon Disclosure Project (CDP) environmental impact credentials of major IT suppliers; and resale of reusable equipment to extend life-span outside of Kew. We have a cloud-first strategy as large-scale providers are able to deliver higher efficiency than on-site services. In future we hope to conduct a thorough assessment of the footprint of the cloud services we procure.

- **We will continue to monitor the sustainability impacts of our IT infrastructure, including assessment of our cloud computing impacts, and seek opportunities to reduce these impacts.**

1.11 Retail

SDGs

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Kew Enterprises prioritises the sourcing of sustainable products in our on-site and online retail outlets. Kew Enterprises has its own Ethical and Environmental Sourcing Policy, and a robust process for ensuring that crucial sustainability certifications (such as FSC and RSPO) are evidenced by our suppliers. While we do not always have the buying power necessary to drive major change in supply chains, we will continue to ask challenging questions of all our suppliers and seek out those suppliers willing to deeply engage with sustainable supply chains. Through our retail outlets we have worked to rapidly remove single-use plastics, measure and reduce packaging, optimise delivery numbers to minimise transport emissions, and select peat-free horticultural products wherever they are available.

- **Within our retail outlets we will continue to seek sustainable suppliers, prioritising reusable or recyclable materials and reducing the climate and biodiversity impacts of our supply chains as rapidly as we can.**

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1.12 Food and drink

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RBG Kew is proud to be working closely with our on-site catering suppliers at both Kew Gardens and Wakehurst to ensure we offer our visitors delicious, sustainable and increasingly plant-based food and drink – an appetising opportunity to appreciate plants and fungi.

Note: in line with popular usage, we are using the term 'plant-based' to indicate food and drink that is not animal-based (i.e. this includes plant, fungal or algal origin).

1.12.1 Kew Gardens

At Kew Gardens, we work with Company of Cooks to offer our visitors sustainable, seasonal food menus across our five cafes and restaurants, in addition to various seasonal pop-up stalls. Company of Cooks monitor their supply chains to minimise environmental impact, selecting local and seasonal ingredients with relevant certification, from MSC fish, Fairtrade coffee[21], and RSPO-certified sustainably sourced palm oil[22]. We are proud to offer delicious vegan options at all our cafés and restaurants. The 'Purely Plants' range was launched in 2019 and offers a variety of low-carbon, plant-based meals, snacks and drinks. In future, we hope to provide customer-facing estimates for the carbon savings gained by choosing plant-based meals, particularly for a selection of popular products such as our delicious vegan sausage rolls.

[21]Coffee at Kew Gardens – our standard bean is Fairtrade, our specialist roast is Union coffee, supporting Kew's partnership project to conserve the Yayo Coffee Forest. Our Botanical Bean is Organic, Rainforest Alliance and Fairtrade.
[22]CH&CO Palm Oil Policy.

1.12.2 Wakehurst

At Wakehurst, we work with Graysons to showcase sustainable, seasonal menus in our on-site eateries. Graysons' strict sourcing policy demands high welfare and ethical standards[23]. This includes using RSPO-certified palm oil, and selecting a coffee supplier who works directly with farmers to achieve the most ethical 'bean to cup' journey[24]. We are working hard to develop high-quality plant-based menus, and will continue to work towards a steady reduction of animal products from the menu.

Graysons work closely with Pale Green Dot to recycle on-site food waste, and have developed a strategy for food waste reduction which has already seen a 50% improvement since 2019. This success is set to continue with the onset of their hot composting system, launching in 2021. This forms part of a circular approach, conveyed with tangible and impactful messaging for customers.

1.12.3 Packaging

Across Kew Gardens and Wakehurst we have taken significant steps to remove nearly all single-use plastic from our catering (see ***Box 5***). Where single-use food and drink packaging can be avoided completely we will strive to do so, though COVID-19 has unfortunately made this more challenging. Where single-use packaging cannot be avoided, we will seek the most sustainable packaging options to minimise material use and maximise reuse, recycling or composting of packaging. At both sites we have a 'cup levy' in place to reward visitors who bring a reusable cup or choose crockery, and we sell branded reusable cups.

There is more progress we can make to reduce disposable packaging waste, and this will be a significant area of focus over the coming years.

Box 5. Replacing single-use plastics: packaging that can be composted on-site

In 2019 Kew and Company of Cooks undertook a large shift to become 99% single-use plastic free across our cafes and restaurants, replacing single-use plastics with commercially compostable packaging such as Vegware or cornstarch wrapping. The compostable packaging, along with food waste, is taken to an on-site aerobic waste digester known as the 'Garbage Guzzler' which turns the materials straight into soil improver, using heat and bacteria.

We have also taken a series of measures to encourage reusables: selling bamboo cups at our outlets and introducing a small levy on the use of disposable coffee cups. Additionally, we always seek to maximise serving options that cut out packaging altogether by serving food straight to the plate wherever possible.

- **We will further develop our plant-based food and drink offer, reduce use of animal products, and encourage our audiences to choose plant-based dishes to minimise the climate and biodiversity impacts of food choices.**
- **We will work with our suppliers to understand, reduce, and transparently report the carbon and biodiversity impacts of food and drink at RBG Kew.**

[23]Graysons source all fish from MSC or other sustainable sources, as well as Rainforest Alliance and Fairtrade products. They are seeking to increase the proportion of ingredients which are certified Organic.
[24]Read more about Crude coffee www.crudedrinks.co.uk.

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2 Expertise

At RBG Kew we use our world-leading expertise to evidence and shape sustainable practices, and support nature-based solutions for climate, biodiversity and livelihoods. Teams across Kew work with our partners to develop understanding and evidence to support sustainable solutions, from best practices within our gardens and the local area to national and international work. We bring our expertise to important conversations around natural capital, spatial analysis, conservation policy, plant health and more.

2.1 Scientific expertise

SDGs

Wide-ranging scientific expertise
RBG Kew is a global resource for knowledge on plants and fungi, and our research spans food and fuel crops, climate resilience and adaptation, conservation, medicinal plants, sustainable land use and much more. Our scientists work collaboratively with over 400 institutions from more than 110 countries, making an invaluable contribution to tackling humanity's biggest challenges.

Supporting the Sustainable Development Goals
RBG Kew's scientific work to understand and protect plant and fungal biodiversity will contribute most substantially to the crucially important SDG 15: Life on Land. It also directly supports many other goals, contributing to sustainable livelihoods, food security, sourcing new medicinal plants, protecting watersheds, finding alternative energy sources, and increasing resilience under climate change. Our biodiversity research also supports other essential areas of progress, such as building the research capacity of countries and developing international partnerships.

Box 6. Supporting climate-resilient coffee

Coffee is one of the world's most important agricultural commodities, supporting a multi-billion dollar sector. In Ethiopia, it is the backbone of the economy, and growing coffee provides a livelihood for around 15 million Ethiopians. Coffee farming is burdened with challenges for these smallholder farmers, including crop losses due to pests and diseases and adverse weather events, and cyclic low prices. On top of all these issues, and compounding them, are the impacts caused by climate change, leading to failing crops and low revenues. Kew Science has led several projects to understand the threats posed by climate, the opportunities, and hopefully some of the solutions. Projects include working with local communities to develop climate resilience, protect biodiversity, and reduce land-use change – with a focus on preventing the loss of forest-based farming systems. For example, our Darwin Initiative (DFID) project 'Mainstreaming Biodiversity Conservation and Climate Resilience' at Yayu Biosphere Reserve, Ethiopia, was transformative for the community, supporting outstanding results for nine UN SDGs. High-resolution forest mapping showed that forest coffee production maintains high levels of healthy forest cover, and close to zero deforestation over a 20 year period.

The changes we make today, this year, and next year, are going to be felt for thousands of years. We have a huge responsibility to take the right action today.

Professor Alexandre Antonelli, Director of Science, RBG Kew, 2020

Box 7. Measuring carbon services from our valuable landscapes and Living Collections

There are many variables that affect carbon draw-down and storage in plants and habitats.

Kew Gardens and Wakehurst both store a large amount of above-ground carbon in their woody biomass, which we are working to measure using drone and LIDAR technology. A rough early estimate puts this figure for Kew Gardens at between 10,000 and 15,000 tonnes of CO_2.

Below-ground carbon storage is arguably even more important: in typical temperate forests in the UK, just 17% of total carbon is stored in trees' above-ground tissues, 6% is stored in roots and a vast 72% stays in soil where it can remain safely sequestered for long periods[25]. It has never been more important to understand the role of fungi in healthy, carbon-rich soils.

In addition to above- and below-ground carbon stocks, it is also important to measure carbon flows. We will begin work to estimate net annual draw-down – but since many of the trees at Kew Gardens and Wakehurst are mature, they may be approaching carbon equilibrium (while still providing many other fantastic benefits and ecosystem services).

This work to measure carbon stocks and flows will run in parallel with wider work to measure natural capital and ecosystem services benefits. The Landscape Ecology programme at Wakehurst aims to measure and manage ecosystem services in four streams: human well-being, hydrological services, carbon sequestration and pollination services. The project will work to set a clear baseline for the natural capital of the site, recommend ways to measure and enhance the valuable ecosystem services, and measure net environmental gain over time through best practices and broad stakeholder engagement. This is a fascinating project with enormous potential, setting out to engage the public, policymakers, landowners, ecologists, economists and more, in a long-term investigation of natural capital and nature-based solutions for well-being, biodiversity and climate at Wakehurst and beyond.

Kew Science is also conducting research to understand opportunities to accelerate and enhance below-ground carbon sequestration. This project, with partners including The Carbon Community, is testing the potential of mycorrhizal fungi, different tree species and enhanced silicate weathering.

[25]What role can forests play in tackling climate change (Waring et. al 2020).

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Box 8. Reforestation to optimise carbon sequestration, biodiversity recovery and livelihood benefits

In February 2021, RBG Kew and Botanic Gardens Conservation International (BGCI) convened an international conference on reforestation. The focus was on finding achievable, evidence-based approaches to reforestation as a nature-based solution for biodiversity, carbon capture and livelihoods, showcasing success stories, identifying challenges and encouraging new integrative perspectives. The conference brought together approaches and tools for modelling, monitoring, forest regeneration and seed supply, as well as examining the wider issues of funding, economics and policy.

This conference highlights the important role Kew can play in bringing experts together to evidence and drive high-quality nature-based solutions and facilitate nuanced discussion of sustainability, in contexts where broad-brush approaches can lead to unintended consequences. Kew worked with others to publish the scientific paper 'Ten Golden Rules for Reforestation to Optimise Carbon Sequestration, Biodiversity Recovery and Livelihood Benefits'. This paper sets out clear guidance for decision makers seeking the simultaneous triple benefits of climate change mitigation, ecosystems recovery and sustainable livelihoods, and has already been applied in diverse contexts from creating urban mini-forests to restoring mangrove forests.

2.1.1 Scientific priorities 2021–2030

In 2021 our Science Directorate is launching a renewed mission to protect biodiversity. Kew Science will innovate, inspire and influence, to support five priorities, which include the two headings below.

These are set out in more detail within RBG Kew's Scientific Priorities 2021–2030, available from *kew.org*.

Priority 1: Ecosystem stewardship
We will develop scientific expertise with our partners to support ecosystem stewardship, combining the protection of *in situ* biodiversity with its sustainable use. We will share knowledge and practices that sustain and promote natural and cultural capital. We will seek to influence governments and companies to increase the protection of the world's most valuable and vulnerable ecosystems, moving beyond species counts to integrate other metrics of biodiversity and their contributions to human well-being, including economic value and health benefits.

Priority 5: Enhanced partnerships
We already have a breadth of international partnerships – but we will develop deeper cross-disciplinary partnerships with experts in broad fields such as climatology, pollination and urban environments, artificial intelligence, and the social sciences. This will enable us to coordinate cross- and multi-disciplinary work to achieve the greatest scientific and societal impact. We will continue to work with governments, NGOs and businesses large and small to protect, conserve and invest in nature.

Maximising carbon sequestration
Kew Science will also support increased understanding of the importance of plants, fungi and soils in maximising carbon sequestration, the importance of biodiversity in nature-based solutions, and the need to prioritise protecting existing forest and woodland, among other productive and carbon-rich habitats.

- **We will work to understand and measure the carbon sequestration and other ecosystem services provided by our sites at Kew Gardens and Wakehurst.**
- **We will aim to understand and measure the carbon sequestration impacts and other ecosystem services of our largest scientific conservation projects around the world.**
- **We will build cross-disciplinary partnerships to support and implement nature-based solutions, and guide best practice to ensure natural climate solutions maximise biodiversity and livelihood benefits.**

We must act now. Scientists have long recognised that humanity is operating beyond the 'Planetary Boundaries' of sustainability.

RBG Kew's Scientific Priorities 2021–2030

2.2 Horticultural expertise

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Kew's highly skilled horticulturists care for and curate our landscapes and living collections. They connect both Kew Gardens and Wakehurst to conservation and scientific themes, as well as preserving and enhancing their valuable historical and cultural significance.
Our Living Collections Strategy is available from *kew.org*.

Our Living Collections Strategy sets out how we use our living collections to undertake research into the collections, the species contained within, and the many valuable ecosystem services they contribute, including: removal of air pollution, carbon capture and sequestration, food, energy, health and well-being, resilience to pests and diseases, and resilience to weather extremes and climate change.

Both Kew Gardens and Wakehurst are extremely valuable sites where we can learn, experiment and share knowledge and best practice. We will endeavour to use them for the benefit of all, maintaining strong collaborations between horticulture, science and conservation.

Kew Gardens contains historic and culturally important landscapes that we must maintain to high standards, but also less structured areas such as our 'Natural Area', managed for pollinators and local biodiversity. The Wakehurst landscape – woodland, meadows, wetlands and formal gardens in the extraordinary High Weald – is rich, biodiverse and shaped by centuries of human use. Its unique trio of assets – landscape, science and people – makes it a microcosm for research like no other. It also contains a Site of Special Scientific Interest, under careful management to return it to a favourable condition.

Kew's horticultural expertise has driven many sustainable practices, from the removal of peat from our general compost over 25 years ago, to the use of no-till planting within the Kitchen Garden and other areas, to natural pest management through biological controls and the planting of disease-resistant varieties to reduce use of avoidable chemicals.

Our horticultural and scientific expertise is also vital in the fight against invasive non-native organisms, such as emerald ash borer (*Agrilus planipennis*). Kew's Plant Health and Quarantine Unit team works with staff and partners worldwide to ensure that live plant and fungal material for Kew's Living and Scientific Collections – whether seeds, spores, cuttings, plants, wood or tissue cultures – are all imported, used and shared safely and in line with all relevant laws and conventions, including plant health, invasive species, CITES and the CBD (see ***Box 10***).

- **We will demonstrate and showcase sustainability best practices across our horticultural operations.**
- **We will use our living collections and landscapes to support research into climate resilience, mitigation, adaptation and sustainable practices.**

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Box 9. Protecting valuable peatland: avoiding peat in horticulture

Kew's skilled horticulture teams removed peat from general use 25 years ago. At the time, extensive trials were conducted to demonstrate that our display gardens and the vast majority of our collections could continue to thrive without it. Every year we use approximately 150 m^3 of peat-free general compost, and additionally convert a significant amount of green waste on-site into high quality compost.

However, within our extensive collections there are a very small number of specialist species for which no suitable alternative to peat has yet been found, although we are continuing to trial other media. Thus, a tiny proportion of our scientific collections is maintained using peat-based media – this represents well below 0.2% of total growing media across the gardens. Without the use of peat for these (mostly carnivorous) genera, some of which are threatened, their survival would be put at risk. We will only source this essential peat through suppliers who have gained the top score using the Growing Media Association Responsible Sourcing Scheme[26] for best practice in minimising impacts on habitats and biodiversity.

Peatlands are the largest natural terrestrial carbon store in the world – peat is a precious resource that must be protected and not harvested for general horticultural use. We support an end to the use of peat for general horticulture and a forthcoming deadline for such a ban. We source from peat-free nurseries wherever possible, and encourage our visitors, members and suppliers to avoid peat use.

[26] Growing Media Association – Responsible Sourcing scheme.

Kew's practical experience and expertise, and collaboration with research colleagues, can put us at the forefront of sustainable horticulture: using our expertise in plants, fungi and soils to develop more highly resilient and biodiverse living landscapes.

Richard Barley, Director of Horticulture, Learning and Operations, RBG Kew

Box 10. Preventing the introduction of pests and diseases, and tackling illegal wildlife trade

RBG Kew's quarantine facilities and our expertise in plant health and biosecurity is put to use in protecting Kew's globally important collections and also in safeguarding the wider UK environment. The introduction of invasive non-native organisms has the potential to damage UK biodiversity, ecosystem services and business – particularly in a time of climate change. We provide practical support, expertise and training to the UK Border Force, the Animal and Plant Health Agency and other government agencies including identification of plant material and assessing and safely managing any biosecurity risks associated with confiscated shipments of plants, seeds and products.

Kew is also the UK Scientific Authority for plants under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In this capacity, we conduct non-detrimental finding assessments, and provide scientific advice on CITES permit applications. We support enforcement and policy developments to combat illegal trade in over 30,000 plant species threatened by international trade – from medicinal plants or derivatives to timber and live plants. Kew's scientists are developing novel techniques to crack down on illegal trade, using genetic identification, chemical analysis and artificial intelligence tools.

Find out more at *kew.org/science/our-science/science-services/UK-CITES/cites-resources*.

Box 11. Protecting and enhancing biodiversity at Wakehurst and its SSSI

There is a rich diversity of species thriving at Wakehurst, centred on its deep ghylls (narrow streams with steep-sided banks), woodlands, the areas of unimproved pastures and meadows, and the freshwater marshes, ponds and reservoir. The long-term conservation of the site provides unique opportunities for innovative research activities at both the landscape and species level – and we have a strong focus on habitat restoration and species reintroduction.

The woodlands form part of the Wakehurst and Chiddingly Woods Site of Special Scientific Interest (SSSI). This site has one of the richest sand rock communities in the country and is of international importance, supporting a unique bryophyte flora and over 300 species of wild plants. For the past decade, Wakehurst's biodiversity action plan has been centred around Natural England's Stewardship schemes and the Forestry Commission's English Woodland Grant Scheme, combining restoration, best practice management and research.

The SSSI has been restored from 'unfavourable declining' condition, with work focusing on the removal and management of the highly invasive *Rhododendron ponticum* which has dominated the woodlands and sand rock outcrops.

Another focus has been on creating, enhancing and restoring species-rich grassland across the site. Long-term monitoring programmes have been set up in various meadows to monitor the success of different restoration methods. A conservation grazing project, in collaboration with Ashdown Forest Conservators, is quickly bringing Wakehurst's grasslands back into a traditional form of management which can support a rich diversity of wildlife.

Significant progress has been made, although ongoing effort is required to bring the whole site into a favourable condition. New management plans are currently in development to take the continued restoration and development of Wakehurst's natural assets forward over the next ten years.

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2.3 Policy, government and international influence

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This section supports all SDGs

We work with governments, international governmental organisations and NGOs around the world to shape and support global treaties, such as the Convention on Biological Diversity and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (see ***Box 11***). We will act to support and shape policy decisions impacting biodiversity and protection of natural habitats around the world.

As a convener of expertise in an increasingly complex world, Kew will develop fact sheets, guiding positions and policy briefings to help shape and promote sustainable solutions, on topics such as carbon offsetting markets, the use of peat in horticulture, tree-planting and reforestation drives, and the importance of developed economies shifting towards mainly plant-based diets. This will allow us to bring evidence-based solutions to the complex and rapidly changing sustainability questions of the decade.

25 Year Environment Plan

Defra 25 Year Environment Plan (25YEP) sets goals to protect and enhance our natural landscapes and habitats, for cleaner air and water, and thriving plant and animal life. This includes plans for reforestation, peatland restoration, reintroducing native species and connecting people with nature. The 25YEP sets an important commitment to turn the tide of environmental degradation, and to support restoration and recovery of our natural systems. Kew's work supports many areas of the 25YEP: connecting people to nature, enhancing biosecurity, using and managing land sustainably, and promoting international biodiversity.

- We will convene evidence and expertise to shape policy and practice on biodiversity loss, sustainable livelihoods and climate change.
- We will meet or exceed the Greening Government Commitments and show leadership within government by reducing our climate impacts as rapidly as possible.

Box 12. Protecting Ebo Forest

Ebo Forest, one of the largest and most biodiverse intact rainforests in Cameroon, is home to incredible wildlife, but its numerous unique and threatened plant species have previously been relatively unknown to botanical science. It is also the ancestral land of 40 surrounding villages that rely upon it for food and resources.

In 2020, the government of Cameroon approved the first logging concession for Ebo Forest, placing the entire forest under threat. In response, the Director of RBG Kew wrote to the government of Cameroon, and more than 60 conservationists – including four from Kew's Africa team – signed an open letter to Cameroon's Prime Minister calling for an inclusive land-use planning process involving local communities.

Scientists at Kew have been working with their partners in Cameroon to document the forest's astonishing array of plant species, collecting data with a view to designating it as a Tropical Important Plant Area (TIPA). Fifty-two globally threatened plant species were recorded as threatened by June 2020. On 10 December 2020, a further 16 Ebo plant species were added to the IUCN Red List of Threatened Species. The new listings were the result of work by the National Herbarium of Cameroon and colleagues in Kew's Plant Assessment Unit. These plants are all endemic to Cameroon, meaning they are not known to grow naturally anywhere else on Earth. Red-Listing plants is vital work which highlights the extinction risk of individual species, informing conservation priorities. This data, along with research into endangered primates living in the area by a team from San Diego Zoo Global, contributed to the decision of Cameroon's President Biya to revoke the logging concessions. This conservation success brought people together, locally and internationally, and we are proud that Kew's research and expertise has supported the protection of this fantastic biodiversity hotspot, helping its unique threatened species to survive the extinction they would otherwise have faced.

To deliver successful and enduring change we need to shape decision-making and encourage debate. We will do so with contributions that draw on robust scientific evidence. We will ask more of policymakers, supporting them with evidence, expertise and arguments to make well-informed and bolder decisions. In particular we will work closely with the Department for Environment, Food and Rural Affairs, our sponsoring department within the UK government.

RBG Kew Manifesto for Change, 2021

2.4 Sustainability training

SDGs

This section supports all SDGs

All new RBG Kew staff are inducted into their environmental management and sustainability responsibilities. Recognising the speed of change and the complexities of making the best sustainable choices across environmental, social and economic impacts, we will develop and curate a range of learning opportunities to upskill and embolden our staff and volunteers. There will also be a variety of training and networking opportunities available to staff through our membership of sustainability networks (see ***3.6 Collaborations, networks and partnerships***).

- We will develop and curate learning and development opportunities to support staff at all levels in understanding broad carbon and sustainability topics.

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3 Voice

SDGs

This section supports all SDGs

RBG Kew will use its respected voice to shine a spotlight on the urgency of environmental sustainability, inspiring and empowering diverse audiences to take action to tackle climate change and protect biodiversity. We will tell powerful stories and start meaningful conversations about the impact of climate change on biodiversity and people. We will collaborate with partners and global voices to convene discussion about fair and equitable sustainability solutions, and engage with wide-ranging communities to advocate for urgent change.

Botanic gardens have a huge global audience, and play a crucial role painting a positive picture of a biodiverse, culturally rich and sustainably developed future. We will support our communities to learn about and engage with scientific and sustainability issues, and use a bolder voice to call for urgent change.

We will highlight the importance of a more balanced relationship with the natural world, sharing ideas and inspiration to generate advocates for nature and sustainability. We will stimulate debate and discussion about fair and equitable sustainable solutions with wide-ranging audiences, from the general public to scientific communities, from governments and policymakers to international partners and other global organisations. Kew will help to shape public discussion of sustainability actions (including nature-based solutions) and choices (including primarily plant-based diets). We will draw on our own research and wider scientific evidence to call for change and advocate solutions. We will promote our evidence-based positions on key sustainability topics and communicate them in ways that are relevant and accessible to broad audiences. We will connect discussion of sustainable solutions to areas of public concern and popular discourse.

3.1 Visitor interpretation and member communications

RBG Kew tells powerful stories connecting our work and gardens to global issues and to positive sustainability actions. We will adopt new approaches to ensure that all audiences feel welcome in our gardens – nobody should be, or feel, excluded. Utilising our collections, both living and historic, we create dialogue and engage visitors and members with challenges and solutions – working harder to welcome and include presently under-represented communities. We will develop the scientific, horticultural and sustainability literacy of our audiences, aiming to build awareness, empowerment and the motivation to join us in making urgent change for a sustainable world.

Telling stories of sustainability practice is one of the central pillars in Kew's Interpretation Master Plan, but sustainability challenges and solutions are also highlighted across interpretation for science, horticulture and other topic areas. This will be developed particularly within our 'Breaking News' stories (see ***Box 13***), our new 'Carbon Garden' (see ***Box 14***) and in planning interpretation for the Palm House restoration.

We will also tell the stories of our own sustainability journey – the lessons we have learned and the trade-offs we must balance to deliver our vital work and maintain our invaluable gardens, buildings, and collections with a positive environmental impact. We will not shy away from challenging topics.

- ☑ **Our visitor interpretation and member communications will tell powerful stories about sustainability, increase scientific and sustainability literacy, and inspire visitors to take action and become advocates for climate and biodiversity.**
- ☑ **We will use signage that can be reused wherever possible and minimise waste in our interpretation planning.**

Box 13. Encouraging change within our communities – calls to action

At Kew Gardens and Wakehurst we tell stories about the natural world and our impacts upon it, starting compelling conversations that help to shape the debate. Through signs and materials, we will be transparent about our impacts and increase the visibility of our sustainability progress, as well as the challenges we face in urgently transitioning to climate positive operations.

In the spirit of shared action, we will encourage our visitors and members to take steps themselves to combat climate change and protect biodiversity. Starting with information on our 'Breaking News' pop-up displays within the gardens, we will inform visitors about wide-ranging actions they can take: from favouring plant-based food choices, to planting pollinator-friendly species in your garden or window-box, to choosing sustainable travel. We will scale actions and offer a range to ensure they are inclusive, while conveying the breadth of choices we can all make to reduce our footprint. Where possible, we will gather feedback from visitors and evaluate the impact of these recommendations – and once tested within the gardens, we will broaden these conversations to other channels, reaching beyond the garden boundaries to many more communities. These learnings will be shared with the broader botanic gardens community through Botanic Gardens Conservation International (BGCI).

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Kew will be an advocate for environmental responsibility, including to our visitors, partners, and suppliers. We will use our voice to influence public attitudes and encourage individuals to be champions of protecting nature.

RBG Kew Manifesto for Change, 2021

Box 14. Carbon Garden

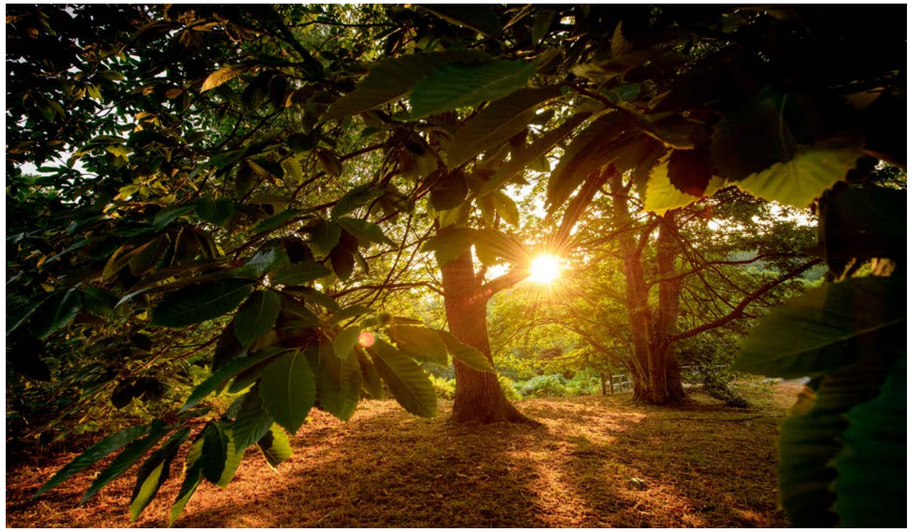
We are developing plans for a Carbon Garden at Kew Gardens: a space to explore the important role of plants and fungi in supplying carbon services, from capturing CO_2 through photosynthesis, to long-term carbon storage in biomass and soils, to production of fuel and biofuels, and more. These services contribute to the stabilisation of our climate, absorbing a significant proportion of anthropogenic emissions (caused by human activity). But not all species and habitats deliver the same carbon services – especially in the face of changing climatic conditions.

Within the Carbon Garden we aim to maximise the storage of carbon above and below ground, demonstrating best-practices to support enhanced carbon sequestration by plants, fungi and soils.

We will seek to engage visitors and community members in this process and support development of other 'carbon gardens' elsewhere.

We will use physical and digital interpretation to visualise carbon flows through natural systems, tangibly connecting the gardens and visitors to carbon stocks and flows across time and space. We will also discuss how teams at Kew Gardens and Wakehurst are working towards a better understanding of carbon in garden landscapes, measuring carbon stocks and flows within our trees and landscapes.

We hope to engage everyone who visits the Carbon Garden with a better understanding of the importance of the biological carbon cycle, how carbon is stored in garden plants, fungi and soils, and what we can do together to increase this carbon storage in our green spaces.



3.2 Visitor programmes, events and exhibitions

Active storytelling for sustainability

Kew holds a wide variety of events, visitor programmes and exhibitions throughout each year, working with creative partners to tell stories and start conversations with our visitors in innovative ways. These events represent a key opportunity to deeply engage audiences. Discussion of global challenges, including the climate and biodiversity crisis, is woven through all our programming.

We are delighted by the success of events which directly promote sustainable activities, such as the Summer Cycle at Kew Gardens – encouraging all ages and abilities to get on their bicycles and discover the joy of cycling around our expansive gardens in a festival-like atmosphere. Our workshops frequently support the development of traditional, sustainable horticultural skills – reusing materials within the gardens (such as weaving, composting and hedge laying), supporting and understanding local biodiversity, and developing conservation skills.

Events at Kew Gardens and Wakehurst are a powerful opportunity to develop skills, activities and awareness for sustainability. We will develop our event offer focusing on sustainability and well-being, meeting the core of the Kew ethos.

Running sustainable events

Kew holds several large annual events, which are managed with sustainability in mind. Each major commercial event has its own commitments, tackling wide-ranging sustainability impacts. This includes food and drink: we work with our providers to ensure there are plant-based, vegetarian and healthy options on offer, prioritising Fairtrade and organic sourcing where available. On waste, we seek to minimise packaging, and provide clear recycling options at all our events, as well as reusing signage and installations. We also select contractors based on their locality, carbon emissions and sustainable ethos, and work to enable sustainable transport for visitors traveling to our events.

The two largest events at Kew Gardens, Christmas at Kew and Kew the Music, both produce sustainability reports providing transparency on their waste, energy and travel impacts, and more.

The nature of our sites means that our large events often require local power generation. We have worked hard to minimise use of diesel generators, prioritising LPG generators or mains power where possible. We seek to further transition, as fast as we are able, to the use of low-carbon solutions such as battery storage or green hydrogen generators, as well as seeking investments in electrical infrastructure and connectivity across our sites (see ***1.2.1 Energy and renewable generation***).

Box 15. 'For the love of... ' Wakehurst supporting the Climate Coalition

At Wakehurst we have worked with the Climate Coalition since 2016, supporting their annual #ShowTheLove campaign. This involves joining our voice with 140 organisations across the UK dedicated to action against climate change, using shared resources to amplify their powerful message. Through engaging family-focused workshops, drop-in activities and on-site trails, we have raised awareness of the climate crisis and the diverse elements of everyday life which are threatened – from chocolate and coffee to gardening and cricket. This campaign helps to inspire action to tackle the climate crisis. Through this campaign we have also highlighted the importance of the work that Kew does in this area and the benefits of engaging in the fantastic natural world around us. By working together, we make sure that the public voice is heard by those who can make a difference in creating a cleaner, more secure future.

- **Our visitor programming, exhibitions and events will engage visitors in powerful stories about sustainability, inspire them to take action, and encourage them to become positive advocates for biodiversity and climate.**
- **We will deliver every event with sustainability in mind and investigate suitable event certifications to establish whether we could reach net zero or other sustainability standards for large events.**

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3.3 Wider public audiences

RBG Kew is a well-known and highly respected organisation referenced widely across media in the UK and globally. We are increasingly approached as an authority to comment on a broad range of environmental issues such as the Amazon fires, species loss and UK nature policy. We have a popular and widely used website alongside social media channels with fast growing audiences that are both loyal to the brand and engaged in our work.

Kew uses its wide digital reach to highlight global challenges including climate change, food security and biodiversity loss. We use an inclusive and accessible voice and share insights and experiences to shape the debate around global issues, promoting sustainable solutions and sustainable development. We tell stories about our global science work, relating the impacts of our work and our partnerships to the lives of the diverse audiences who engage with our digital content. We use different storytelling formats to reach broad audiences, and encourage our existing and new audiences to take tangible, achievable steps for a more sustainable future for our planet.

We will transparently discuss our sustainability performance on ***kew.org***, and also weave sustainability throughout our digital content, linking broad topics back to the environmental emergency and the choices we can make to fairly respond to this crisis.

Box 16. Raising awareness with online audiences: What is extinction debt?

Through kew.org and our social media channels, we ask challenging questions, engaging our audiences with the climate and biodiversity crises and sustainable solutions. This has included content discussing big questions such as ‘What is Ecocide?’ and ‘What is Extinction Debt?’. We aim to develop the sustainability literacy of our audiences, and their understanding of the need for change and transparency at this critical time for our planet. We will continue to develop informative and emotive content, engaging in nuanced discussion about the complexities of global challenges, sustainable solutions and the opportunities we can all take to call for change in the coming years.

Kew works with a range of broadcast, print and online media titles to place features, interviews and news stories that reach audiences of millions each month. The focus of these stories ranges from pure scientific and horticultural research to news of festivals and experiences available to visitors at our gardens. Such coverage enables us to demonstrate our sustainability work and encourage engagement from the public as we increase opportunities for people to take action and support us.

- We will use our digital reach and influence to discuss the climate crisis, biodiversity loss and sustainable development issues, to grow our audiences’ understanding, and encourage them to take action to tackle these challenges.
- Working with the media, we will amplify more diverse and trusted voices to discuss environmental and sustainability issues, also seeking to engage previously under-represented audiences.
- We will deploy our public relations skills to identify the right people and the right opportunities for us to use our voice, to shape discussion on important topics around sustainability and nature.

3.4 Education and outreach

Education is a priority for RBG Kew. Our extensive collections, knowledge and expertise are used to provide learning at all levels, from early years to youth and adults, both in a formal and informal education context.

Environmental issues impact all levels of society and addressing them requires an inclusive approach. To this end, Kew’s learning programmes seek to remove social, sensory, economic and psychological barriers that may prevent access. Our aim is to engage with as wide an audience as possible.

Kew runs one of the largest botanic garden schools programmes globally, educating over 100,000 pupils (5 to 18 years of age) both on-site and online. All sessions are linked to Kew Science and Horticulture, encouraging pupils to think critically about key global challenges including threats to biodiversity and the drivers of climate change. Visitor Learning programmes engage a range of audiences, many of whom face barriers to visiting. Sessions focus on creative and accessible ways into learning about plants and Kew Science, including knitting with plant materials, zine making inspired by Kew’s collections, and co-curating self-led resources. Using our Community Allotments, we also engage people who have no access to outdoor space or who have never grown plants before.

Kew’s School of Horticulture trains future horticultural experts in sustainable practices and principles. We will work to ensure that across our full range of courses, students leave with the skills and experience to drive forward sustainability within their future careers.

Our outreach learning programme, Grow Wild, reaches millions of people nationwide, inspiring them to come together and grow native wildflowers and fungi. Since 2014, Grow Wild has shared enough seeds for 2.4 million people to cover 1,000 football pitches with wildflowers. Through engaging with Grow Wild, 88% of groups have learnt new things about wildflowers and 76% have done more for nature.

We also work with a diverse and enthusiastic range of volunteers, who gain a range of skills and experiences, and provide fantastic support to our teams. Volunteer roles range from School Gate Greeters, volunteer Guides and Explainers, to beekeepers, Met Office weather monitors and sustainability event auditors.

The Kew Mutual Improvement Society is led by our students, and serves to curate and present a varied programme of public lectures on botany, horticulture and conservation – sharing expertise and best practice, and triggering discussion on sustainable practices across varied topics.

Within our Science Directorate, we draw on the exceptional expertise of our teams to train the next generation of fungal and plant scientists. In partnership with Queen Mary University of London, we deliver a world-class plant and fungal science MSc to both UK and international students. Our researchers co-supervise over 75 doctoral students from UK and international universities, and we support professional development through a number of specialist training courses. Kew Science also supports an annual cohort of undergraduate internships, as well as training hundreds of undergraduate students from UK and international universities on biology-related courses. Going forward we intend to build on our scientific strengths and the evolving needs of society, joining forces with outstanding universities to deliver even more cutting-edge training for the next generation of experts.

Across all ages, Kew educates and inspires, creating skilled and passionate advocates for the protection of the natural world.

Box 17. Inspiring and empowering young minds for change

The Early Years and Family Programme connects children to nature right from the start, encouraging them to develop a sense of wonder about the natural world, while the Youth Explainer Programme equips young people (14–17) with the knowledge, skills and confidence to communicate plant science and conservation to Kew visitors. The Youth Forum gives young people a voice and an opportunity to lead their own environmental projects. In so doing, they develop strong personal connections to the environment and a commitment to tackling conservation issues.

- Our educational and outreach activities will continue to raise awareness of the climate and biodiversity crisis, and equip all learners with the skills and motivation to take positive actions to tackle climate change and biodiversity loss, and support sustainable livelihoods.
- Our volunteer Guides and Explainers will communicate stories about how Kew Science and Horticulture are helping to solve global challenges and the ways in which visitors can play their part.

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3.5 Supporting corporate sustainability

RBG Kew works with a wide range of mission-aligned commercial partners to achieve shared goals, such as responsible sourcing, the sustainable use of plant-based products and ingredients, prevention of deforestation, delivering climate positive initiatives and supporting the circular economy.

Commercial partnerships link vital Kew knowledge, research and plant science to everyday products and services. Kew's phytochemistry unit provides expertise and analytical capabilities to identify and authenticate plant extracts, optimising quality and performance and ensuring responsible sourcing.

These partnerships represent an opportunity to support new sustainable products and supply chains, and to utilise Kew's insights and expertise to prioritise impacts on natural ecosystems.

We will continue to cast light on the pressures being placed on the natural world and the benefits of preserving healthy ecosystems, using expertise to identify best practice and influence change across our wide-ranging current and future partnerships.

Box 18. Rattan – working with IKEA to ensure traceability of an important renewable material

Rattan cane comes from the stems of spiny, climbing palms found throughout the Asian tropics. This important renewable commodity is used across a wide range of IKEA products. For many years IKEA has been committed to improving the responsible sourcing agenda for their materials, including rattan – improving general knowledge and defining criteria to make responsible sourcing the norm across the IKEA business and beyond.

Regarding rattan, IKEA reached out to partner with RBG Kew to help build and apply knowledge for improving sustainable rattan supply chains with a particular focus on species identification. Processed rattan canes cannot be confidently identified to species level because diagnostic features have been removed. Without this information it is difficult to assess the status of a species in the wild.

Kew has a long history of rattan research, so is a natural partner for IKEA to address the current knowledge gaps. We hold unrivalled collections of rattan specimens in our herbarium, and have applied cutting-edge techniques to sequence the DNA of all rattan species. Excitingly, we have successfully applied the same methods to IKEA rattan products purchased in store, and to samples from their supply chains. With our reference DNA data from Kew specimens, we have been able to identify the rattan species in IKEA supply chains. Kew is now working with IKEA to further develop this and to make it publicly available to support improvements in compliance, traceability, and sustainability across the wider rattan supply chains. Through this work, Kew scientists are supporting IKEA, and other industry players, to secure responsible sourcing of rattan.

Box 19. Botanical fingerprinting to support P&G's Responsible Beauty program

RBG Kew and P&G share a mutual enthusiasm for the relationship between beauty and science. Since 2018 Kew has utilised its world-leading expertise in plant and fungal science to validate the use of quality botanical-derived extracts in P&G beauty products. Starting with the Herbal Essences bio:renew range, a global P&G haircare brand, and progressing to co-development of new products, the partnership sees RBG Kew's botanical science expertise guide the uses of botanical-derived extracts. Kew scientists use a process known as botanical fingerprinting to confirm the identity and authenticity of key botanicals used in the Herbal Essences bio:renew products. This scientific collaboration has significantly increased P&G's understanding of botanical ingredients and how to optimise their quality and performance, while prioritising responsible sourcing. Kew scientists are supporting P&G in its Responsible Beauty programme to enable and inspire a positive impact on the environment and society. Further information is available at ***us.pg.com/responsible-beauty.***

We will work with commercial partners to leverage Kew's scientific and horticultural expertise in the direct support of robust and quantifiable sustainable initiatives.

3.6 Collaborations, networks, and partnerships

The global race to zero emissions will be a collaborative transformation: we will face challenges which we cannot tackle alone, and progress will be more rapid and beneficial if we work together. Kew will work with a wide range of partners locally, nationally and internationally, including government bodies, botanic gardens around the world, universities, small and large organisations and non-profits. We will enthusiastically collaborate, and share successes, lessons and solutions openly and transparently.
A key part of this collaboration will be our contribution to new and existing sustainability networks – such as our contributions to shared progress within Defra group sustainability networks, the 'Fit for the Future' network, or the Climate Change Alliance of Botanic Gardens.

Additionally, we are supporting the establishment of new sustainability networks, such as one led by Botanic Gardens Conservation International (BGCI), which is based on-site at Kew Gardens. In 2020, BGCI produced a review of sustainability practice at botanic gardens and set in motion a new programme of activity to connect and drive sustainability practice in gardens around the world. Kew will be a lead member, working to support BGCI and Phipps Conservatory in developing a collaboration between practitioners in gardens from Kew to Sydney to Shanghai. We will share lessons and effective sustainable practices to scale-up international efforts and support rapid action across all gardens, large and small. A core principle behind the network is to use the sustainability expertise found within botanic gardens to design programmes which engage and incentivise their 750 million annual visitors, mobilising a huge global force for change. See more in ***Box 13 – Encouraging change within our communities***.

We will collaborate openly and transparently with other organisations on sustainability, and support development of a new sustainability network among international botanic gardens.

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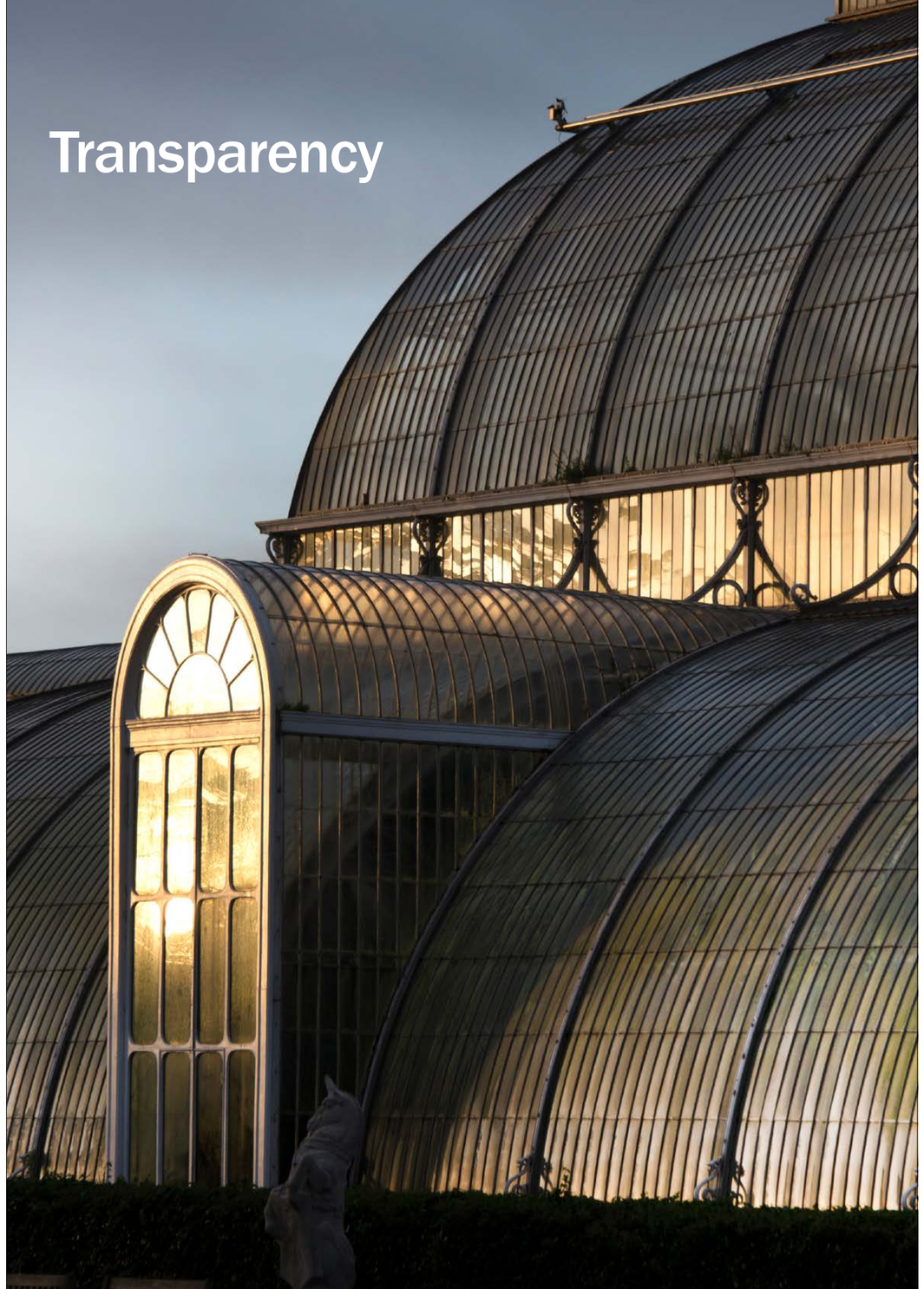

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Reporting

RBG Kew publishes an Annual Report and Accounts (ARA), recording our sustainability performance for many years. From 2021 onwards we will report additional sustainability and carbon data, including our annual 'core scope 3' emissions. We will also meet the guidelines laid out in the Streamlined Energy and Carbon Reporting (SECR) standard. Additionally, we report a wider array of sustainability performance indicators to Defra via the Greening Government Commitments: new targets for 2021 to 2025 will be announced soon, covering topics from GHG emissions, to using resources effectively, to nature recovery and land management.

For internal progress reporting, we will develop a comprehensive set of indicators to track our sustainability impacts with increased granularity, and more detailed action plans setting out how we will achieve these KPIs. Reporting pathways follow below, but we also aim to make these sustainability metrics visible to all staff where the data allows.

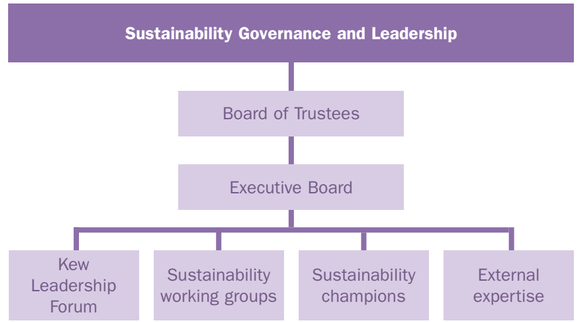
Fully tracing our sustainability impacts will involve working with many suppliers, and it is likely we will need to adjust the sustainability indicators we use as data becomes more readily available across international supply chains, and as carbon reporting best practice evolves and becomes more widespread.

Governance

Achieving our sustainability aims will require collaboration and action from all of Kew's passionate, talented and committed staff, volunteers and supporters. Individuals at all levels, in all departments and directorates, play an invaluable role in making RBG Kew special, and will continue to support us as we align for a climate positive future.

Networks of sustainability champions at both Kew Gardens and Wakehurst will also support sustainability – as they have been doing for many years. These champions networks will be supported by the Head of Sustainability, and will also play a role in encouraging others within their teams and buildings to play their part. This is a journey we will take together, not solely the responsibility of a few. Overall responsibility for ensuring the prioritisation of sustainability lies with Kew senior leadership. RBG Kew's Environmental Policy is signed off by the Director, who also participates in ISO14001 annual audits. For targeted action, sustainability progress will also be supported by a number of working groups. A Net Zero Working Group has been formed, which meets monthly to discuss detailed actions and progress made. Other groups include the Travel Plan Working Group and the ISO14001 Management Group.

Following publication of this strategy, we will develop detailed sustainability KPIs and internal reporting dashboards for tracking sustainability progress. Sustainability performance metrics will be incorporated into the operational plans for each directorate, and reviewed quarterly by the Executive Board. We will report sustainability progress to our Executive Board and our Board of Trustees.



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We recognise that resourcing the commitments in this strategy will involve investments and resources, which we cannot fully quantify until the detailed delivery pathways are established. RBG Kew is funded from diverse sources, including membership and visitor income, a portion from government as an arms-length body of Defra, and generous donations large and small from supporters of our work.

Importantly, we will strive to take into account true costs over the longer term – integrating full lifecycle environmental costs into our business planning and decision-making processes to fully understand the immediate and longer-term costs of our choices.

In order to make necessary investments in sustainability action to become climate positive, we will seek diverse investment from sources including grants, loans, Defra Capital Bids, donor secured income and more. The business case for sustainability is clear, and the costs of inaction are unaffordable.

Fundraising: Kew Foundation

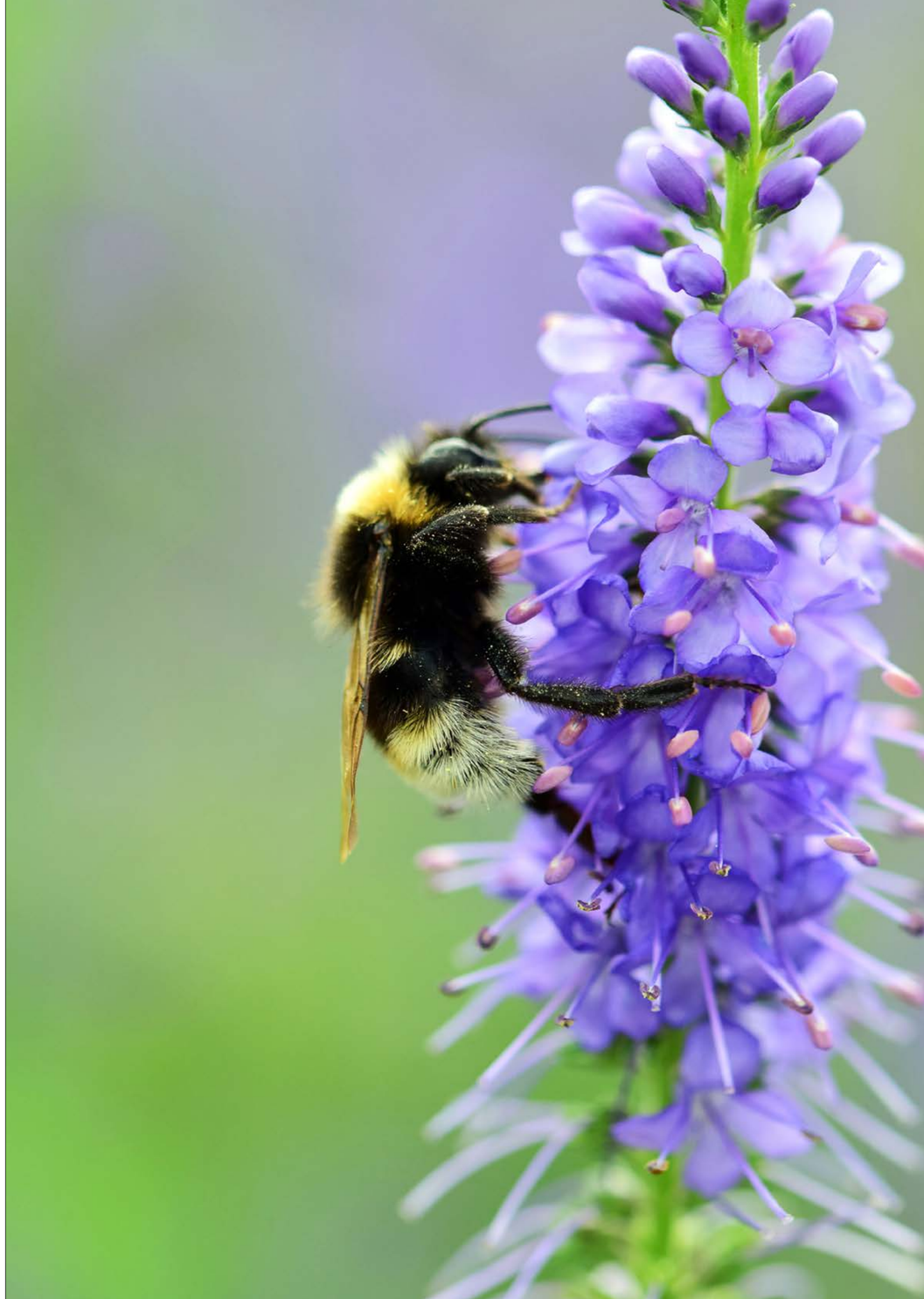
Crucial fundraising to deliver against Kew's climate positive objectives will be supported by Kew Foundation, connecting our drive to invest in sustainable infrastructure with our considerable network of supporters, members and benefactors. This has historically been the case for Kew's notable investment projects, including the restoration of the Temperate House, the creation of the Millennium Seed Bank, and recently the BREEAM Excellent or Outstanding rating for Kew's newly built Arboretum Headquarters[27]. Our ability to secure philanthropic support for our sustainability commitments will be greatly enhanced by ensuring sustainability is at the heart of our major funding initiatives – for instance, ensuring net zero or climate positive benefits are baked-in to new build and restoration projects, rather than undertaken as a standalone activity.

Pledges, accreditations and initiatives

There is a large number of voluntary pledges, certifications or initiatives with specific requirements or commitments, for organisations wishing to work together and build momentum for rapid climate and sustainability action. Kew will support and join appropriate pledges and accreditations, most specifically those that align strongly with this strategy or with our corporate strategy and mission. Identified below are some of the initiatives and certifications we have agreed to support. Each has different commitments and reporting requirements which we will meet. This list is likely to develop over coming years, as new initiatives are developed that Kew wishes to support.

- ISO14001 Environmental Management System
- Science-Based Targets initiative
- Together for our planet – Race to Zero
- Pledge to Net Zero

[27]Awaiting final certification at time of publication.



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Note: *Some sustainability and climate terminology is still evolving, and may be used differently by different organisations, in different contexts, or as norms and definitions evolve over time. For the sake of full transparency here we have defined how we use these terms within this strategy. We recognise that in the spirit of progress and innovation, the common usage of some of these terms may change in the future.*

Absolute emissions reduction – a reduction in annual GHG emissions not accounting for any offsetting (compared with 'net emissions reduction' which does include offsetting).

Carbon emissions (CO_2e) – the standard measurement for GHG emissions. Carbon dioxide equivalent (CO_2e) standardises greenhouse gases into units of tonnes of carbon dioxide equivalent.

Carbon neutral – an equilibrium whereby an individual, organisation or activity offsets their carbon emissions, using carbon credits. Often used interchangeably with net zero, but in some cases the term has been associated with the use of carbon offsets without significant emissions reductions.

Carbon offset – quantified, certified actions that remove or avoid emissions outside of an organisation's value chain, to remove or compensate for unavoidable emissions within the value chain. Offsets do not reduce the urgent need for absolute emissions reductions. A variety of factors determine the quality of an offset, including additionality, transparency, permanence, and quantifiable co-benefits. RBG Kew will invest in high-quality, certified, nature-based offsets and report transparently on all carbon offsets purchased.

Carbon sequestration – the capture and secure storage of carbon that would otherwise be emitted to, or remain in, the atmosphere. Also referred to as 'carbon draw-down'.

Carbon sink – a reservoir (natural or artificial) that accumulates and stores (sequesters) carbon. Natural sinks sequester carbon above ground (e.g. trees), below ground (soils, peat bogs) and below water (oceans, kelp forests, seagrass etc.).

Circular economy – a system designed to keep resources in use for as long as possible, extracting the maximum value from them while in use, then recovering and regenerating products and materials at the end of each service life.

Climate adaptation – the process of adjustment to expected climate change and its effects, planning human systems to best suit future conditions, and in some cases supporting natural systems to facilitate adjustment to future climate change and its effects. Since climate breakdown will bring weather instability, ongoing flexibility and adaptability is likely to be a core component of climate adaptation.

Climate breakdown – a term for climate change that highlights the complex network of interdependent processes involved in Earth's climate: human-induced warming may trigger biosphere 'tipping points' across a range of ecosystems and scales, leading to feedback loops that accelerate warming that could leave us in a 'Hothouse Earth'.[28]

[28]PNAS – Trajectories of Earth Systems in the Anthropocene

Climate positive – a commitment to go beyond net zero by offsetting organisational emissions and further investing in additional nature-based carbon sinks, in order to have a net beneficial impact on the climate.

Climate change mitigation – the actions we can all take to reduce or prevent the emission of greenhouse gases in order to reduce the magnitude and/or rate of climate change, and to limit the impacts of related effects – such as increasing shade cover and other measures to reduce the impact of urban heat islands.

Combined Heat and Power (CHP) – a technology commonly installed to reduce emissions, whereby electricity is generated locally on-site, and the heat captured that would otherwise be wasted is used to provide useful thermal energy. CHPs have delivered historical emissions reductions but will not do so indefinitely as UK national grid decarbonisation continues.

Ecosystem services – benefits to humans from the natural environment and from healthy ecosystems. Plants, fungi and microorganisms provide: provisioning services or goods like food, wood and other raw materials; essential regulating services such as pollination of crops, prevention of soil erosion and water purification; and a vast array of cultural services, like recreation and a sense of place.

Emissions boundary (organisational emissions) – the emissions boundary determines which categories of emissions are included within our organisational 'footprint' (scope 1 and 2 emissions, and many scope 3 categories) and which emissions categories are excluded (such as emissions from visitor travel).

Environmental emergency – a term recognising the interconnected crises of climate change and biodiversity loss, and the impacts these crises will have on the local and global systems we rely on for a healthy biosphere and a habitable planet.

Environmental net gain – the principle of achieving net increases in capacity of natural capital within a set area or project to deliver a range of ecosystem services i.e. enhancing the overall state of natural environments, enabling greater resilience and services such as pollination, purification of water and air, provision of resources, human well-being etc.

GHGs – greenhouse gases, the emissions responsible for global warming. These include carbon dioxide, methane, nitrous oxide and fluorinated gases, among others.

KPI (Key Performance Indicator) – a numeric target to monitor performance and support setting of SMART targets. We will set sustainability KPIs for quarterly reporting to our Executive Board

Location-based & market-based emissions reporting – when calculating and reporting emissions from electricity (scope 2), location-based reporting reflects the average emissions intensity of the electricity from the grid (grid-average emissions factor). Market-based emissions reporting accounts for the contractual instruments (such as energy attribute certificates, or direct contracts) therefore allowing more specific emissions factors to be utilised dependent on the details of the energy purchase arrangement.

Natural capital – the stock of the world's, a country's, or an area's natural resources, which includes geology, soils, air, water and all living organisms.

Nature-based solutions (NBS) – defined by the IUCN as 'actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits'. NBS can align conservation and human well-being needs by simultaneously protecting climate, people and biodiversity. NBS explicitly focused on carbon sequestration are sometimes referred to as natural climate solutions. RBG Kew supports the evidence-based guidelines for successful, sustainable NBS found here: ***nbsguidelines.info***.

Net zero emissions – annual organisational emissions are reduced rapidly, and residual emissions are balanced by transparent, certified carbon offsets. Kew will prioritise investment in nature-based carbon sinks.

Power Purchase Agreement – a contract to purchase renewable energy directly from a generator, often with additionality not found in standard renewable tariffs.

Planetary boundaries – a term identifying the natural limits to the resources and resilience of our planetary (natural and biophysical) systems. As anthropogenic change pushes us beyond these planetary boundaries we deplete natural systems and processes, and risk crossing potentially irreversible tipping points.

Plant-based – a term for food and drink that is derived from non-animal origins. This term includes food containing fungi and algae.

Science-based solutions – innovations, tools, methods, activities and behaviours, developed or validated by scientific approaches, for which there is evidence of positive outcomes that help tackle urgent challenges including climate change and biodiversity loss. Science-based solutions have considerable overlap with nature-based solutions (see NBS definition above).

Science-based target (SBT) – an absolute emissions reduction target established using methodology from the Science Based Targets initiative (SBTi). Carbon emissions reduction targets are considered 'science-based' if they are measurable, actionable, time-bound, and in line with climate science requirements to meet the goals of the 2015 Paris Agreement. Kew has used the most rigorous SBTi methodology, setting science-based targets to limit global warming to 1.5°C (rather than well below 2°C) above pre-industrial levels.

Scope 1, 2 and 3 emissions

Scope 1 (direct) – direct emissions from activities owned or controlled by the reporting organisation. Examples of scope 1 emissions include emissions from combustion in owned or controlled boilers, furnaces, vehicles, emissions from chemical production in owned or controlled process equipment.

Scope 2 (energy-indirect) – emissions released into the atmosphere associated with the consumption of purchased electricity, heat, steam and cooling. These are indirect emissions that are a consequence of the organisation's activities, but which occur at sources it does not own or control.

Scope 3 (other indirect) – emissions that are a consequence of the organisation's actions, which occur at sources which it does not own or control and which are not classed as scope 2 emissions. Examples of scope 3 emissions are business travel by means not owned or controlled by the organisation, waste disposal which is not owned or controlled, or purchased materials.

Soft landings – a strategy designed to make an easy transition from the construction to occupation phases of a project with the overriding aim of realising optimal operational performance. Soft landings help to narrow the performance gap between design intent and operational outcomes that can emerge at any stage in a construction project.

Tipping point – a point at which cumulative impact of a gradual change (such as rising temperature) causes a planetary system or habitat to change dramatically and potentially irreversibly. These 'tipping points' are thresholds where a tiny change could push a system into a completely new state. For example, changes in rainfall patterns could trigger a 'regime change' in the Amazon rainforest, pushing it into a stable savannah grassland habitat (accelerating climate change and biodiversity loss in the process).

ULEV (Ultra-Low Emission Vehicles) – ULEVs are currently defined as having less than 75 g of CO_2 per kilometre (g/km) from the tail pipe (though this threshold may decrease). 100% electric vehicles have no tailpipe emissions, but ULEV also includes certain compatible plug-in hybrids, with a minimum fully electric range of 20 miles.

Value chain emissions – the GHG emissions produced 'upstream' and 'downstream' of the reporting organisation's activities. Upstream emissions include those from the manufacture of purchased goods and services, transportation, and employee commuting. Downstream emissions include those from waste disposal, leased assets and investments.

Zero carbon or zero emissions – the long-term global target. In the context of Kew, this would mean no fossil fuels involved in generating any heat or energy we use, and zero carbon transport solutions. This is our long-term ambition, but considerable planning, investment and technological development will be required, and it is not yet clear at what date we will be able to achieve zero carbon operations.

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HEADLINES (EXECUTIVE SUMMARY)

- ☑ We will become climate positive by 2030 and reduce carbon emissions below science-based limits for 1.5 °C warming.
- ☑ We will develop a detailed carbon reduction pathway, and a carbon offsetting policy for our future investment in high-quality nature-based offsets.
- ☑ We will establish site-wide strategies for energy, water and waste.
- ☑ We will work with our suppliers to understand and minimise negative impacts of our supply chains.

NATURE-BASED SOLUTIONS

- ☑ RBG Kew's Manifesto for Change identifies an important role for Kew in working with others to support the implementation of science- and nature-based solutions.
- ☑ We will facilitate understanding and support of nature-based solutions for climate, biodiversity and well-being, helping public audiences and corporate investors understand the importance of high-quality nature-based solutions.

ACTION

Climate positive

- ☑ We will report scope 1, scope 2 and core scope 3 emissions annually.
- ☑ We will work to measure more accurately our wider scope 3 emissions, and include these categories within our organisational emissions reporting and science-based target from 2025.
- ☑ We will reduce our core carbon footprint as rapidly as possible, below our science-based emissions reduction target.
- ☑ We will encourage our suppliers to set verified science-based emissions reduction targets.
- ☑ We will include wider scope 3 emissions within our science-based emissions reduction target by 2025.
- ☑ We will develop our planned carbon reduction pathway, identifying reduction scenarios and setting key priorities for carbon reduction.
- ☑ We will invest in high-quality nature-based offsets, which maximise biodiversity and well-being co-benefits. We will offset more than our residual emissions by 2030, if not sooner, and report transparently on the offsets used.

Energy, buildings and glasshouses

- ☑ We will develop energy strategies for Kew Gardens and Wakehurst, analysing our energy needs and infrastructure constraints, and mapping out a pathway to low-carbon electricity and heat for our buildings and glasshouses.
- ☑ We will build new buildings to a net-zero standard, utilising a site-wide approach where net zero cannot be achieved within the bounds of the project.

Managing our land

- ☑ We will maximise ecosystem services, including carbon sequestration, biodiversity and well-being, when making choices about how we manage our land.

Travel

- ☑ We will encourage and enable visitors and staff to use sustainable modes of travel to reach our sites.
- ☑ We will develop new flexible working policy to support long-term reductions in commuter emissions.
- ☑ We will offset emissions from business travel by 2025 if not sooner.
- ☑ Fleet vehicle replacements will be ULEV compliant, and we will purchase 100% battery electric vehicles wherever possible, for a fully ULEV fleet by 2030 or sooner.
- ☑ We will install EV charging facilities for visitors and staff at our sites.

Waste and the circular economy

- ☑ We will develop a site-wide waste, recycling and reuse plan that will set out a pathway to reduce waste, reuse more, segregate more valuable material streams, minimise energy from waste and reach zero-to-landfill.

Water

- ☑ We will develop site-wide water and irrigation strategies.
- ☑ We will seek every opportunity to maximise the use of rainwater to irrigate our precious living collections at Kew Gardens and Wakehurst.

Procurement

- ☑ We will ensure that appropriate contracts have specific sustainability KPIs which are subject to systematic monitoring and review.
- ☑ We will have measurable sustainable procurement practice embedded within our procurement processes, specifically ensuring that sustainability criteria are built into the specification writing and tender evaluations.
- ☑ We will work to integrate whole-life costing into our purchasing processes and decisions.

Retail

- ☑ Within our retail outlets we will continue to seek sustainable suppliers, prioritising reusable or recyclable materials and reducing the climate and biodiversity impacts of our supply chains as rapidly as we can.

Food and drink

- ☑ We will further develop our plant-based food and drink offer, reduce use of animal products, and encourage our audiences to choose plant-based dishes to minimise the climate and biodiversity impacts of food choices.
- ☑ We will work with our suppliers to understand, reduce, and transparently report the carbon and biodiversity impacts of food and drink at Kew.

Investments

- ☑ We will monitor and seek to minimise the carbon intensity of our investments.

IT

- ☑ We will continue to monitor the sustainability impacts of our IT infrastructure, including assessment of our cloud computing impacts, and seek opportunities to reduce these impacts.

EXPERTISE

Scientific Expertise

- ☑ We will work to understand and measure the carbon sequestration and other ecosystem services provided by our sites at Kew Gardens and Wakehurst.
- ☑ We will aim to understand and measure the carbon sequestration impacts and other ecosystem services of our largest scientific conservation projects around the world.
- ☑ We will build cross-disciplinary partnerships to support and implement nature-based solutions, and guide best practice to ensure natural climate solutions maximise biodiversity and livelihood benefits.

Horticultural Expertise

- ☑ We will demonstrate and showcase sustainability best practices across our horticultural operations.
- ☑ We will use our living collections and landscapes to support research into climate resilience, mitigation, adaptation and sustainable practices.

Policy, government and international influence

- ☑ We will convene evidence and expertise to shape policy and practice on biodiversity loss, sustainable livelihoods and climate change.
- ☑ We will meet or exceed the Greening Government Commitments and show leadership within government by reducing our climate impacts as rapidly as possible.

Sustainability training

- ☑ We will develop and curate learning and development resources and opportunities to support staff at all levels in understanding broad carbon and sustainability topics.

VOICE

Visitor interpretation and member communications

- ☑ Our visitor interpretation and member communications will tell powerful stories about sustainability, increase scientific and sustainability literacy, and inspire visitors to take action and become advocates for climate and biodiversity.
- ☑ We will use signage that can be reused wherever possible and minimise waste in our interpretation planning.

Visitor programmes, events and exhibitions

- ☑ Our visitor programming, exhibitions and events will engage visitors in powerful stories about sustainability, inspire them to take action, and encourage them to encourage them to be positive advocates for biodiversity and climate.
- ☑ We will deliver every event with sustainability in mind and investigate suitable event certifications to establish whether we could reach net zero or other sustainability standards for large events.

Wider public audiences

- ☑ We will use our digital reach and influence to discuss the climate crisis, biodiversity loss and sustainable development issues, grow our audiences' understanding, and encourage them to take action to tackle these challenges.
- ☑ Working with the media, we will amplify more diverse and trusted voices to discuss environmental and sustainability issues, also seeking to engage previously under-represented audiences.
- ☑ We will deploy our public relations skills to identify the right people and the right opportunities for us to use our voice, to shape discussion on important topics around sustainability and nature.

Education and outreach

- ☑ Our educational and outreach activities will continue to raise awareness of the climate and biodiversity crisis, and equip all learners with the skills and motivation to take positive actions to tackle climate change and biodiversity loss, and support sustainable livelihoods.
- ☑ Our volunteer Guides and Explainers will communicate stories about how Kew Science and Horticulture are helping to solve global challenges and the ways in which visitors can play their part.

Supporting corporate sustainability

- ☑ We will work with commercial partners to leverage Kew's scientific and horticultural expertise in the direct support of robust and quantifiable sustainable initiatives.
- ☑ We will collaborate openly and transparently with partner organisations on sustainability, and support development of a new sustainability network among international botanic gardens.

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The development of this strategy has received support, input and expertise from many individuals within and outside of RBG Kew. We would like to thank everyone for their enthusiastic input. We would also like to thank the Board of Trustees and Executive Board, and Net Zero Working Group members for their insightful comments on the draft strategy and targets over the past six months.

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Thank you to all contributors for your considerable effort and insight.

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Citation
This document should be cited as:
RBG Kew:
Sustainability Strategy (2021)

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Front and back cover: Jenny Williams;
Inside-front: Justus Menke; Inside-back: Ed Hawkins.

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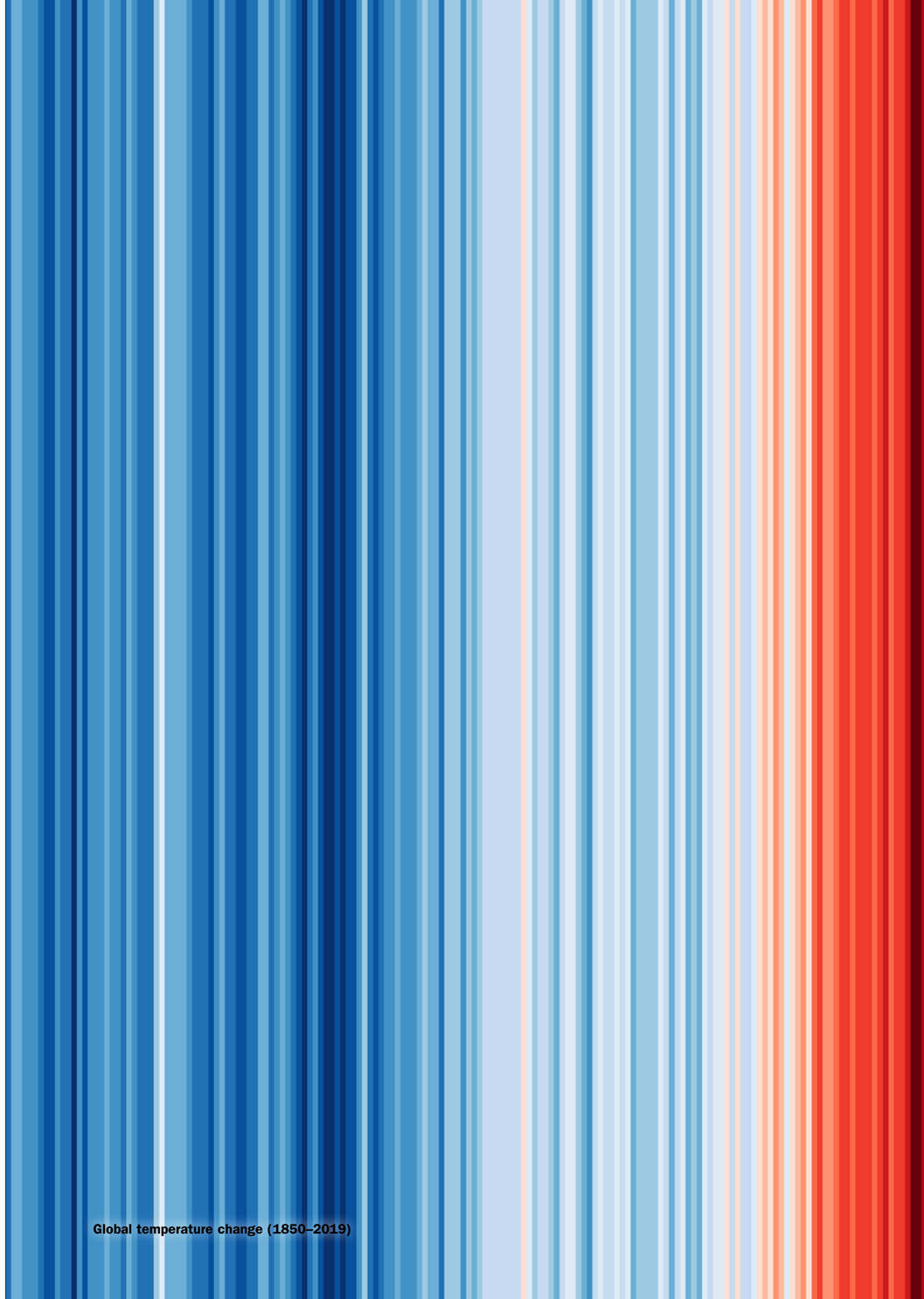

Global temperature change (1850–2019)


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