



WAZA

*World Association
of Zoos and Aquariums*

A GUIDE

**Reducing,
Measuring,
and Offsetting
Carbon at your
Zoo or Aquarium**

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01

HOW TO USE THIS GUIDE

The purpose of this guide is to provide readers with a step-by-step process for reducing their zoo or aquarium's carbon footprint. The guide also includes a **checklist** which gives an overview of how to go about starting your carbon reduction journey.

There are links throughout the guide that can be used to jump between sections within the guide as well as to refer to external resources for further information. The internal links are indicated by text in grey boxes.

Different sections of the guide will be relevant to different stakeholders, depending on where your zoo or aquarium is on the carbon reduction journey. Some sections may be more relevant for executives while others are more appropriate for sustainability officers who want to implement the steps recommended by the guide. For example, if you are an executive, you might want to focus on the section on governance and organisational structure, section 6 on divestment, and section 7 with the case studies. Sustainability officers will find section 2 on carbon reduction, section 3 on measuring carbon, section 4 on carbon offsetting, section 7 with the case studies, and section 8 containing the check list to be most relevant.





A checklist which gives an overview of how to go about starting your carbon reduction journey

CHECKLIST

CHECKLIST

1 RESEARCH AND PLANNING

- Get familiar with and understand the terminology used around carbon emissions.
- Become aware of the tools available to measure the zoo or aquarium's current carbon footprint.
- Survey the extent to which resources such as water, energy and food are currently being wasted and determine if there are ways to use them more efficiently (such as through an energy audit).
- Agree on the scope you want to include (which areas of your operations will be included) in your carbon footprint
- Set realistic short-term (annual), medium-term (three to five years) and long-term goals to help reduce your carbon footprint (e.g. reducing your carbon footprint by 30% by 2030).
- Review best practices or case studies from other zoos and aquariums who are working towards reducing their carbon footprint (or have become carbon neutral).

Internal links that can be used to jump between sections indicated by text in grey boxes

CARBON REDUCTION

WHAT IS A CARBON FOOTPRINT? measuring carbon

A carbon footprint is a measure of the cumulative greenhouse gas (GHG) emissions produced directly and indirectly by the activities of an individual, organisation, event or in the production of goods. Zoos and aquariums generate significant emissions through their activities, such as electricity use, and the purchase of animal feed.

A carbon footprint includes all six of the main greenhouse gases listed in the Kyoto Protocol which are converted to tonnes of 'carbon dioxide equivalents' for ease of comparison and reporting:

- carbon dioxide (CO₂);
- methane (CH₄);
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INTRODUCTION

In August 2021 the United Nations Intergovernmental Panel on Climate Change (IPCC) released a report from Working Group 1 titled "Climate Change 2021: The Physical Science Basis". This is the first section of the IPCC's Sixth Assessment Report (AR6), which is to be completed in 2022. Labelled "a code red for humanity", the Report notes unprecedented changes in climate in every part of the globe and unequivocally places the cause of these changes on human activities. The Report states that, unless there are urgent, large-scale, and rapid reductions in greenhouse gas emissions, including carbon, the global temperature will rise over 1.5 degrees Celsius (°C) or even 2°C. Exceeding temperatures by 2°C will have dramatic and deadly consequences for all life on Earth.

Climate change will affect every aspect of our lives if it isn't already. It is a crisis with far-reaching impacts into economic stability, health, food security, social and gender justice, equity and of course biodiversity, the very cornerstone of all life on the planet. If we do not dramatically cut greenhouse gas emissions in the next decade, we will have little chance of achieving any of the Sustainable Development Goals (SDGs) set out in the UN's 2030 Agenda for Sustainable Development. The agenda and all 17 SDGs were adopted by all United Nations Member States in 2015 and recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

THE ROLE OF ZOOS AND AQUARIUMS

Zoos and aquariums are at a pivotal point in their existence as well as in the world in which they operate. As custodians of the natural world, humans are faced with responsibility like never before. Not only do we need to communicate, educate, and inspire our visitors about what is happening with respect to biodiversity loss and climate change, but we also need to ensure that we lead by having systems and processes in place to reduce the impact of our operations, and in particular, our greenhouse gas emissions, on the environment.

03

“THE FIRST AND MOST CRITICAL PART OF THE JOURNEY IS MEASURING AND REDUCING YOUR CARBON FOOTPRINT. THIS MUST COME EVEN BEFORE YOU START THINKING OF OFFSETTING AND BECOMING CARBON NEUTRAL. NEVER MIND NET ZERO CARBON.”

“IF WE DO NOT DRAMATICALLY CUT GREENHOUSE GAS EMISSIONS IN THE NEXT DECADE, WE WILL HAVE LITTLE CHANCE OF ACHIEVING ANY OF THE SUSTAINABLE DEVELOPMENT GOALS (SDGS) SET OUT IN THE UN'S 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT.”

Links to external resources for further information

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Zoos and aquariums around the world are visited by more than 700 million people annually. We are perfectly positioned to influence our visitors to make positive behaviour changes in their daily lives. However, the credibility of our messages and even the legitimacy of our existence is at stake if we do not reduce our own emissions. Now, more than ever, we need to lead by example and provide a showcase to individuals and other organisations of what needs to be done to cut emissions.

WAZA “PROTECTING OUR PLANET SUSTAINABILITY STRATEGY 2020–2030”

In 2020 WAZA launched “[Protecting our Planet Sustainability Strategy 2020–2030](#)” which provides information to assist WAZA members in integrating sustainability into their strategies and throughout their operations.

The strategy works through each of the 17 SDGs and provides key facts and figures, recommendations, and case studies.

The following are recommendations for zoos and aquariums to address SDG 13 – Climate Action:

1. To address climate change.
2. Work with your local authorities to set climate action targets.
3. Integrate climate change measures into your organisational policies, including greenhouse gas emissions reduction targets.
4. Raise awareness amongst visitors, community, and staff about actions they can take towards climate mitigation, adaptation, and impact reduction.
5. Raise awareness amongst your visitors, community, and staff about what your zoo or aquarium is already doing, and plans to do, to help mitigate climate change.



WAZA Climate Change/ Crisis Positioning Statement

Our commitment is to engage our visitors and lobby governments to take urgent action to combat climate change and its impacts.



Aim of this guide

The WAZA Carbon Guide has been developed to assist WAZA members in measuring and reducing their greenhouse gas emissions and outlines various steps which zoos and aquariums can take across their operations.

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CARBON REDUCTION

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WHERE TO START?

There is a fair amount of jargon associated with carbon emissions – from carbon offsetting and carbon neutrality to net zero carbon. Please have a look at the [glossary](#) to gain a better understanding of the terminology as a starting point.

The first and most critical part of the journey is measuring and reducing your carbon footprint [measuring carbon](#), and it must come first before you even start thinking of offsetting and becoming carbon neutral, never mind net zero carbon.

It is important to view your carbon reduction efforts as a journey rather than a destination that you must reach immediately. Taking this approach will enable you and your team to avoid feeling overwhelmed and paralysed by the immensity of the task. It will also help with budget allocations, staff buy-in, community engagement, behaviour change, and rolling out the changes you need to make in your operations.



It might seem that efforts to reduce your emissions are going to be costly and therefore, it is important to plan your carbon cutting journey. Think of carbon reduction efforts as an investment rather than a cost – you are working to ensure the continued existence of your organisation as well as investing in protecting the planet for the future. And often you will find that reducing your carbon footprint will also save you money! Have a look at the [benefits](#) here.

STEPS TO TAKE



Research

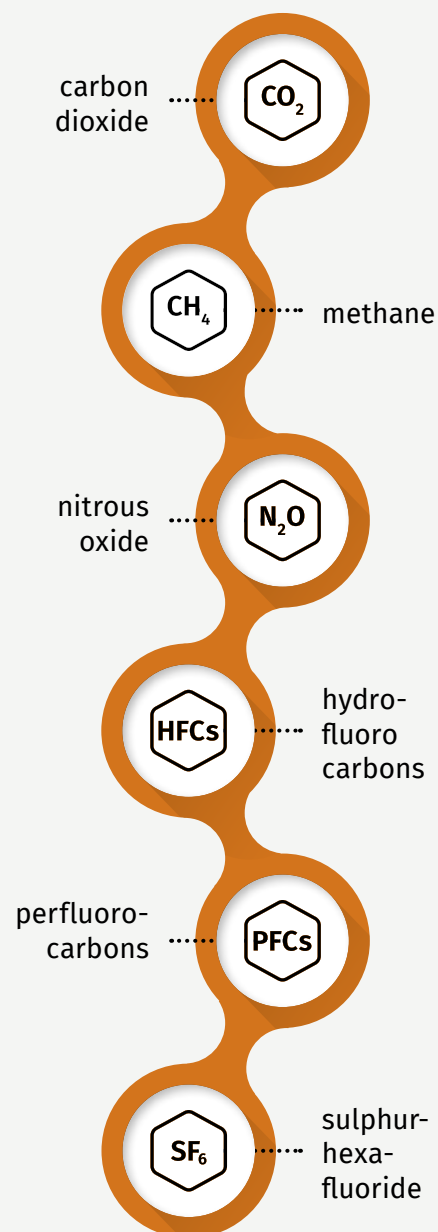
Start your journey by doing some research to get a broad understanding of the climate crisis, and the reasons why it is necessary to reduce carbon emissions. Read up on what other zoos and aquariums are doing ([we have provided some great case studies in this guide to help with this](#)) and investigate local initiatives and legislation. Find out what your country and city are doing about climate change, what measures they are putting in place, what funding opportunities might be available, and how you can take advantage of these in your organisation.



Strategy

Develop a short-term (annual), medium-term (three to five years) and long-term carbon-reduction strategy (e.g., carbon neutral by 2030 or 50% reduction in carbon emissions by 2025). Consider involving both external and internal stakeholders in developing this strategy so that it is inclusive and intersects with other areas of your operation. Your strategy may be as simple as setting a target which is agreed upon by your senior leadership. Choose your external certifying partner if you decide to go this route.

A carbon footprint includes all six of the main greenhouse gases





Scope of your initiatives

Create the scope of your initiatives by deciding which areas of your operations you are going to include and which ones you will exclude in your measurement. You may want to set this out so that, for example, in year one you are going to only include certain activities, and then in year two, add in the next set.

Carbon reduction initiatives and measurement are generally broken down into three categories or scopes:

measuring carbon

Scope ①

These are direct emissions from activities conducted by your zoo or aquarium and include heating, cooling, cooking, vehicle fleet and refrigeration. You own or control the sources of these emissions.

Scope ②

These are indirect emissions emanating from the electricity you use as supplied to you through the national grid i.e., purchased electricity which your facility uses. You do not own or may be able to control the sources of these emissions.

Scope ③

These are also indirect emissions through sources which you do not own or control and include activities such as business flights, waste disposal, water consumption, and employee commuting.

Once you have established these boundaries you will be able to move on to the next step which is writing policies and procedures and implementing them.



Policies and procedures

Policies and operating procedures are necessary to provide clarity and guidelines for staff, volunteers, and visitors. They set out the activities which must be undertaken to achieve your objectives. They also help to formalise your efforts and provide evidence of your commitment to carbon reduction. Policies and procedures should reflect your objectives and targets, describe operational conditions, be measurable and achievable, and should be reviewed at least annually.

Take each of the areas below and write up policies and procedures for each section.



Targets

Measurement and monitoring are critical in your carbon reduction efforts. You may want to measure before you embark on any changes so that you have a baseline to start with and an indication of your current carbon emissions. By doing this you will then be able to set targets for carbon reduction and see how your emissions start to reduce over time through the various systems and processes which you implement. Seeing your emissions starting to reduce is motivational for your staff and provides great material to communicate with your stakeholders and visitors.

measuring carbon

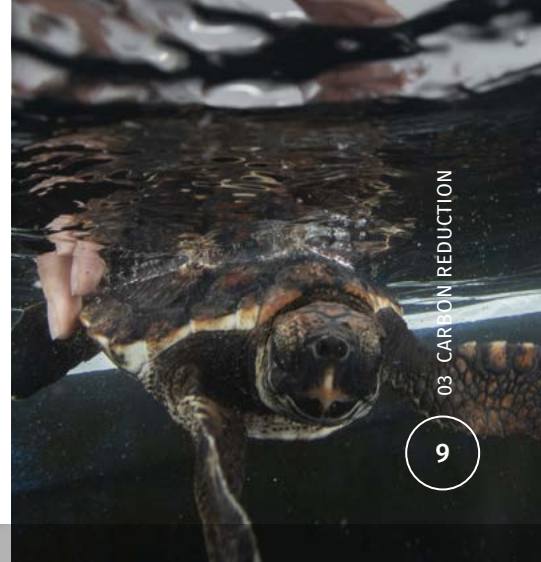
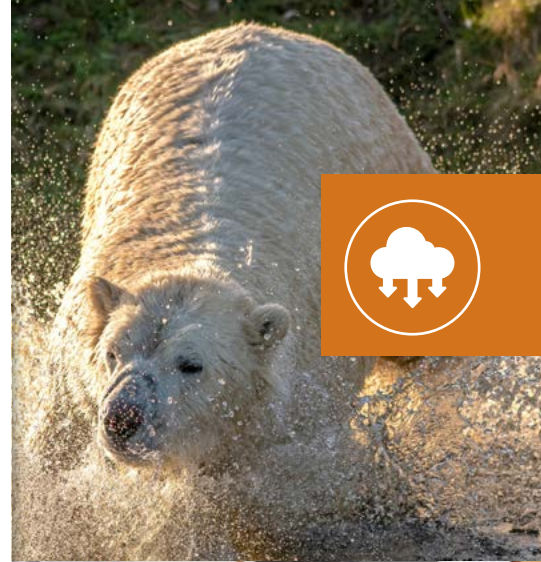


Carbon reduction team

Set up a team who can drive this with passion and determination. Some of the team members will require technical expertise, but you should also aim to have the CEO or Director and the Finance people on this team as their support will be critical and decision-making will be quicker if they are involved from the start and appreciate the importance of reducing carbon.

We have included a more detailed section on governance, organisational structure, budgeting, and communication here.

governance and organisational structure



AREAS TO FOCUS YOUR EFFORTS: TAKE WHAT APPLIES TO YOU

The list below is by no means exhaustive, but rather suggests some general actions that can be undertaken to reduce carbon emissions. Zoos and aquariums operate in a particular context that will provide opportunities unique to your organisation. You will also discover that your team has innovative ideas to further reduce emissions so that you can advance on your journey to carbon neutrality or even carbon net-zero, and instead create positive impact ([a carbon handprint](#)).

Every action we take has consequences somewhere else as everything is connected. While not directly associated with Scope 1, 2 or 3 emissions, there are additional choices you might want to consider as part of your broader sustainability journey as they do have emissions associated with them. We have provided references to these in the resource section. [references and resources](#)



Energy

Unless your zoo or aquarium is situated in a region where renewable energy solutions and service providers are already available, energy and electricity from fossil fuel sources is going to be the biggest source of carbon emissions in your facility. As a result, this is the area in which the biggest reductions can initially be made.

1. Conduct an energy audit so that you can assess your energy use and requirements.
2. Install meters on your incoming energy supply.
3. Install a monitoring system so that you can actively measure your energy use. Having an independent monitoring system is important so that you can ensure that you are being billed accurately by your municipality or local energy supplier, and so that you can see which areas of your operation consume the most energy.
4. Once you can actively measure your energy use you will then be able to establish areas in which you can reduce your consumption.
5. The biggest and fastest reductions will come from pumps and life-support systems (like ozone), and heating and cooling equipment. Sites that treat and/or recycle wastewater on-site will also use a significant amount of energy as well.



Pumps

- Install variable speed drives (VSDs) on pumps to control flow rates.
- Make sure pumps are correctly specified for the function they are required to fulfil.
- Replace older pumps with more energy-efficient models.



Heating, cooling, and insulation

- Keep the ambient temperature in your building at a moderate temperature – not too cold and not too hot.
- Use the hot or cold air generated by the Heating Ventilation and Air Conditioning system (HVAC system) to heat or chill exhibit water in aquariums.
- Replace element heaters with heat pumps in water-heating systems.
- Temperature control and monitoring of cold storage or freezer facilities.
- Replace older refrigeration equipment with up-to-date models.
- Switch off all non-essential hot water supply lines.



- Install timers and insulation on geysers or hot water boilers.
- Correctly orientate new buildings to benefit from natural light and heating and cooling according to the seasons.
- Double glazed windows and glass doors to ensure energy efficiency.



Lighting

- Replace all lighting with energy-efficient LEDs.
- Install motion sensors to trigger lighting in storerooms, offices, etc.
- Use natural lighting wherever possible via skylights, and large windows.
- Plan buildings to make use of natural light by orienting large windows facing north (Southern Hemisphere) and facing south in the Northern Hemisphere.
- Switch off lighting or install timers in visitor areas outside of operating hours.



Maintenance

- Maintain plant and equipment according to manufacturer specifications.
- Use reflective paint on roof tops.



Office equipment

- Purchase energy-efficient office equipment – most have energy-star ratings.
- Switch off equipment when not in use and don't leave in standby mode.
- Reuse equipment where possible and buy equipment made from high recycled content.



Renewable energy sources

- Investigate whether your municipality has renewable energy to sell.
- Investigate renewable energy suppliers in your locality.
- Consider solar and wind installations in your facility.



Waste management

Reduction and reuse of waste will help reduce pressure on the planet's natural resources while reducing emission of greenhouse gases created through mass production and burning of fossil fuels.

1. Conduct a waste stream audit so that you can determine which areas generate the most waste and what that waste comprises.
2. Implement a waste monitoring and measurement system.
3. Set targets for waste reduction – it might be too ambitious initially to start with a target of zero waste to landfill, but this is what you should ultimately be aiming for.
4. Separate waste at source – install waste separation bins in public and staff areas and install appropriate signage.
5. Set up an on-site waste sorting area with dedicated and trained staff.
6. Recycle as much as possible.
7. Consider the life cycle of products before purchasing them.
8. Aim to reduce food waste – from visitor catering to animal feed (this will require a separate audit to see where you can minimise waste).
9. If you have the space, start composting organic waste. This can then be used on grounds and gardens.
10. Consider converting waste to energy, e.g., installing biogas digesters.
11. Dispose of hazardous waste (e.g., batteries, computer equipment, chemicals) responsibly via appropriate e-waste service providers.
12. Apply the concept of circularity if possible – close the loop so that items can be used over and over rather than single-use and to avoid using virgin materials if possible. You could create a way for staff to advertise their 'waste' that could potentially be used by other departments. For example, the facilities team might have empty plastic containers that could be donated to zookeepers for animal enrichment, or your construction demolition will likely have useful equipment and fittings (smoke alarms, door latches, hoses) which other areas of the zoo might need.



Catering for visitors and staff

This is an area where you can reduce emissions and waste and use it as an opportunity to educate your visitors about the impact of diet on climate change.

Plant-based diets are critical in reducing emissions as well as the consumption of water and land-use.

1. Work with on-site caterers to implement carbon-friendly offerings for visitors.
2. Reduce, if not remove, meat and animal products from restaurant and canteen menus. If you are using meat or animal products, ensure they are ethically sourced.
3. Serve products that are organic, seasonal, and locally sourced from small-scale farmers if possible.
4. Plan appropriately to avoid food waste.
5. Reduce the size of servings.



Animal feed

Animal feed is likely to be another source of high carbon emissions in zoos and aquariums. You can reduce greenhouse gas emissions such as methane by carefully considering the ingredients in the food you provide to your animals.

1. Assess the diets of your animals – you might choose to do this with a subset rather than your entire collection.
2. Look for local sources rather than importing products – choosing local products means you cut carbon miles and carbon emissions associated with the transport of products.
3. Grow your own vegetables and feed if you have space.
4. Choose sustainably sourced and grown animal food products.
5. Where possible, find out about alternatives to beef (cow meat), for example game meat or insects.
6. Take advantage of food waste – contact your local grocery stores and wholesalers to see if they pass on food waste.





Water management

Water use requires large amounts of energy whenever water is moved uphill, treated, heated, cooled or pressurised.

1. Conduct a water audit so that you can assess your water consumption and requirements.
2. Install meters on your incoming water supply.
3. Install a monitoring system so that you can actively measure your water consumption. Having an independent monitoring system is important so that you can ensure that you are being billed accurately by your municipality or local water supplier, and so that you can see which areas of your operation consume the most water.
4. Once you can actively measure your water use you will then be able to establish areas in which you can reduce your consumption.
 - Detect and fix leaks as soon as possible.
 - Install low flow faucets/shower heads.
 - Put up tanks for rainwater harvesting.
 - Install grey water systems so that toilets can be flushed with grey water only.
 - Investigate black water treatment systems.
 - Irrigate with grey water.
 - Install drip irrigation in gardens and grounds.
 - Landscape with indigenous, water-wise plants.
 - Create 'wetlands' to filter and clean grey water.
 - Eradicate water-thirsty vegetation from grounds.



Procurement (Working with suppliers, tenants, and concessionaires)

Supply chains have the greatest room for improvement to meet sustainability goals. According to [McKinsey](#), "the typical consumer company's supply chain creates much greater social and environmental costs than its own operations. Supply chain impacts account for more than 80% of greenhouse gas emissions and more than 90% of the impact on air, land, water, biodiversity and geological resources".

1. Conduct an audit on all products and services so that you can establish:
 - Source of products – local or imported.
 - Lifecycle of products (carbon footprint of products).
2. Set a target to procure only ethically sourced products and services that have minimal environmental, social and economic impacts throughout their life cycle.
 - Look for [Fairtrade](#)-certified products.
 - Choose low carbon or certified carbon neutral products.



Buildings (embodied carbon)

Buildings have a carbon footprint before they even become operational and therefore, it is critical to consider the embodied carbon when planning a new building or renovations to your facility. Embodied carbon is the carbon emissions associated with the materials and the construction practices throughout a building's lifecycle.

According to the [World Green Building Council](#), "Buildings are currently responsible for 39% of global energy related carbon emissions: 28% from operational emissions, from energy needed to heat, cool and power them, and the remaining 11% from materials and construction".

1. Write up a building and renovation policy.
2. Do you absolutely need to build or renovate?
3. Consider the design process carefully, looking to nature to inspire biophilic designs that will enable you to keep carbon emissions low once the building is operational.
4. Consider the materials you need. How they are manufactured and where they will come from?
5. Can you use recycled materials? Or low emissions materials like green steel?
6. Approach your local Green Building Council for guidance.
7. Request information from the service provider about its emissions and its understanding of emissions and ensure that this is included in proposals and tenders.



Transport

Besides electricity consumption this is another area in which you can reduce carbon emissions substantially.

1. Survey your staff to establish how they are travelling to and from work.
2. Source animal food products locally to reduce carbon miles.
3. Use local products wherever possible in all aspects of your operation.
4. Reduce air travel where possible.
5. Plan trips to use EVs and not petrol vehicles.
6. Service vehicles regularly and according to manufacturer specifications.
7. Purchase low emission or electric vehicles.
8. Incentivise and reward your staff to carpool, take public transport or use alternative forms of transport.
9. Incentivise and reward your visitors to carpool, take public transport or use alternative forms of transport.





Digital carbon footprint

One of the operational aspects less considered when calculating carbon footprints is the digital carbon footprint – the emissions produced by our Internet use, our devices (including the manufacturing and transport), data storage, and the systems required to operate these.

Many facilities have moved away from print materials to reduce their paper use and have moved to digital platforms. Social media has become one of the preferred and more effective means of marketing our facilities and sharing our stories. Cloud storage has replaced physical servers. During the Covid-19 pandemic there was a significant shift to online with people around the world working from home, participating in education programmes, and hosting online conferences and webinars. According to the [World Economic Forum](#), Internet use increased by 40% during the first three months of 2020.

According to [Climate Care](#), the Internet, the devices we use and the systems which support them contribute 3.7% towards the world's emissions. This is the equivalent of the emissions produced by the airline industry. According to a recently published paper (Obringer et al. 2021), "Taking the median carbon footprint for the world (32 g CO₂e/GB), data storage and transmission emits 97 million tonnes of CO₂e a year – roughly equivalent to the annual carbon footprint of Sweden and Finland combined".

We can work towards reducing our digital carbon footprints in several ways:

At an organisational level:

1. Keep and maintain IT equipment for as long as possible.
2. Dispose of e-waste in a responsible and safe manner.
3. Check the digital weight of your website with your service provider – the less complex your website, the lower its carbon footprint.
4. Switch to a carbon neutral or net zero web host and cloud storage option.
5. Educate staff about the impact of digital use on emissions.
6. Minimise data storage on servers and in the cloud.
7. Implement policies to remove unnecessary files and data.

Some tips for individual users include:

1. Unsubscribe to newsletters you are no longer interested in.
2. Use other means of communicating where possible (in person or phone) rather than using email as your preferred option.
3. Delete unwanted or outdated files from file servers and from cloud storage systems such as Dropbox, Google Drive and iCloud.
4. Store your data locally as opposed to using cloud services.
5. Clear out your Inbox and stored emails on a regular basis.
6. Turn off video where possible when participating in online meetings.
7. Unplug laptops and mobile phones from electricity sources once fully charged.

COMMUNICATE, EDUCATE, RAISE AWARENESS



Key to your carbon reduction journey is communication, education and awareness-raising with your staff, service providers, tenants, contractors, partners and of course your visitors. It is also vital that you incentivise and reward your stakeholders so that they are encouraged to be part of the journey.

- Implement a training plan for your staff.
- Include your carbon reduction journey in your communications and marketing strategy.
- Use signage and other interpretation tools as opportunities to share your story and educate your visitors.
- Demonstrate how staff and visitors can cut emissions and reduce the size of their personal carbon footprints.
- Share your achievements online through blogs on your website and on social media platforms.
- Share your achievements with the media.
- Use your influence to put pressure on local and national authorities to cut emissions, and to change legislation relating to carbon emissions.
- Work with other organisations to assist them in embarking on a carbon cutting journey.
- Inform your visitors about the climate change impacts on the ecosystems in which the species within your zoo or aquarium live *in situ* and on the species themselves.

governance and organisational structure

BENEFITS TO REDUCING EMISSIONS

In the beginning you might question the benefits of reducing emissions especially if the costs initially seem high. However, some of the significant benefits include:

- Long-term operational cost savings.
- Impactful environmental, social, and corporate governance (ESG) reporting.
- Increased attractiveness to investors and donors.
- Powerful and positive stories and case studies to share with stakeholders, staff, and visitors.
- Positive media exposure.
- Alignment with vision and mission and shows that your zoo or aquarium is a purpose-driven organisation.
- Talent attraction – employees want to work for purpose-driven organisations.
- Inspiration to visitors to reduce their emissions.
- Enhanced brand value.

04



Woodland Park Zoo, US, purchases carbon offsets to account for the additional electricity used to power the wintertime WildLanterns spectacle.

MEASURING CARBON

SUMMARY OF ACTIONS



Set your boundary

Choose which areas of your organisation you will include in your footprint calculation, for example just your main site or *in situ* conservation sites as well?



Gather data

Gather data, usually annually, from book-keeping and accounting, invoices, delivery notes, meter readings and surveys. Put all the data together into a spreadsheet for ease of calculation.



Set exclusions

Define any elements you will be leaving out and why. You may not have sufficient data on some emissions to make a meaningful estimate at this time. You can come back to these later.



Apply conversion factors

Obtain the latest set of conversion factors and apply to your data.



Report

This could be internally for your own management purposes, or regionally for comparison with similar organisations, or publicly on your website.



Set target

Are you on your way to reaching your stated target of becoming carbon neutral or net zero?



A STARTING POINT

Calculating the total carbon footprint of your organisation can seem a bit daunting if you've never done it before, but a simple carbon footprint is probably easier to calculate than you first think.

This section of the guide is designed to aid you in producing a simple carbon footprint. The footprint calculation can be expanded as you become familiar with the technique and want to add different types of emissions, particularly from your supply chain. This section is based on the international Greenhouse Gas (GHG) protocol developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

This will provide useful insight into the biggest producers of emissions in your organisation, show you where to target action, and enable you to demonstrate progress.

You can also work with companies who will work with you to measure your carbon footprint from the data you have collected.

Some organisations may be obliged to report on carbon emissions under local legislation. Follow the relevant legislative guidance if you are obligated under one of these schemes in your country.

“

A SIMPLE CARBON
FOOTPRINT IS PROBABLY
EASIER TO CALCULATE
THAN YOU FIRST THINK.

DEFINITIONS

In this guide references to carbon or carbon footprint include all greenhouse gases. There are many gases that contribute to global warming including carbon dioxide, nitrogen dioxide, methane and various refrigerant and industrial gases. Six gases were listed in the Kyoto Protocol in 1997 as major contributors to climate change. For ease of comparison these are all converted to a single unit called carbon dioxide equivalents (CO₂e) using conversion tables. To convert any greenhouse gas into CO₂e, you need to multiply it by its 'global warming potential'.

Carbon emissions are typically split into two types of emissions, direct and indirect:

Direct emissions are produced directly from your activities and hence are under your control. This could be fuels for heating, cooking, vehicles, or lawn mowers.

Gas leaks from refrigeration plant and fire suppression systems are referred to as fugitive emissions and are also counted under direct emissions.

Indirect emissions are those emitted by others as a consequence of your actions which you may be able to influence but can't control. This includes emissions from power stations producing the electricity you use, from the production and transport of goods and services you use (including mains water), from the recycling ① and disposal of our waste (including sewage) and from the travel of both staff and guests to and from your premises. You don't need to include all of these in your first carbon footprint – see below.

For reporting purposes emissions are divided into three scopes:

Scope 1 (*all direct emissions*)

- Heating Fuel such as mains gas, LPG, kerosene, fuel oil, woodchip ②.
- Cooking fuel such as mains gas, LPG, butane (e.g., BBQ).
- Fuel for vehicles and equipment owned and operated by your organisation. This could include road-going and on-site vehicles and handheld equipment such as mowers, trimmers, chainsaws, etc.
- Fugitive emissions from leaking refrigeration equipment and fire suppression systems including leaks during its use, charging and servicing.

Scope 2 (*indirect emissions*)

- Electricity supplied from external sources. Both electricity from conventional and external renewable sources should be recorded. The carbon emissions from these will be reported differently.
- Do not include electricity generated on-site ③.
- Heat supplied from an external source via heat distribution pipes carrying steam or hot water.



Scope 3 (indirect emissions)

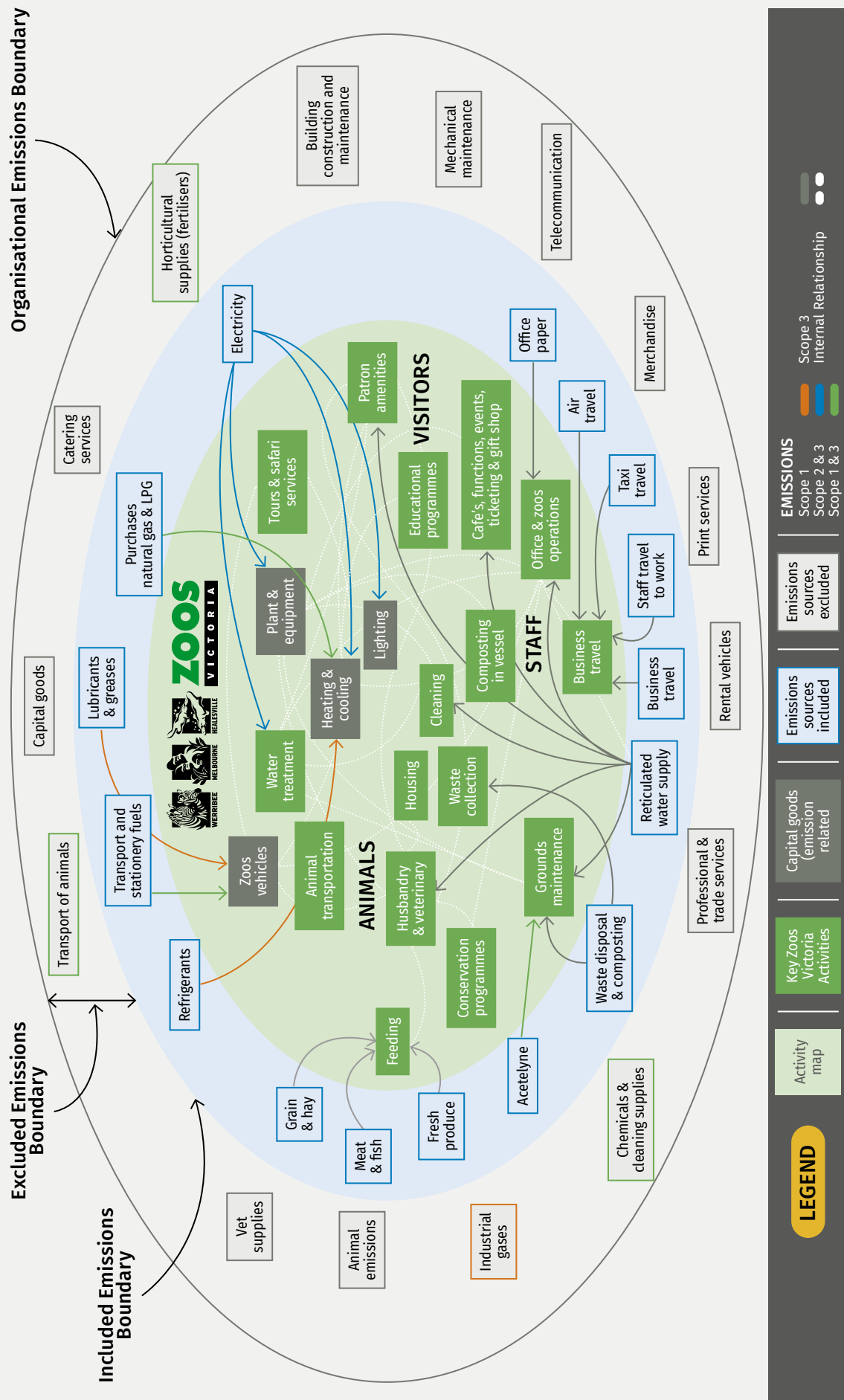
Scope 3 emissions are those associated with the supply chain and stakeholders external to your organisation, but who create emissions as a result of your activity. These include:

- Emissions associated with energy losses during electricity transmission.
- 'Well to tank' emissions from the extraction and processing of fuels.
- Provision of mains fresh water.
- Purchased goods (e.g. food and beverage for guests, animal feed).
- Purchased services (e.g. printing, training, auditing, maintenance).
- Business travel and staff commuting.
- Guest travel.
- Waste disposal and recycling.
- Sewage treatment.
- On-site construction.

A basic carbon footprint would count all scope 1 and scope 2 emissions. This will provide you with good insight into where the major sources of carbon emissions under your control are happening. Your scope 3 emissions are likely to be higher than combined scopes 1 and 2 but gathering data on them is harder so most organisations start with scopes 1 and 2 and include more scope 3 as they become familiar with the techniques and as they gain access to more data.



FIGURE 1: Relationship of scopes 1, 2 and 3



SYSTEM BOUNDARY

In order to calculate the carbon footprint, it is necessary first to define a 'system boundary' and to determine which, if any, scope 3 emissions you decide to include in the carbon footprint. The simplest form is a location or operational boundary and only includes activities within your site boundary. Alternatively, you could be more ambitious and use a 'financial control' approach that includes everything that is under your financial control including international travel and *in situ* conservation activity funded by you.

It is a good idea to start with a simpler system and then to expand it as you obtain more data.

EXCLUSIONS

It is useful to state what you are excluding from your footprint calculation and why if you plan to publicise it to avoid confusion. For example, if you have chosen to include just your zoo or aquarium, some readers might assume that includes visitors to the site so state that their travel is not included if you have decided not to calculate this initially. Defining your emissions boundary will become increasingly important as more organisations start to report on their carbon footprint, and the integrity of reporting is examined by the media and the community.

DATA SOURCES

You will need to gather data from a number of different sources to construct your carbon footprint. The following table lists the most common sources of data for scope 1, 2 & 3 emissions and the likely units that data will be expressed in.

TABLE 1

SCOPE 1	
Mains Gas	kWh, GJ or m ³ consumed from meter readings or invoice
Liquid heating fuels	Litres consumed from meter readings or invoices
Solid heating fuels	Tonnes or m ³ consumed from meter readings or invoices
LPG (heating or cooking)	Litres consumed from meter readings or invoices
Bottled propane or butane	kg or number of bottles consumed from purchase records or invoices
Vehicle and equipment fuel	Litres used from invoices, till receipts, delivery notes, bowser tracking system, litre tracking system, local council, or vehicle km or miles ④
Refrigerant gases	Litres or kg of gas used to recharge AC or refrigeration system should be recorded on service records ⑤ and using refrigerant loss factors



TABLE 1 (continuation)

SCOPE 2	
Electricity	kWh used from meter readings or invoices
Heat	kWh used from meter readings or invoices
SCOPE 3 (SOME COMMONLY INCLUDED EXAMPLES)	
Water	Litres, m ³ or kL or ML used from meter readings or invoices
Business travel	Miles or km by travel type from expense claims or travel records
'Well to tank' emissions ⑥	Converted from same data used in scope 1 emissions for fuels
Transmission and distribution losses ⑦	Converted from same data used in scope 2 emissions for electricity and heat
Staff commuting	Miles or km by transport type from staff surveys or records
Guest travel	Miles or km by transport type from guest surveys or records
Products	Number of units or weight data from purchase records or direct from supplier ⑧
Sewage	Litres, m ³ or kL or ML discharged from meter readings or invoices
Waste and recycling	Tonnes of each waste stream from invoices
Food and beverage	Total kilograms or litres of each type ⑧
Construction	Total weight and type of each material purchased

FOOTPRINT CALCULATION

Gather your data together in a spreadsheet like *Table 2* and apply the appropriate conversion factors. All conversion factors shown in this example are from the DEFRA GHG conversion factors published annually in the United Kingdom. Some of these factors will be different in different countries so you should look for the conversion factors most appropriate to your location. Some examples of conversion factors from different regions are given in the [references](#).

You can opt to work with an external certifier to calculate your footprint once you have collected the data.

The conversion factor databases often include information on which factor should be used for each type of emission so read the associated guidance if you are unsure. The conversion factors may convert your consumption to kg of CO₂e or it may include factors for each of the six main greenhouse gases. In the latter case you will need to add the six factors together to get your final conversion factor. The final carbon footprint should be reported as tonnes of CO₂e for reporting so remember to divide the final total by 1,000 if the factor is in kg of CO₂.

This example uses conversion factors from 2020, but the latest factors should be used each year.



TABLE 2

SCOPE 1			
Mains Gas	Meter 1	Meter 2	Meter 3
kWh	250,000	100,000	50,000
Conversion factor	0.18387	0.18387	0.18387
kg CO ₂ e	45967.50	18387.00	9193.50
Liquid heating fuel	Building 1 Gas Oil	Building 2 Kerosene	Building 3 Biodiesel
Litres	20,000	15,000	10,000
Conversion factor	2.75776	2.54039	0.1658
kg CO ₂ e	55155.20	38105.85	1658.00
Solid heating fuel	Building 1 Woodchip ⑨	Building 2 Wood pellets	Building 3 Straw
Tonnes	100	20	100
Conversion factor	58.35272	72.29731	60.95408
kg CO ₂ e	5835.27	1445.95	6095.41
LPG	Building 1	Building 2	Building 3
Litres	20,000	10,000	5,000
Conversion factor	1.55537	1.55537	1.55537
kg CO ₂ e	31107.40	15553.70	7776.85
Bottled Gas	Catering use	Maintenance use	
Bottles per year	10 × 47 kg bottles	2 × 19 kg bottles	
kg	190	38	
Conversion factor	1.55537 ⑩	1.55537	
kg CO ₂ e	295.52	59.10	
Vehicle fuel	Use 1 eg tractor	Use 2 eg forklift	Use 3 eg strimmers
Fuel	Diesel	LPG	Petrol
Litres	2,000	500	500
Conversion factor	2.54603	1.55537	2.16802
kg CO ₂ e	5092.06	777.69	1084.01
Refrigerant gas	Gas type 1 – R404A	Gas type 2 – g R410A	Gas type 1 – R134A
kg	1	0.5	0.3
Conversion factor	3922	2088	1430
kg CO ₂ e	3922.00	1044.00	429.00

TABLE 2 (continuation)

SCOPE 2			
Electricity	Meter 1	Meter 2	Meter 3
kWh	1,000,000	500,000	50,000
Conversion factor	0.23314	0.23314	0.23314
kg CO ₂ e	233140.00	116570.00	11657.00
Heat	Heat Meter		
kWh	500,000		
Conversion factor	0.17261		
kg CO ₂ e	86305.00		
SCOPE 3			
Water	Mains meter 1	Mains meter 2	Borehole
m ³	20,000	10,000	20,000
Conversion factor	0.344	0.344	0
kg CO ₂ e	6880.00	3440.00	0.00
Business Travel	Air	Road – diesel car	Rail
Km	10,000	1,000	1,000
Conversion factor	0.14615	0.16637	0.03694
kg CO ₂ e	1461.50	166.37	36.94
Staff commuting	Car (diesel)	Car (petrol)	Bus
Km	20,000	20,000	1,000
Conversion factor	0.16637	0.18659	0.10312
kg CO ₂ e	3327.40	3731.80	103.12
Guest travel	Car (diesel)	Car (petrol)	Bus
Km	20,000	20,000	10,000
Conversion factor	0.16637	0.18659	0.10312
kg CO ₂ e	3327.40	3731.80	1031.20
Well to tank – heating fuel	Building 1 Gas Oil	Building 2 Kerosene	Building 3 Biodiesel
Litres	20,000	15,000	10,000
Conversion factor	0.63523	0.52835	0.37381
kg CO ₂ e	12704.60	7925.25	3738.10
Transmission and distribution	Meter 1	Meter 2	Meter 3
kWh	1,000,000	500,000	50,000
Conversion factor	0.02005	0.02005	0.02005
kg CO ₂ e	20050.00	10025.00	1002.50

TABLE 2 (continuation)

SCOPE 3			
Sewage	Mains meter 1	Mains meter 2	Borehole
m ³	19,000	9,500	19,000
Conversion factor	0.708	0.708	0.708
kg CO ₂ e	13452.00	6726.00	13452.00
Recycling	Recyclable guest waste	Paper and card	Construction and demolition
tonnes	100	15	10
Conversion factor	21.317	21.317	1.009
kg CO ₂ e	2131.70	319.76	10.09
Waste	General guest waste for energy recovery	Bulky general waste for landfill	Oil & oil spill materials for combustion
tonnes	100	20	0.25
Conversion factor	21.317	458.176	21.317
kg CO ₂ e	2131.70	9163.52	5.33
All kg CO ₂ figures are then added together to get 826,732 and this is then divided by 1,000 to convert to a tonnes of CO ₂ e for reporting purposes.			
Total (tonnes CO₂e)	826.73		

SUPPLY CHAIN EMISSIONS

Emissions from your supply chain and visitors to your zoo or aquarium can be included in your scope 3 emissions if you have access to the required data. As more companies calculate their own carbon emissions this data should become easier to obtain over time.

Emissions you could consider include carbon emitted in production of materials, goods, animal feed, catering supplies and other products used or sold on-site, transport emissions delivering these to you, transport emissions moving animals, emissions associated with cloud-based IT services, carbon emitted in the construction of new buildings and exhibits, and end of life disposal of products sold to guests.

As a starting point you could calculate the weight of your largest deliveries e.g., bedding material, animal feed, canned drinks, toys etc, and use freight conversion factors to calculate the emissions associated with delivering those products to you. For example, Marwell Wildlife in the UK bought 50 tonnes of straw bedding in 2020 from a supplier approximately 5 km away. The DEFRA conversion factors have a conversion factor of 0.07524 kg CO₂e/tonne/km for freighting goods so the carbon footprint of transporting straw to Marwell Wildlife in 2020 is $50 \times 0.07524 \times 5 = 18.81$ kg CO₂e.

For a more complete picture include the embodied carbon or the carbon footprint of the product itself. This can be difficult to obtain. Ideally the supplier will have accurate data on the carbon emitted during manufacture of the product, commonly called 'cradle to gate' emissions, that is from material extraction (cradle) to leaving the factory (gate). This data is becoming more common, but many suppliers, particularly smaller ones, won't have this data and some form of industry average value will need to be used instead.





List the products you buy for the year in question and start to construct a table similar to *Table 3a* or *Table 3b* depending on whether you are using supplier data or industry averages. Rank the list by volume or weight and start your calculation with the largest items which are likely to have the highest impact. Alternatively, you can also look at your organisation's financial accounts and rank spend on products to determine likelihood of impact and add known scope 3 emissions such as visitor and staff impacts e.g., waste, travel etc.

It is acceptable to exclude scope 3 aspects that would contribute only a very small amount of carbon compared to your overall footprint. For example, services such as accountancy or training probably only add a small amount of travel and office carbon. Other sources of carbon might be excluded because data is not available to calculate the emissions. If you are reporting on your total footprint, it is worth noting which emissions have been excluded and why for completeness. Please see GHG Protocol for guidance <https://ghgprotocol.org/scope-3-technical-calculation-guidance>.

TABLE 3A: If supplier 'cradle to gate' data is available

PRODUCT	NO OF UNITS OR WEIGHT	UNIT	CONVERSION FACTOR, KG CO ₂ E/UNIT	SUBTOTAL	WEIGHT FOR SHIPPING, TONNES	SHIPPING METHOD	SHIPPING DISTANCE, KM	CONVERSION FACTOR	SUBTOTAL, KG	TOTAL, TONNES
Woodchip	173.1	Tonnes	0	0	173.1	Tractor and trailer	33	0.07524	0.429	0.43
Straw	50	Tonnes	0 ¹¹	0	50	Tractor and trailer	5	0.07524	18.81	0.01881

TABLE 3B: If industry averages are used

PRODUCT	NO OF UNITS OR WEIGHT	UNIT	CONVERSION FACTOR, KG CO ₂ E/UNIT	TOTAL, TONNES
Soft toys	63,241	Items	0.78 ⁽¹²⁾	49.3
Coffee	1,147	kg	3.64 ⁽¹³⁾	4.18



1. The carbon saving from recycling materials is included in the carbon footprint of the product made from recycled material hence this carbon saving doesn't show in your carbon footprint calculation.
2. Burning biomass for heat produces N₂O and CH₄ that are converted to CO₂e for reporting.
3. Electricity generated from on-site renewables or off-site from a carbon neutral energy provider, e.g. solar panels or wind turbines, are zero carbon so do not need to be included. Electricity generated on-site from fossil fuels such as gas CHP or diesel generators produces emissions – this should be included in scope 1 under gas or fuel consumption.
4. Conversion from volume of fuel is more accurate than kilometres or miles conversion.
5. Industry average annual leakage rates from refrigeration and air conditioning are available which can be used to estimate leakage, but a well-maintained system shouldn't leak so service records will be more accurate if you have them.
6. Well to tank emissions account for the carbon emitted in extraction, processing, and transport of fuel.
7. Transmission and distribution losses account for losses in the distribution systems bringing electricity and heat to your site.
8. Amount spent, or financial expenditure can be used as a proxy for quantity of goods and converted to CO₂e using industry averages. For example, while they were working to update internal accounting systems to allow for consistent reporting of kilograms and litres of food purchased, Taronga Zoo Sydney's greenhouse gas accounting consultants applied an industry average conversion factor to the total expenditure for each food type ('input-output analysis'). This can be an easier way to start but is less accurate so moving to a quantity-based method is preferred.
9. Biofuels like woodchip, pellets and straw have zero carbon dioxide emissions because the same amount was absorbed during growth. Combustion of these materials releases other gases like nitrous oxides which have global warming potential, so these are accounted for in our conversion factors.
10. Bottled propane and butane have the same conversion factor as LPG which is a mix of the two.
11. Straw is a waste or by-product of cereal production, so product carbon footprint is zero.
12. Approximate figure from 'A Playful Life Cycle Assessment of the Environmental Impact of Children's Toys' – <https://via.library.depaul.edu/cgi/viewcontent.cgi?article=1141&context=depaul-disc>
13. Approximate figure from 'Life cycle assessment synthesis of the carbon footprint of Arabica coffee: Case study of Brazil and Vietnam conventional and sustainable production and export to the United Kingdom' – <https://www.researchgate.net/publication/348111421>.

CHOOSING CARBON OFFSETS STEPS



Choose carbon offset types



Choose a certified offset



Consider opportunities for partnerships



Consider procurement strategies



Avoid greenwashing

CARBON OFFSETTING

Carbon offsetting should be used as a last resort. Additionally, the quality of the offset must also be considered, before deciding to choose a suitable offset type. The following will help you navigate the process of carbon offsetting.

SUMMARY OF STEPS WHEN CHOOSING CARBON OFFSETS

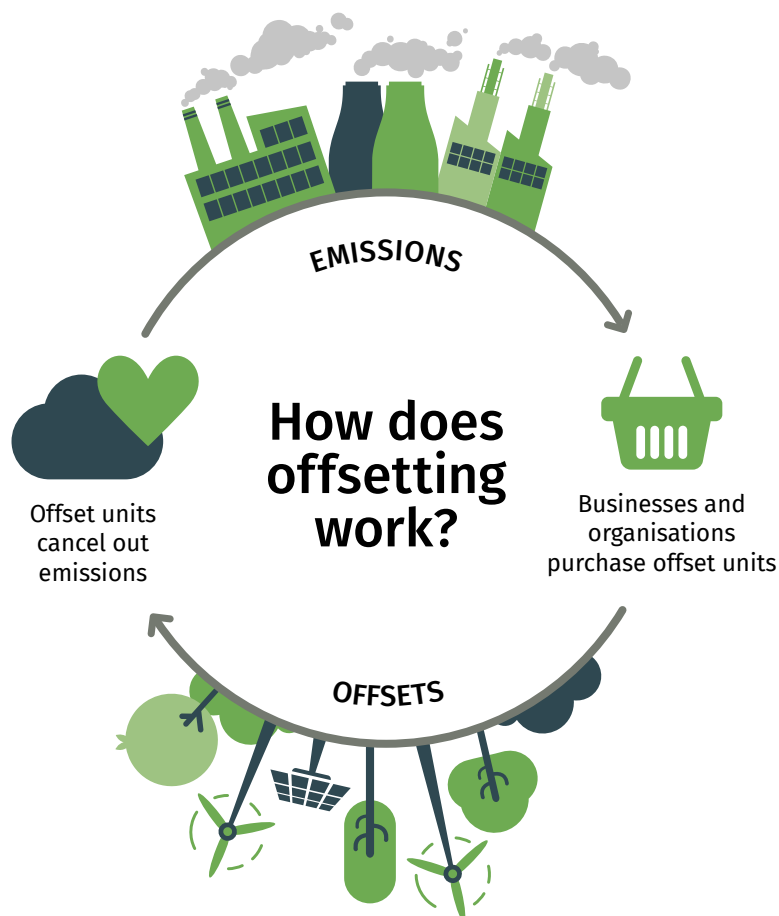
Choose carbon offset types that are appropriate to and aligned with your values. Consider your organisation's conservation objectives and invest in projects with high co-benefits. Avoid carbon offsets that have a negative impact on the natural environment. Use WAZA's "[Protecting our Planet Sustainability Strategy 2020–2030](#)" and the SDGs as a guide.

Choose a certified offset that is appropriate with your offset standard. Independently verified standards will ensure that the carbon offset claims are verified by third party verifiers and have processes in place for ongoing assessments. Also consider and give preference to additional certifications such as Climate, Community and Biodiversity Standards (CCB Standards).

Consider opportunities for **partnerships with chosen offset projects** (directly or through your offset broker) for example, partnering on conservation in a carbon offset project site.

Consider procurement strategies that will provide long term availability of chosen offsets.

Avoid greenwashing and choose credible offsets that remove or reduce CO₂ in the atmosphere. Reducing emissions should be your priority and implemented first or alongside with your carbon offsetting. Avoid the use of carbon offsets as your sole strategy in emissions reduction i.e., getting others to reduce emissions on your behalf.



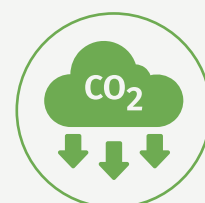
CARBON OFFSETS

Carbon offsets (also referred as carbon offset credits or units) are used to claim carbon neutrality or net zero emissions. Offsetting should be considered as an option only after first reducing your emissions as much as possible (using renewable electricity, etc). Generally, carbon offsets will represent renewable electricity generation, or tree planting (see [offset types](#)). An offset is 'retired' or cancelled to compensate for remaining emissions usually in tonnes of carbon dioxide equivalent (CO₂e). One carbon offset unit is equal to one tonne of CO₂e emissions. Carbon offsets are certified by international regulatory bodies, governments or independent certification bodies and traded internationally. Carbon offsets produced are capped, registered and finite and once retired (cancelled), cannot be reused. However, they can be traded if not retired or used. Not all carbon offsets are created equally, and its acceptance will depend on your carbon neutral certification rules and claims.

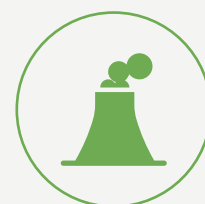
After your emissions reduction, carbon offsets are bought and retired to compensate for these residual emissions for carbon neutral claims.



Emissions



Reduce emissions



Remaining emissions



Offset projects to eliminate remaining emissions



Zero emissions (the state of being carbon neutral)

OFFSET TYPES



Land use, land-use
change and forestry



Blue Carbon



Renewable Energy



Energy efficiency



Others

IDEAL OFFSETS

Additional: emission reductions that are unlikely to occur in the ordinary course of events and have not been double counted.

Permanent: permanent reductions in greenhouse gas emissions e.g., for a period of 100 years for carbon sinks.

Measurable: methods used to quantify the amount of emission reductions generated must be supported by clear and convincing evidence.

Transparent: must have access to information about the offset project that generated the abatement, including the applied methodology and project-monitoring arrangements.

Address leakage: provide deductions for any material increases in emissions elsewhere as a result of the offset project which nullify or reduce the abatement that would otherwise be represented by the offset unit.

Independently audited: verified by an independent, appropriately qualified third party.

Registered: the offset unit must be listed and tracked in a publicly transparent registry.

Wildlife-friendly: offset projects must not compromise habitats for wildlife.

High co-benefits: projects with high co-benefits that address UN SDGs should be prioritised.

OFFSET TYPES

There are many carbon offset types, but they fall into two main categories: carbon removal and avoidance. Carbon removal is the absorption of carbon from the atmosphere and can be natural, for example in vegetation planting (members can do their own planting to sequester carbon, but for reporting purposes, particularly net zero, these will need to be certified or verified) or technology such as direct capture of carbon or methane. Carbon avoidance is the prevention of carbon emissions. Examples include renewable energy, energy efficiency and avoiding deforestation. Note for net zero emissions claims, the science-based targets require carbon removal offsets to neutralise any residual emissions that cannot be eliminated.



Offset projects with the following attributes are recommended for zoos and aquariums:

- Minimum environmental harm during construction and manufacture, productive period, and end of life.
- Co-benefits that support natural habitats and biodiversity. Priority should be given to projects that have the potential to protect threatened species.
- Co-benefits with high social outcomes. Examples include community development such as community employment, health, and education services (**More information is provided in the [co-benefits](#) section**).

Project types to consider include carbon offsets from:



Land use, land-use change and forestry

‘The rate of build-up of CO₂ in the atmosphere can be reduced by taking advantage of the fact that atmospheric CO₂ can accumulate as carbon in vegetation and soils in terrestrial ecosystems.’ – United Nations Framework Convention on Climate Change.

The accumulation of CO₂ in vegetation and soils acts as ‘carbon sinks’. Carbon offsets could come from the following:

Carbon offsets could come from the following:

- Afforestation and reforestation – new forest plantings where there were no trees (e.g., on agriculture land or plantings in degraded forests).
- Avoided conversion – prevention of a forest being converted to a non-forest project (e.g., forest clearing for agriculture).
- Improved forest management – management of existing forests to maintain or improve the carbon stock of the forests.

As conservation organisations, we encourage you to support projects in this category and select projects that align with your goals, values, and programmes. For example, align your conservation programme to protect a specific threatened species with your offset procurement or choose to protect a forest with high biodiversity significance.

Other considerations in this offset category are the project's certifications to global initiatives such as the REDD+ by the United Nations Framework Convention on Climate Change, Climate, Community and Biodiversity Standards (CCB Standards) and alignment with the UN Sustainable Development Goals.

For organisations seeking net zero emissions claims, consider afforestation and reforestation projects that are certified as carbon removal units and projects that support biodiversity and community development.



Blue Carbon

Blue Carbon is the use of coastal vegetated ecosystems namely mangroves, sea grasses and salt marshes for carbon sequestration. Co-benefits include the conservation and restoration of coastal ecosystems which is essential for marine biodiversity and coastal protection.

This is an emerging area for carbon offsets – organisations using these offsets should look into the offset methodologies and certifications. For example, in Australia, the Blue Carbon methodology is from the modification of tidal systems to restore or establish marine wetlands ecosystems. Offsets that meet the methodology can be registered as Australian Carbon Credit Units.



Renewable Energy

Energy generated from clean, renewable sources, such as wind, solar, hydro, or certain types of renewable biomass that have little to no greenhouse gas emissions. Hence carbon offsets can be generated from renewable energy projects. However, hydro and wind projects must be considered carefully as there could be negative environmental or biodiversity impacts associated with these.



In the south of Tenerife, Loro Parque has 2.75 MW of photovoltaic power. Loro Parque's most innovative project includes the installation in the 2022–2023 period of a new photovoltaic plant that will increase the total power generated to 10MW, making the facility 100% energy self-sufficient.





It is possible to buy offsets via the Clean Development Mechanism that install renewable energy in communities currently using fossil fuels e.g., in rural Africa and India. These offsets don't necessarily have direct biodiversity benefits, but they do have significant social impact.

However, renewable energy can also lead to the generation of Renewable Energy Certificates (RECs). When choosing to mitigate emissions using renewable energy, you should use RECs when you have a strategy for emissions reduction through renewable energy; example 100% renewable energy target, joining RE100 or seeking SBTi's Net-Zero Standard based on science-based net-zero targets. Note: One Renewable Energy Certificate (REC) equates to one megawatt of renewable energy produced. Renewable electricity RECs can only be used to offset your electricity consumption (scope 2 and possibly electricity transmission in scope 3) and not used to offset other emission sources like natural gas, diesel or petrol emissions, or supply chain emissions.

Carbon offsets from renewable energy on the other hand equate to tonne/s of CO₂e and can be used to offset emissions from any scope 1, 2 or 3 emissions.

When choosing offsets (or RECs) from renewable energy, the following project attributes should be considered:

- Minimum environmental and social harm during the construction and manufacture, productive period, and end of life. Avoid projects that harm cultural sites, displace communities, build on wildlife corridors and migratory routes etc.
- Co-benefits with high social outcomes. Examples include community development such as community employment, health, and education services. (More information is provided in the [co-benefits](#) section.)



Energy efficiency

Compared to conventional systems, energy-efficient projects require less energy and result in reductions in greenhouse gases. Examples include energy efficiency in industrial processes, LED lighting and cooking stoves. With reductions of energy use from sources such as gas, wood and fossil fuel-derived electricity, the lower emissions can lead to the development of carbon offsets.

When choosing offsets from energy efficiency, the following project attributes should be considered:

- Minimum environmental and social harm during construction and manufacture, productive period, and end of life.
- Co-benefits with high social outcomes. Examples include community development such as community employment, health, and education services. (More information is provided in the [co-benefits](#) section.)
- Pay close attention to additionality when using energy efficiency offsets. Organisations should be increasingly efficient so be sure your offset investment is genuinely increasing efficiency, for example by working in a country where they can't afford to invest in more efficient technology.



Others – e.g. process changes

Carbon offset methodologies can be developed for other projects not listed above. The same criteria for carbon offset creation applies. Examples could include emissions reduction as a result of changed agriculture and industrial practices, cattle management, savannah burning etc.

When choosing offsets from this area, the following project attributes should be considered:

- Minimum environmental and social harm during construction and manufacture, productive period, and end of life.
- Co-benefits with high social and environmental outcomes. Examples include community development such as community employment, health, and education services. (More information is provided in the **co-benefits** section.)

CARBON OFFSET PROGRAMMES

The following are examples of carbon offset programmes and their certification marks:

KYOTO PROTOCOL CARBON OFFSET PROGRAMMES	CERTIFICATION MARK
Clean Development Mechanism (CDM)	Certified Emission Reduction (CER)
Land use, land-use change and forestry (LULUCF)	Removal units (RMUs)
Joint Implementation (JI)	Emission Reduction Unit (ERU)
COUNTRY BASED (COMPLIANCE) CARBON OFFSET PROGRAMMES	CERTIFICATION MARK
California Compliance Offset Programme	Air Resources Board Offset Credit (ARBOC)
Clean Energy Regulator	Australian Carbon Credit Units (ACCUs)
Alberta Emission Offset Programme (AEOP)	Alberta Emissions Offset Credit (AEOC)
VOLUNTARY CARBON OFFSET PROGRAMMES	CERTIFICATION MARK
Verified Carbon Standard	Verified Carbon Unit (VCU)
Gold Standard	Gold Standard (GS)
Climate, Community and Biodiversity Alliance	Climate, Community and Biodiversity Standards (CCB Standards)
Social Carbon	SOCIALCARBON Standard
Plan Vivo	Plan Vivo Certificate (PVC)
Toitū Envirocare	Carbon programmes and certification
PlanetMark	Certification



Co-benefits

As conservation organisations, it is important we choose carbon offsets that have co-benefits for habitat protection, biodiversity, and people. Preferred projects should align with your conservation commitment and/or focus on reforestation and the protection and rehabilitation of degraded forest or around coastal and marine ecosystems. Key points to consider when choosing co-benefits for carbon offsets include:

- **Environmental benefits** include protection and enhanced biodiversity, maintaining and improving habitat for native flora and fauna, avoiding deforestation or vegetation loss, enhanced forestry management, improved environmental conditions and its management.
- **Social benefits** include positive aspects for community development as a result of the carbon offset project. These include opportunities for employment, improved living conditions such as improved health and education, and access to clean and affordable energy and capacity building.
- **Economic benefits** include direct and indirect income from the sale of offset credits that flow back into the community. They allow for community development together with improved infrastructure and economic opportunities.



Partnerships through Carbon Offsets

Develop partnership opportunities or form direct purchasing options or contracts with offset project developers or providers to leverage potential benefits by:

- Establishing conservation partnerships with project developers. Conservation knowledge and expertise could be utilised to enhance the co-benefits of the project.
- Co-branding, endorsing and developing retail opportunities of selected offsets with high co-benefits in conservation for sale to the public.



06

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THE TASK OF REDUCING CARBON EMISSIONS IS A COLLECTIVE RESPONSIBILITY, AND IMPLEMENTATION MUST BE INTEGRATED INTO ALL PROCESSES ACROSS THE ORGANISATION.

GOVERNANCE AND ORGANISATIONAL STRUCTURE

The task of reducing carbon emissions is a collective responsibility, and implementation must be integrated into all processes across the organisation. To implement a successful carbon reduction programme, it is important to pay attention to the organisational governance structures and to specify how different elements (such as responsibilities, mandate, goals, priorities, and budgets) will be set to enable carbon reduction.

Each organisation will differ in terms of how governance structures can best facilitate carbon reduction. This section includes a set of tips to consider. They are grouped in three categories:

AIM FOR IT!

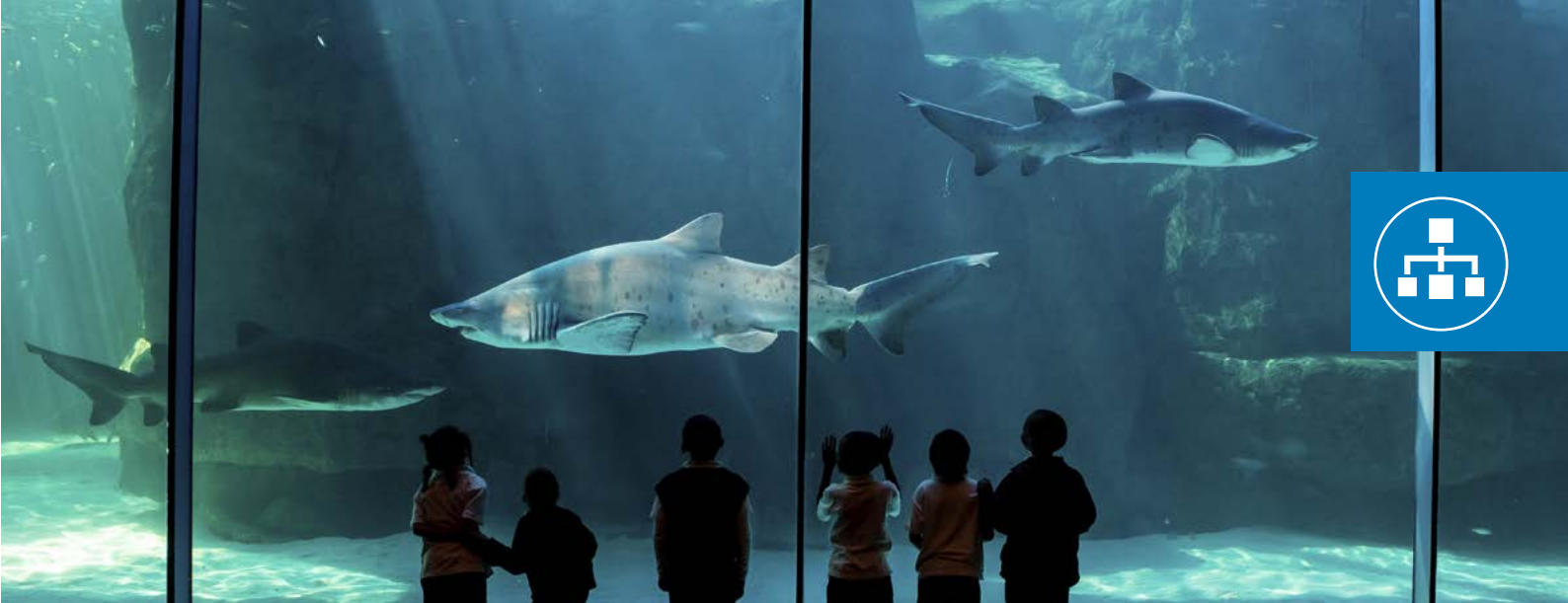
TALK ABOUT IT!

COLLABORATE!



AIM FOR IT

Determine one long term goal: While you need to set annual targets, setting one ambitious long-term goal, preferably one that is easy to understand and to remember for everyone, sets the overall vision for what you are wanting to achieve. Examples include “Carbon neutral by 2030” or “50% reduction in carbon emissions by 2025”. Make sure the goal is ambitious enough to challenge the status-quo, but specific enough to evoke a call-to-action. Setting one overall goal is going to help you communicate one clear message to everyone in the organisation, and to suppliers, visitors, funders, government etc. It is crucial that this goal is supported by the director(s) and senior management of the organisation.



Commitment of board of directors and senior management: The full board of directors (or equivalent depending on your organisational structure) should commit to doing everything in its power to achieve this goal.

Determine who is responsible: Make it clear which stakeholder is responsible for each carbon-emitting process. As processes tend to move through the organisation, there is always the risk that no-one is held accountable for the emissions. Making it clear which department is responsible (or 'in the lead') to reduce carbon emissions in a specific process mitigates this risk. Choose the departments that have the most control over the process. Examples:

- Maintenance is responsible for the emissions caused by heating and lighting, buildings, and animal enclosures.
- ICT is responsible for (indirect) carbon emissions related to paper usage.
- Logistics is responsible for transport emissions.
- Communication or Guest Experience is responsible for visitor-transport emissions.

Determine mandate: Decide who in the organisation can make budget (investment) decisions on carbon reduction efforts. Those responsible for the emissions in a particular process should be mandated to make recommendations to achieve carbon reductions. Make sure that budgets align with the annual targets as well as long-term goals and foster synergies between processes.

Set annual targets per department: Even though there is one long-term goal for the whole organisation, it is important to set annual targets for departments. Linking performance feedback or annual performance bonuses for achieving these targets per team or even at an individual employee level may further accelerate the transition towards carbon reduction.

Evaluate and report: Set up annual, quarterly, or monthly evaluations on e.g., energy consumption, and compare those with previous reporting periods. Evaluating and reporting regularly on your progress will keep your targets top of mind throughout the organisation and will also allow for a swift response when targets are not being met. Evidence of carbon reduction efforts will also provide motivation to everyone involved as well as being able to be used for external messaging.

Set a carbon reduction budget: Set aside a budget specifically for carbon reduction.

- It demonstrates that your organisation is fully committed to carbon reduction.
- It makes it easy to track investments and expenditure on carbon reduction efforts throughout the organisation.
- It guarantees an annual investment in carbon reduction.
- Every expenditure decision has the potential to cut carbon!
- If possible, set a mandate for carbon reduction projects with a defined payback period. For example, if a project pays back in three years or less, it should then be mandatory to fund and progress.



TALK ABOUT IT

Make 'affinity with sustainability and carbon reduction' part of your recruitment process

Recruitment is the first professional contact every employee has with the organisation. By adding a standard question about carbon reduction in recruitment interviews, every new employee will understand how important carbon reduction is for the organisation. Furthermore, it emphasises the fact that every person in the organisation plays a role in the carbon reduction (direct or indirect) for both the interviewer and the interviewee. Standard questions could be:

- *How would you contribute to the carbon reduction goals of this organisation?*
- *Can you give an example of a situation where you reduced carbon emissions in a process?*
- *What would be the first thing you would do in your new position to reduce carbon emissions?*

Make 'contribution to carbon reduction' part of every development and assessment interview:

All employees can help to reduce carbon emissions in their daily routines. Examples include driving more fuel-efficiently, reviewing the heating of animal enclosures with consideration to animal welfare, efficient purchasing logistics, and including carbon reduction in contract negotiation. You can discuss these efforts as part of the annual development and assessment interview – not only will this help you recognise positive contributions but will also remind staff of the ongoing effort to reduce carbon emissions.

Helpful questions include:

- *How did you reduce carbon emissions in your daily work this year?*
- *Do you have the right tools to reduce carbon emissions?*
- *How do you think we can further reduce carbon emissions in your daily work?*

Organise full staff meetings: Make sure everyone in the organisation is invested in achieving the long-term goal. Set full staff meetings to inform people about the goal and the efforts to achieve it and ask them for input to accelerate the transition. Often, employees know best how to make their work more sustainable. Share successes with your employees to keep them motivated.



Staff training: Include environmental and sustainability training that incorporates carbon management and reduction in your skills development plans.

Make the world aware of your efforts: Share your carbon reduction efforts with your visitors, partners, funders, media, and government. Sharing your success stories will inspire others and lend credibility to your facility. It is important that you share details on how you have achieved emissions reductions to assist anyone else who is on the carbon reduction journey. You may even consider entering various awards – winning an award which acknowledges your efforts not only provides an opportunity for more people to learn about what you are doing, but it will also inspire your staff to want to do more! Have a look at these [case studies](#).



COLLABORATE

Set up a green team or sustainability committee: Set up a group of sustainability enthusiasts who meet frequently to keep each other in the loop on carbon reduction efforts within the organisation. Clear communication between departments can be difficult, and a Green Team can help to improve communication. An effective Green Team could have:

- People from various departments. Try to include representatives from as many departments as possible, while keeping the group to a decisive size (6–8 should be the maximum).
- People from various levels in the organisation.
- A mandate to push for carbon reduction efforts.
- A direct line to management.

Make carbon reduction a part of every project: Make it a requirement for projects to evaluate carbon emissions during the process, and to measure the carbon reduction achieved via the project.

Choose carbon neutral products or services: Choose certified carbon neutral products or services where possible. This ensures that you reduce your carbon footprint as well as encouraging and supporting other like-minded organisations in their efforts to reduce carbon emissions.

Find partnerships: Moving towards carbon zero can be costly and challenging. Therefore, it is important to collaborate with experts in the field and the frontrunners of industry. They can provide guidance and are often willing to provide funds or materials to achieve them (in return for publicity).

Make carbon reduction part of every tender (large and small) and contract: Highlighting the importance of carbon reduction in all tenders and contracts demonstrates how serious you are in fighting climate change.

Ask visitors to contribute: Everyone is part of the energy transition, including your visitors. Asking them to collaborate with you to reduce the carbon emissions (e.g. transportation) highlights the collective efforts required to reduce emissions.

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SCIENTISTS HAVE MADE IT CLEAR THAT WE ARE RUNNING OUT OF TIME TO ADDRESS THE CLIMATE CRISIS. AS INSTITUTIONS DEDICATED TO CONSERVING SPECIES, ZOOS AND AQUARIUMS HAVE A SPECIAL RESPONSIBILITY TO HELP PROTECT THE FUTURE OF OUR PLANET.

DIVESTMENT

Scientists have made it clear that we are running out of time to address the climate crisis. As institutions dedicated to conserving species, zoos and aquariums have a special responsibility to help protect the future of our planet. It makes no moral or practical sense to pay for the conservation of a species or the education of a generation of children by investing in companies whose business plan guarantees that they will not have a recognisable planet to live on.

Many zoos and aquariums have implemented energy conservation programmes to green their infrastructure, developed marketing strategies and climate-related education programmes, and encouraged their visitors to adopt good habits to help the planet. These institutions recognise that it is essential for them to align their operational practices with their mission statements.

By greening your institution and your portfolio, you are making an investment in a liveable future. Together, zoos and aquariums have the opportunity to take a leadership role in action to rescue the planet; the chance to tackle the source of the problem that, if left unaddressed, will continue to undermine our conservation efforts.

Zoos and aquariums that invest money can choose to divest from fossil fuel companies and reinvest in solutions that align with their mission of conservation. Divestment is the opposite of an investment – it simply means getting out of certain stocks, bonds or investment funds. Divestment also starts to build momentum for moving money into clean energy, community development, and other more sustainable investments.

Zoos and aquariums without direct investments can still use the power of money to send signals to the fossil fuel industry. For example, recommend an ethical superannuation or pension fund to your employees, and ask your finance team to choose banking partners that are divested or divesting from fossil fuels. Many zoos and aquariums also accept sponsorship and donations from large corporations and might want to consider a screening process to ensure that partners are aligned with values around climate change and emissions reduction.



FREQUENTLY ASKED QUESTIONS ON DIVESTMENT

Is it even possible for my institution to divest from fossil fuels?

Even though the first answer you receive from your board and fund manager might be “no,” the answer is YES! Boards and senior managers can tell their money managers to develop responsible investment strategies that exclude direct investments in fossil fuel corporations and funds that include fossil fuels in their portfolio (it is called “screening”). As people have become more aware of the threat of the climate crisis and the role of the fossil fuel business model in perpetrating this crisis, more options for fossil-free funds have become available.

Can we still make a reasonable return without investing in fossil fuel companies?

While it is true that fossil fuel companies are extremely profitable (the top five oil companies made \$137 billion in profit – that is \$375 million per day in 2020), they are also very risky investments. Coal, oil, and gas companies’ business models rely on emitting five times more carbon into the atmosphere than civilisation can handle, which makes their share price five times higher than it should be in reality. In addition, disasters like Exxon Valdez, the BP oil spill, along with massive fluctuations in supply and demand of coal, oil, and gas, make energy markets particularly volatile, and therefore risky.

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BY GREENING YOUR INSTITUTION AND YOUR PORTFOLIO, YOU ARE MAKING AN INVESTMENT IN A LIVEABLE FUTURE.

STEPS TO DIVESTMENT



Find out where
your money is



Commit to pursuing
divestment



Research responsible
investment alternatives



Meet with your
financial planner



Divest stocks



Choose a pension
provider for your staff



Choose a bank that
meets your standards



Spread the word

What about fiduciary responsibility of our boards to act in the best interest of our organisation?

Administrators argue that fiduciary duty compels them to maximise returns, a position that ignores the social impacts of corporate externalizing of costs as well as the crisis of climate change. There is no one single definition or interpretation of fiduciary responsibility, but it should not mean maximising profits at the expense of the environment and the zoo community's own policies or values. The fiduciary responsibility to act in the interests of stakeholders, for example, makes little sense without a commitment to intergenerational equity – a cornerstone of sustainable investment. Your facility has the opportunity to look beyond immediate, short-term, and unsustainable ways of generating profits and returns. That said, in recent years, those who were ahead of the curve in divestment have financially benefited and that trend is expected to continue.

STEPS TO DIVESTMENT

1 Find out where your money is

Talk to your foundation, board, or financial planner to find out where your money is invested. Even zoos and aquariums with ethical investment policies are likely invested in one or more of the top 200 fossil fuel companies (<http://gofossilfree.org/companies/>).

2 Commit to pursuing divestment

It is both that simple, and that complicated. A commitment to divestment does not mean that you know all the answers or can predict the outcome. It means that your institution will begin taking necessary steps to move in this direction. Remember, it doesn't have to happen overnight.

3 Research responsible investment alternatives

Investment products that exclude fossil fuel industries are available to investors and just like for any investment product, there is help available for identifying fossil fuel free funds. For a good place to start, visit <http://www.greenamerica.org/fossilfree/>, which has links to fossil free mutual funds, green asset management firms, and financial planners.

4 Meet with your financial planner

Once armed with a sufficient information, meet with your financial planner if you have one. Most likely, they will be familiar with some type of socially responsible investing (SRI) and can help you identify fossil fuel free products. Remember that your advisor's job is to help you and your institution meet your goals, and this includes ensuring your portfolio is aligned with your mission.

5 Divest stocks

Research divestment options for your other investments. Divesting stock holdings might be easier than divesting your pension fund or endowment, so if your institution invests in stocks, pursue that first. While mutual funds and endowments will take time to untangle from fossil fuels, if your zoo or aquarium holds any stock in the Top 200 fossil fuel companies, divesting from these might be considered "low-hanging fruit".

6 Choose a pension provider for your staff that allows them to make ethical investment choices of their own.

7 Choose a bank that meets your standards

In addition to your own investments your bank also invests the money held in your account and many of these investments may not meet your own ethical standards. Choose a bank that you are confident is not investing in carbon intensive industries or which at least has a plan to reduce investment in a timeframe that meets the requirements of the Paris 1.5°C commitment.

8 Spread the word

We know that you will not make a divestment decision lightly. Thus, when you've decided to consider divestment, announce your intention to divest. This is something to be proud of, and although divestment will be complicated, the message it sends is not. Let your divestment serve as an invitation for other zoos and aquariums and your community to also participate in this movement actively.

TOOLS THAT CAN HELP!

Visit the IUCN Species Survival Commission Conservation Planning Specialist Group's page on [divestment](#) to learn more and to read about the "[Zoos and Aquariums for 350 campaign](#)".



CASE STUDIES

A CARBON NEUTRAL AZA CONFERENCE

Woodland Park Zoo



When Woodland Park Zoo hosted the 2018 AZA Conference, we made every effort to ensure that the event had a positive impact on both the zoo community and the earth. Part of doing this was internalising the cost to the planet of convening the event in the form of carbon offsets. Our Sustainability Team calculated the carbon emissions associated with the following factors: transportation for all participants, supplies and vendors, utilities used to heat and illuminate indoor spaces, all meals and beverages provided to participants, waste disposal, hotel accommodations for our vendors, and all printed materials (banners, maps, agendas, etc.).

Ultimately, we offset 49.53 metric tons of CO₂. The offsets paid to plant 10 Douglas Fir trees in local evergreen forests which will sequester up to 140 tons of CO₂ over 100 years, provide habitat to countless species, improve ecosystem resiliency, and affirm our organisations' shared ethic of sustainability.





ZOO POO – A WORLD’S FIRST INITIATIVE

Marwell Zoo

Marwell Zoo has become the first of its kind to convert manure into fuel for their new biomass boiler. Zoo poo from endangered species such as Grevy’s zebra, Scimitar-horned oryx and African wild ass will heat our largest buildings via an underground heat network.

The world-first Energy for Life initiative saves 220 tonnes of CO₂ equivalent each year. It marks a critical step in our goal to become carbon neutral.

Our dedicated team of keepers sweep up the zoo poo from the animal paddocks and enclosures each morning. A mini refuse truck then collects the waste and transports it to the Energy Centre.

A digger transfers the mixture of manure and bedding to a shredder for mixing. It is then dried and pressed into briquettes, which are fed into the boiler.

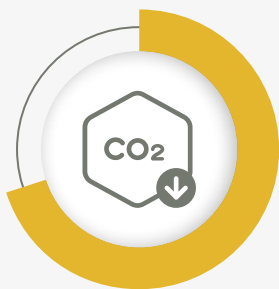
The boiler heats a 15,000-litre thermal store. Hot water from the store then flows underground to heat Energy for Life: Tropical House. The exhibit combines the tropical animal habitat with educational exhibits on energy flow, climate change, and powering modern lifestyles. The heat distribution system also takes the hot water to heat other animal houses and the 14th century Marwell Hall removing the need for fossil fuel heating from six buildings.

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PREVIOUSLY, 600 TONNES OF ANIMAL WASTE WAS TAKEN OFF-SITE TO BE COMPOSTED. THIS CAME WITH A SIGNIFICANT CARBON TRANSPORT COST. WE CAME UP WITH THE IDEA OF BIOMASS HEAT GENERATION TO REDUCE OUR CARBON FOOTPRINT. WE WOULD TURN A PREVIOUS WASTE STREAM INTO A VALUABLE RESOURCE – ACHIEVING COST SAVINGS IN THE PROCESS.

Dr. Duncan East,
Head of Sustainability





70%

REDUCTION IN EMISSIONS



100%

**RENEWABLE ENERGY
POWERED**



89%

**ZERO WASTE TO LANDFILL
DIVERSION RATE**

A DECADE OF CARBON NEUTRALITY

Zoos Victoria

Zoos Victoria is the world's first certified carbon neutral zoo organisation. Certified since July 2011, its scope covers emissions generated by staff travel, waste to landfill, composting, energy supply, paper use, reticulated water, refrigerant losses and the supply of animal foods. In line with the Net Zero pathways, we have continually sought to reduce our emissions through resource efficiency, renewable energy and reduction of waste to landfill supported by staff behaviour change, resulting in a 70% reduction in emissions since certification. We are now powered by 100% renewable energy with 675kW of on-site solar PV, off-site wind power and GreenPower from the electricity grid. Our Zero Waste to Landfill has achieved an 89% diversion rate and reduced our emissions by 2,400 tonnes CO₂e a year from composting and recycling. We use Environmental, Social and Governance procurement to assess suppliers. We believe in reducing emissions through quality offsets that support biodiversity and community development.





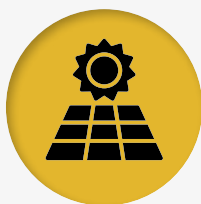
CUSTOM-MADE CARBON EMISSIONS CALCULATION THROUGH OPEN ACCESS RESOURCES

Aquazoo Löbbecke Museum Düsseldorf

The Aquazoo Düsseldorf plans to offset all emissions resulting from its operations. We started carbon measuring in April 2021 and, once the total amount of carbon emissions is known, we will support a rainforest restoration project on Sulawesi.

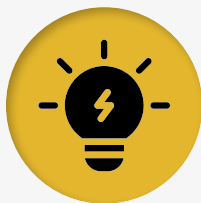
As one of the smaller zoo members in WAZA, we do not have the capacity to hire a professional company for CO₂ accounting. Therefore, we developed a Do-It-Yourself approach that relies on open access resources. This work is in progress and has great potential for those zoos and aquariums that do not have the capacity to advance their in-house sustainability.





11

ROOFTOP SOLAR PANEL
SYSTEMS INSTALLED



900,000
kWh

OF ELECTRICITY
GENERATED PER YEAR

OCEAN PARK HONG KONG EMBRACES A GREEN FUTURE

Ocean Park Hong Kong

Ocean Park Hong Kong is committed to forging a greener future for all. To keep its carbon footprint in check, the Park has been conducting annual carbon audits since 2009. A 10-year carbon reduction target of 10% was set in 2012, using fiscal year 2011–2012 as the base year for comparison.

With collaborative efforts across the organisation, an integrated carbon reduction and energy saving plan was rolled out to achieve the target. The key actions included upgrading equipment to improve energy efficiency, adopting seasonal settings in animal exhibits, and implementing green technologies such as LED lighting and gas absorption chillers. In addition, the Park introduced all staff members to best practices for energy conservation.

As a result, Ocean Park achieved its 10% carbon reduction target four years ahead of schedule in 2018. To further combat climate change, Ocean Park was among the first public places of entertainment in Hong Kong to welcome renewable energy and installed solar panel systems at 11 rooftop locations park-wide since 2019, generating over 900,000 kWh of electricity per year.



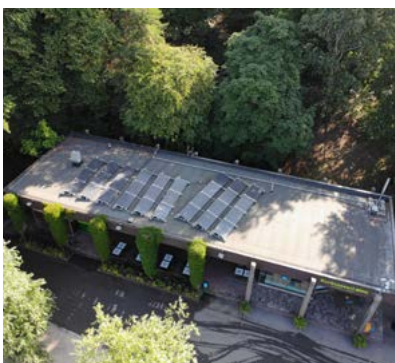


CARBON NEUTRAL KORKEASAARI ZOO IN HELSINKI 2030

Korkeasaari Zoo

Korkeasaari Zoo in Helsinki started to calculate its carbon footprint in 2016 with the aim of becoming carbon neutral by 2030. The calculations included energy, transport, procurement, animal food and staff commuting. The first step was to move away from fossil energy and electricity. This was followed by an increase in the share of gas and electricity in the zoo's own vehicles and machinery. Staff were advised to avoid unnecessary purchases and to choose low-carbon products and services. The environmental impact of animal feed was carefully studied and ways of replacing beef in the diet of carnivores will be considered in the future. Continued promotion of local food and food waste will be pursued. Climate-friendly dishes are planned for restaurants and the menu already includes many vegetarian, vegan and fish options. In the future, the emissions caused by the arrival of customers will be calculated and ways to reduce and offset them will be considered. The customers already have quite good access to the zoo by public transport and this will improve with the new bridge and rail link to the city centre that is under construction.

So far, the emissions of Korkeasaari Zoo have been reduced by about 40%. This is an encouraging trend, but there are still many stones to be turned.

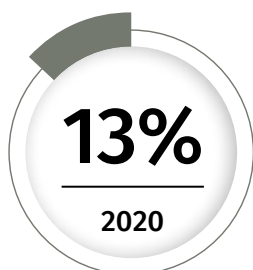
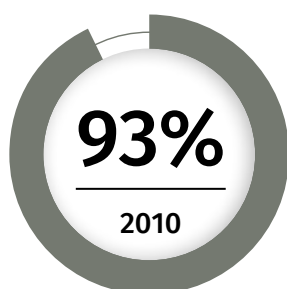


Video

<https://youtu.be/BVlpDfmbS7g>



Scope 1 emission reduction



IMPROVING THE HEATING SYSTEM

Zoo Zürich

Prior to 2010 Zoo Zürich's heating system used a combination of oil and FSC-certified wood chips from local forests. In 2010, oil accounted for about 30% of the total heating capacity. Following an evaluation of our carbon emission in 2011, we implemented various improvements:

- a heat pump was installed in the Masoala Rainforest powered by carbon neutral green electricity.
- two outdated oil-fired boilers were replaced by three new, more efficient units.
- a technical heat storage tank was installed as part of the central heating system to cover demand fluctuations and reduce reliance on oil.
- outdated burners in the woodchip heating system were replaced by modern, more efficient ones.

Subsequently, the percentage of oil within Scope 1 emissions was reduced from 93% in 2010 to 13% in 2020. Oil currently covers only 1% of our entire heating demand and we reduced our carbon emission by approximately 700 tonnes.





SUPPORTING PRIORITY SPECIES THROUGH OFFSET PARTNERSHIP

Taronga Conservation Society Australia

In 2018 Taronga was certified carbon neutral. To become carbon neutral certified under the Australian Climate Active scheme, organisations must show that they are committed to acting on climate change by reducing carbon emissions on a continual basis, and they must offset their remaining emissions by investing in carbon reduction projects. Taronga offset its FY20-21 by supporting renewable energy projects, and Australian carbon restoration projects which provide habitat for our priority species like the critically endangered Regent Honeyeater. In partnership with Greenfleet, Taronga has planted the equivalent of 29,000 trees across Australia which help to protect critical habitat for native species. This is the equivalent of taking more than 1,800 cars off the road for a whole year. An example of a project that Taronga recently supported is 'Greentrees'. Greenfleet is establishing a native forest on the floodplain of the Wilson River in Northern New South Wales and extending vital habitat for a breeding population of koalas. Of the nearly 4,000 native trees that have been planted so far, almost half of them will provide food and habitat for koalas. This project will also restore the Coastal Swamp Oak (*Casuarina glauca*) ecological community.



**29,000
trees**

PLANTED TO HELP
PROTECT CRITICAL HABITAT
FOR NATIVE SPECIES

“

**WELLINGTON ZOO
PRIDES ITSELF IN BEING A
LEADER IN THE COMMUNITY
FOR BEST PRACTICE
ENVIRONMENTAL
ACTIVITIES.**



WORLD'S FIRST TOITŪ CARBON ZERO CERTIFIED ZOO

Wellington Zoo Trust

Carbon neutrality aligns with Wellington Zoo's strategy to be the “zoo with the biggest heart”, with the kaupapa (ethos) Me tiaki, kia ora! We must all look after the environment so that all life will flourish.

The philosophy of environmental accountability underpins Wellington Zoo's entire decision making, especially focusing on education, community engagement, building and construction projects, conservation projects and resource use. Wellington Zoo prides itself in being a leader in the community for best practice environmental activities. This means that being seen to be reducing its GHG emissions is essential. Being Toitū carbon zero certified for the 10th year in a row takes this a step further and helps to lead and inspire other business and organisations to take similar steps to reducing their GHG emissions. By spreading the low carbon message through the community, Wellington Zoo provides a tangible connection between the actions of individuals in New Zealand with the conservation of endangered species worldwide.





WITH A LONG-TERM GOAL OF ACHIEVING CARBON NEUTRALITY, WE COMMIT TO:

ALIGNING AQUARIUMS ACROSS THE US AROUND A SHARED CLIMATE COMMITMENT

Aquarium Conservation Partnership

On April 24, 2022, 24 AZA institutions that are part of the [Aquarium Conservation Partnership](#) (ACP) announced a joint climate commitment that sets ambitious goals for reaching climate neutrality while allowing for the maximum amount of flexibility in achieving them. Two members, WAZA member [Monterey Bay Aquarium](#) and Seattle Aquarium, have already achieved climate neutrality and will share lessons learned with the partnership.



ACP members will work together to leverage their outstanding legacy of leadership in conservation, science, communication, and education to engage each member aquarium and their audiences in climate solutions.

By April 2023 or sooner:

- Complete an initial greenhouse gas inventory for Scope 1 and Scope 2 emissions.
- Determine the priority categories for Scope 3 emissions and determine a timeline for completing a Scope 3 inventory.
- Determine carbon neutrality goal(s) and timeline(s).

By April 2024 or sooner:

- Develop an emissions reduction plan and determine a timeline for completing the plan.

Annually:

- Measure and report greenhouse gas emissions.
- Identify, share, and implement strategies to (1) reduce greenhouse gas emissions from operations and (2) remove greenhouse gas emissions from the atmosphere.
- Support strong nature-based solutions in international, federal, and state climate change policies.

Communicate the journey to achieve carbon neutrality with audiences.



TAKING THE FIRST STEPS ON OUR CARBON CUTTING JOURNEY

Two Oceans Aquarium

The Two Oceans Aquarium has calculated its carbon footprint and currently the most significant emissions are produced through our reliance on the national grid which uses fossil fuels.

- We have installed 500 solar panels on our roof, reduced the number of water pumps, use variable speed drives on our bigger systems, replaced element heaters with heat pumps, and replaced older pumps with more energy-efficient models.
- Our HVAC system utilises hot or cold air generated to heat or chill exhibit water.
- We switched to LED lighting and non-essential hot water supply lines have been switched off.
- We monitor energy demand and usage on our sub-distribution boards.
- We have a waste management system and work towards reducing our overall waste while increasing our recycling.
- In 2018 Cape Town experienced a severe drought and our water-saving efforts contributed to reducing our emissions from water consumption.
- We continuously raise staff awareness around energy use, waste management and water use.
- Carbon emissions from fleet and business travel have been offset by supporting a local reforestation project ([Greenpop](#)).

The Two Oceans Aquarium still has a long way to go to achieve carbon neutrality, but we have taken our first steps on the journey.



GOING SOLAR



16,7kg

Weight of each
1m x 1.67m
solar panel



25 years

The lifespan
of a solar
module



500

Total number of
solar panels on
the roof



850m²

Roof span
covered by
solar panels



193 tonnes

Amount of carbon dioxide
expected to be saved in
the first year



535kWh

Average daily production

With 535kWh per day you can:



Travel **2 675km**
in an electric car



Power **1 070**
fridges for a day



Run **2 150**
washing cycles



Power **36.5**
homes for a day



CHECKLIST

1 RESEARCH AND PLANNING

- Get familiar with and understand the terminology used around carbon emissions.
- Become aware of the tools available to measure the zoo or aquarium's current carbon footprint.
- Survey the extent to which resources such as water, energy and food are currently being wasted and determine if there are ways to use them more efficiently (such as through an energy audit).
- Agree on the scope you want to include (which areas of your operations will be included) in your carbon footprint
- Set realistic short-term (annual), medium-term (three to five years) and long-term goals to help reduce your carbon footprint (e.g. reducing your carbon footprint by 30% by 2030).
- Review best practices or case studies from other zoos and aquariums who are working towards reducing their carbon footprint (or have become carbon neutral).
- Explore the various ways through which you can offset your carbon footprint.

2 IMPLEMENTING

- Train staff and volunteers to take actions towards reducing carbon emissions that are aligned with the short, medium, and long-term goals you have set.
- Set a carbon reduction budget.
- Decide on who is championing your carbon reduction efforts so that they can manage the process and be held accountable.
- Involve visitors in your carbon reduction journey by informing them of ways in which they can adopt more sustainable practices.
- Consider integrating carbon reduction strategies in every project.
- Reduce waste reduction through adopting principles of circularity, recycling and reducing food waste.
- Choose sustainably sourced and grown food to cater for staff and visitors as well as for animal feed.



- Explore opportunities to disinvest in fossil fuels and evaluate options for sustainable and ethical investments e.g. clean energy and community developments.
- Consider signing up with a certifying partner.
- Develop an institutional policy or position statement on carbon emissions to provide direction to leadership and clarity to staff when trying to make changes in the zoo or aquarium operations.
- Ensure that there is clear communication around the policies and guidelines towards reducing your carbon footprint.
- Identify specific actions within those areas where you can have a positive impact: Energy, waste management, catering for visitors and staff, animal feed, water management, procurement, digital and IT, buildings, transport, etc.

3 MONITORING

- Measure and determine a baseline against which progress may be measured.
- Monitor key resources with high impacts regularly (e.g. monthly). These could include utility type resources such as electricity, gas, water. As your monitoring program improves, add other high carbon impact areas such as food, staff travel and visitor impacts. Also include emissions reduction initiatives such as renewable energy generated or consumed. Report on key indicators to senior management as part of the normal business reporting cycle.
- Communicate your results to staff, volunteers, visitors, partners, funders, media, government, and the wider zoo and aquarium community.

4 REVIEW AND IMPROVE

- Review your performance against targets. Check to see what worked and what needs improvement.
- Revise existing programs and/or develop new carbon reduction programs.
- Set new targets.

GLOSSARY

Below is a list of some of the terms used in this guide. For a comprehensive glossary of terminology associated with the climate crisis please refer to the IPCC website <https://www.ipcc.ch/sr15/chapter/glossary/>

Carbon footprint: A carbon footprint is a measure of the cumulative greenhouse gas (GHG) emissions produced directly and indirectly by the activities of an individual, organisation, event or in the production of goods.

Carbon handprint: A measure of the positive environmental impact goods and services can contribute throughout their lifecycle.

Carbon neutrality: A state in which human activities result in no net effect on the climate system. An organisation achieves carbon neutrality when it has measured its carbon footprint and reduced it to zero by cutting emissions in its operations and supporting carbon offsetting projects.

Carbon offsetting: Compensation for carbon dioxide emissions produced by human activity which are gained by participation in projects which enable the equivalent reduction of carbon dioxide in the atmosphere.

Conference of the Parties (COP): The body of UN conventions, such as the United Nations Framework Convention on Climate Change (UNFCCC), consisting of parties with a right to vote that have ratified or acceded to the convention.

Direct emissions: Direct emissions are produced directly from your activities and hence are under your control. This could be fuels for heating, cooking, vehicles or lawn mowers.

Gas leaks from refrigeration plant and fire suppression systems are referred to as fugitive emissions are also counted under direct emissions.

Indirect emissions: Indirect emissions are those emitted by others as a consequence of your actions which you may be able to influence but can't control. This includes emissions from power stations producing the electricity you use, from the production and transport of goods and services you use (including mains water), from the recycling and disposal of our waste (including sewage) and from the travel of both staff and guests to and from your premises.



Global warming: An increase in the earth's atmospheric temperature as a result of the greenhouse effect caused by carbon dioxide emissions and other pollutants.

Greenhouse gases (GHG): Gases which contribute to the greenhouse effect. These include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

Energy transmission factor: The energy lost in the cables that brings electricity to a site. For every kW consumed at the site the generator has to produce about 10% additional energy to make up for the energy losses in transmission. The energy transmission factor adds that additional energy generation into a carbon footprint calculation.

International Panel for Climate Change (IPCC): A United Nations group dedicated to the science of climate change.

Kyoto Protocol: An international agreement whereby nations committed to reducing greenhouse gas emissions.

Net zero carbon: Net zero carbon is achieved when carbon dioxide emissions produced by human activities are balanced globally by the removal through human activities of carbon emissions over a specified period. Net zero carbon is also referred to as carbon neutrality. Some organisations consider net zero as being 'one step further' than carbon neutrality – in that net zero is reducing emissions as much as is physically possible (or in line with the SBTi) and then offset what remains.

Renewable Energy Certificate (RECs) (also referred to as carbon offsets or Carbon Offset Credits or Units): A market tool which states that the bearer owns a certain amount of electricity generated by renewable energy sources which can then be traded on the market.

Retired carbon credits: A number of carbon credits are generated for sale by a particular carbon offset scheme each year. Credits can be bought and then sold again, but if a credit is bought in order to offset carbon emissions, then that credit is retired so it cannot be sold again and hence the amount of carbon saved is assigned to the organisation purchasing the credit.

Scope 1 emissions: These are direct emissions from activities conducted by your zoo or aquarium and include heating, cooling, cooking, vehicle fleet and refrigeration. You own or control the sources of these emissions.

Scope 2 emissions: These are indirect emissions emanating from the energy you use as supplied to you through the national grid i.e., purchased electricity which your facility uses. You do not own or control the sources of these emissions.

Scope 3 emissions: These are also indirect emissions through sources which you do not own or control and include activities such as business flights, waste disposal, water consumption, and employee commuting.

Sustainable Development Goals (SDGs): A set of 17 goals set by the United Nations which aim to achieve global sustainability for all. The vision is to achieve these goals by 2030.

Well to tank: The upstream carbon emissions produced from extracting, refining and transporting fuel before it is used.

REFERENCES AND RESOURCES

REFERENCES

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-  <https://www.ipcc.ch/>
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-  <https://www.zoo.org.au/fighting-extinction/sustainability/>
-  <https://www.weforum.org/agenda/2021/12/digital-carbon-footprint-how-to-lower-electronics/>
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-  <https://www.sciencedirect.com/science/article/abs/pii/S0921344920307072>

DEFRA. *Environmental Reporting Guidelines: including streamlined energy and carbon reporting guidance*. Department for Environment, Food & Rural Affairs

DEFRA. *Small business use guide: Guidance on how to measure and report your greenhouse gas emissions*. Department for Environment, Food & Rural Affairs

WBCSD/WRI. *The greenhouse gas protocol: A corporate accounting and reporting standard* (revised edition). World Business Council for Sustainable Development (WBCSD)

EXAMPLES OF CONVERSION FACTORS



Australian National Greenhouse Accounts Factors

 <https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors>

UK Department for Business, Energy and Industrial Strategy Greenhouse gas reporting conversion factors

 <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

United States Environmental Protection Agency Greenhouse Gas Equivalencies Calculator

 <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Emission Factors for Greenhouse Gas Inventories

 <https://www.epa.gov/sites/default/files/2020-04/documents/ghg-emission-factors-hub.pdf>

Land Use, Land-Use Change and Forestry (LULUCF)

 **Fact Sheet: About REDD+ – UN-REDD Programme Collaborative Online Workspace**

Australian Government – Clean Energy Regulator

 <http://www.cleanenergyregulator.gov.au/csf/how-it-works/explore-project-types/Pages/plantation-forestry-projects.aspx>

Big-business greenwash or a climate saviour? Carbon offsets raise tricky moral questions

 <https://theconversation.com/big-business-greenwash-or-a-climate-saviour-carbon-offsets-raise-tricky-moral-questions-171295>

Carbon Offset Guide

 https://www.offsetguide.org/wp-content/uploads/2020/03/Carbon-Offset-Guide_3122020.pdf

SBTi Science Based Targets (Net-Zero Standard)

 <https://sciencebasedtargets.org/net-zero>

Climate Active certification – Carbon Offsets

 <https://www.climateactive.org.au/what-climate-active/carbon-offsets>

United Nations – Climate Neutral Now

 <https://unfccc.int/climate-action/climate-neutral-now>

Ambitious Corporate Climate Action

 <https://sciencebasedtargets.org/>

RESOURCES

-  These countries are leading the transition to sustainable energy
-  Three ways businesses can lighten their carbon footprints
-  Here are the cities most prepared for climate change
-  Visualizing Global Per Capita CO₂ Emissions
-  Nature Positive Is the New Net Zero

These are additional resources which will be of benefit in your broader sustainability journey and can contribute to emission reductions in other areas.

-  Sustainable Palm Oil Resources for Zoos and Aquariums
-  WAZA Short Guide on Sourcing Sustainable Palm Oil at your Zoo or Aquarium
-  WAZA Short Guide – How to Choose Responsibly Sourced Forest Products at your Zoo or Aquarium
-  WAZA Short Guide – How to Reduce Single-use Plastic at your Zoo or Aquarium
-  WAZA Sustainability Strategy 2020–2030: Protecting our planet

ADDITIONAL CASE STUDIES

-  The Toronto Zoo is turning poop into power and helping the environment in the process
-  We're rising to the climate challenge – Monterey Bay Aquarium
-  How is the Two Oceans Aquarium lowering its carbon footprint? – Two Oceans
-  CarboNZero Certified Zoo – Wellington Zoo
-  Zoos Victoria Sustainability – Zoos Victoria
-  Zoos Victoria Environmental Sustainability Investment Prospectus 2019–2024 – Zoos Victoria

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Reducing, Measuring, and Offsetting Carbon at your Zoo or Aquarium

www.waza.org

