How to decarbonise your science centre

(the session your grandchildren want you to go to)

AGENDA

Introduction

Carbon emissions – what are they and where you find them

How to measure and set targets for reducing emissions

Decarbonisation hierarchy

Case study of decarbonisation from the Natural History Museum

Q&A

Why decarbonise?

Environmental

Financial

Reputational

Legislation?

Creating the culture for decarbonisation

Mission, strategy and values

Staffing and resource

Organisational change

Staff training

Professionalising this area of work

Carbon Emissions

Greenhouse Gas Emissions

7 gases

carbon dioxide

methane

nitrous oxide

hydrofluorocarbons

perfluorocarbons

sulphur hexafluoride

nitrogen trifluoride

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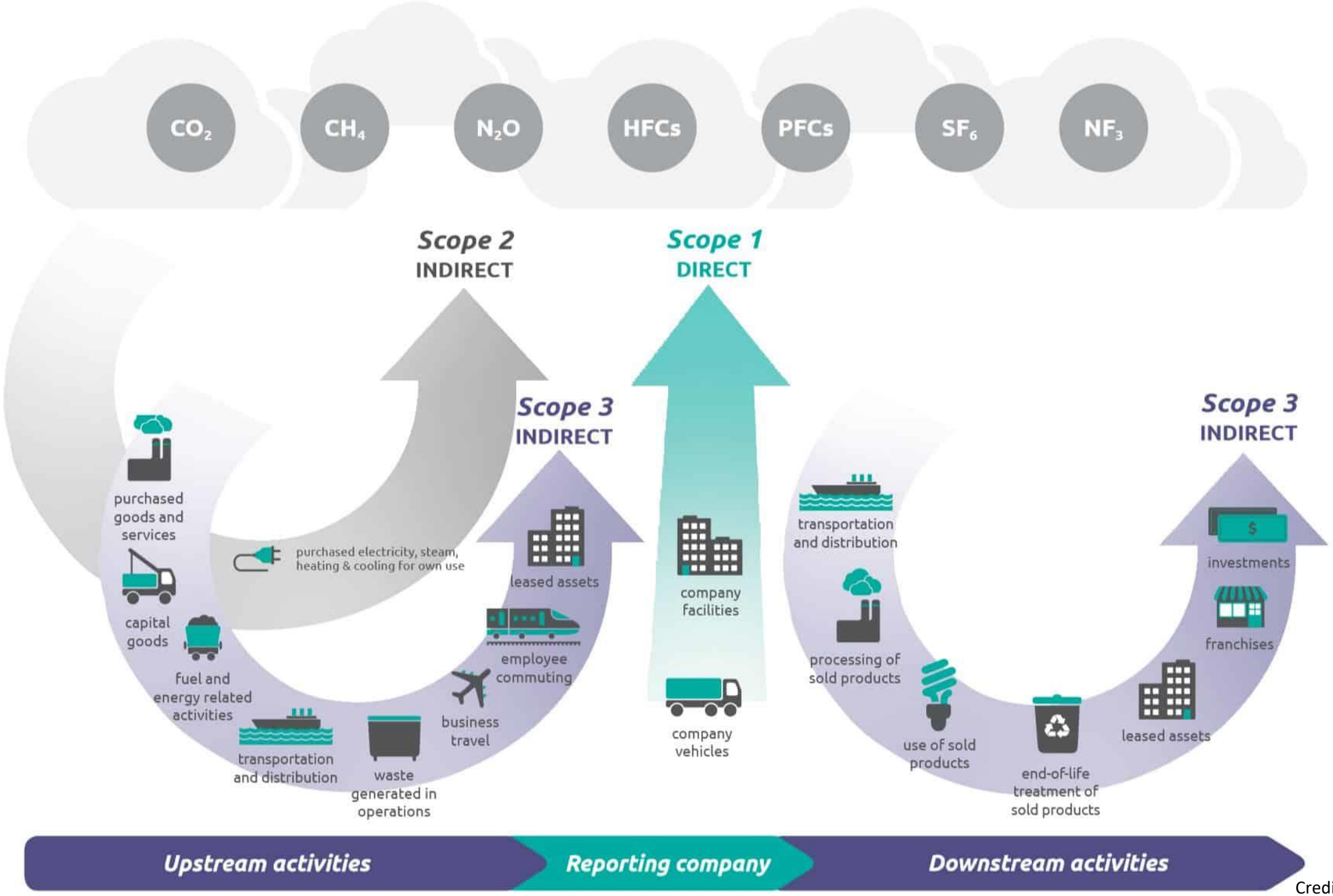


Credit: GHG protocol

Anything you burn/release on site

Gas

Main building – Education
Main building – Catering*
Studio
Patio heaters + BBQ

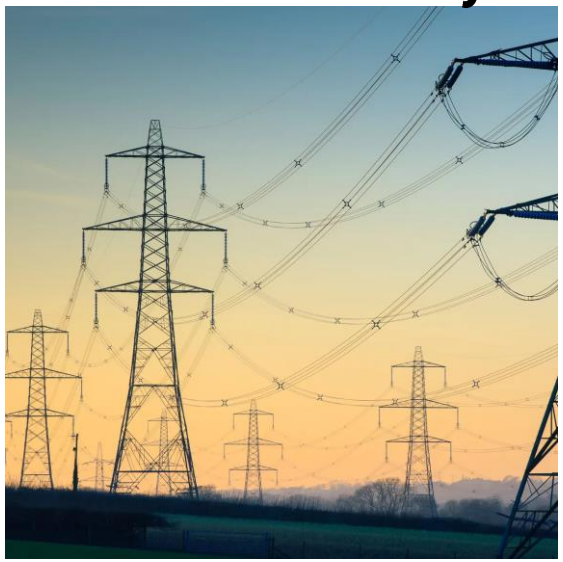
Petrol and Diesel

Vans and cars
Cleaning machines
Scissor lifts
Generators

Refrigerant leakage
Air source heat pumps
Air conditioning units
Versatemps
Fridges/freezers

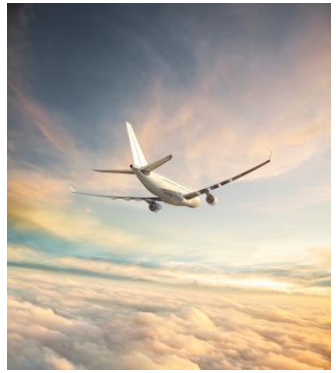
Scope 1

Purchased electricity



Scope 2

Everything else



Scope 3

Scope 3

Upstream

1. Purchased goods and services
2. Capital goods
3. Fuel and energy related activities (not included in scope 1 + 2)
4. Upstream transportation and Distribution
5. Waste generated in operations
6. Business Travel
7. Employee Commuting
8. Upstream Leased Assets

Downstream

1. Downstream transportation and distribution
2. Processing of sold products
3. Use of Sold products
4. End of life treatment of sold products
5. Downstream leased assets
6. Franchises
7. Investments

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YOU'VE COME TO THE RIGHT PLACE
WE ALL NEED HELP HERE
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CARBON EMISSIONS

Gemma Tong

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CONTENTS

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We are an integrated engineering design, energy and sustainability consultancy

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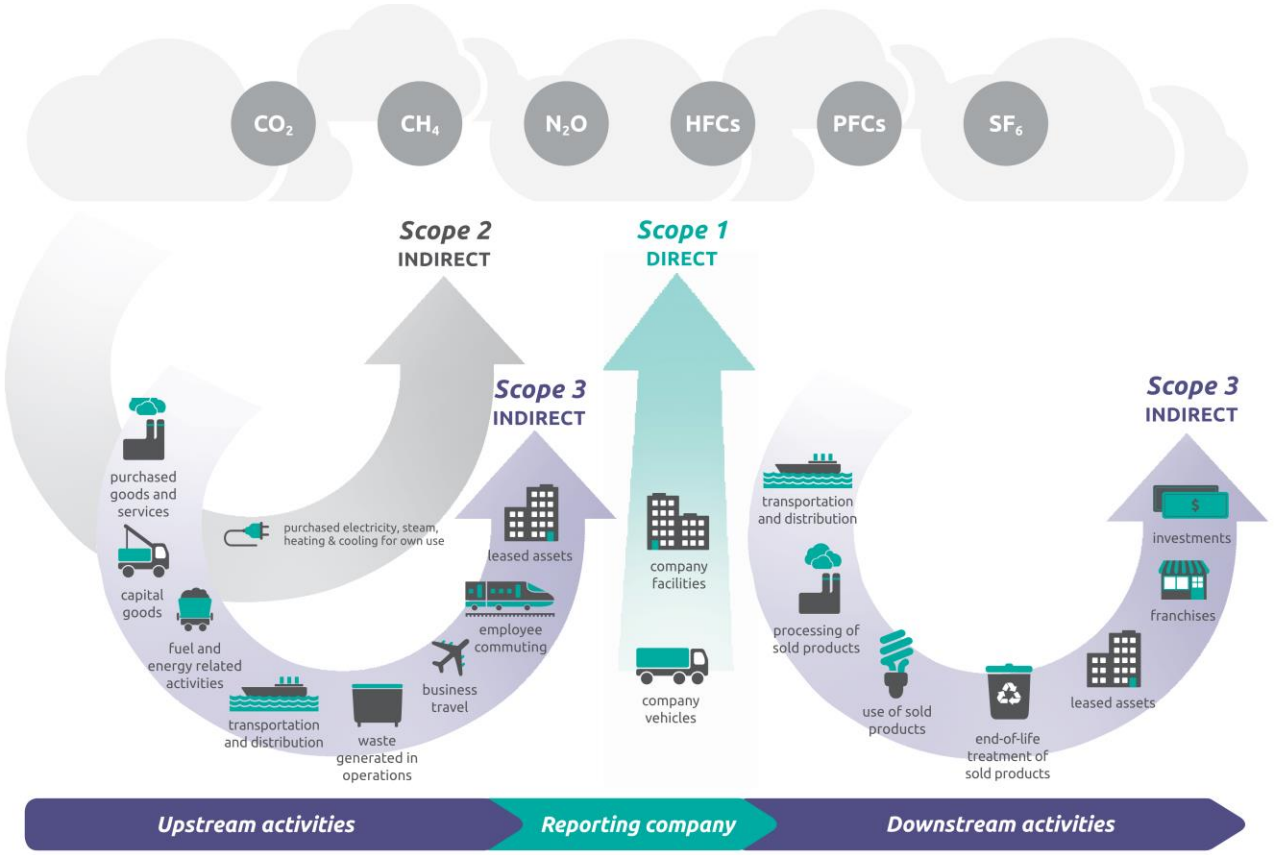
CONTEXT

SCOPE 1, 2 & 3

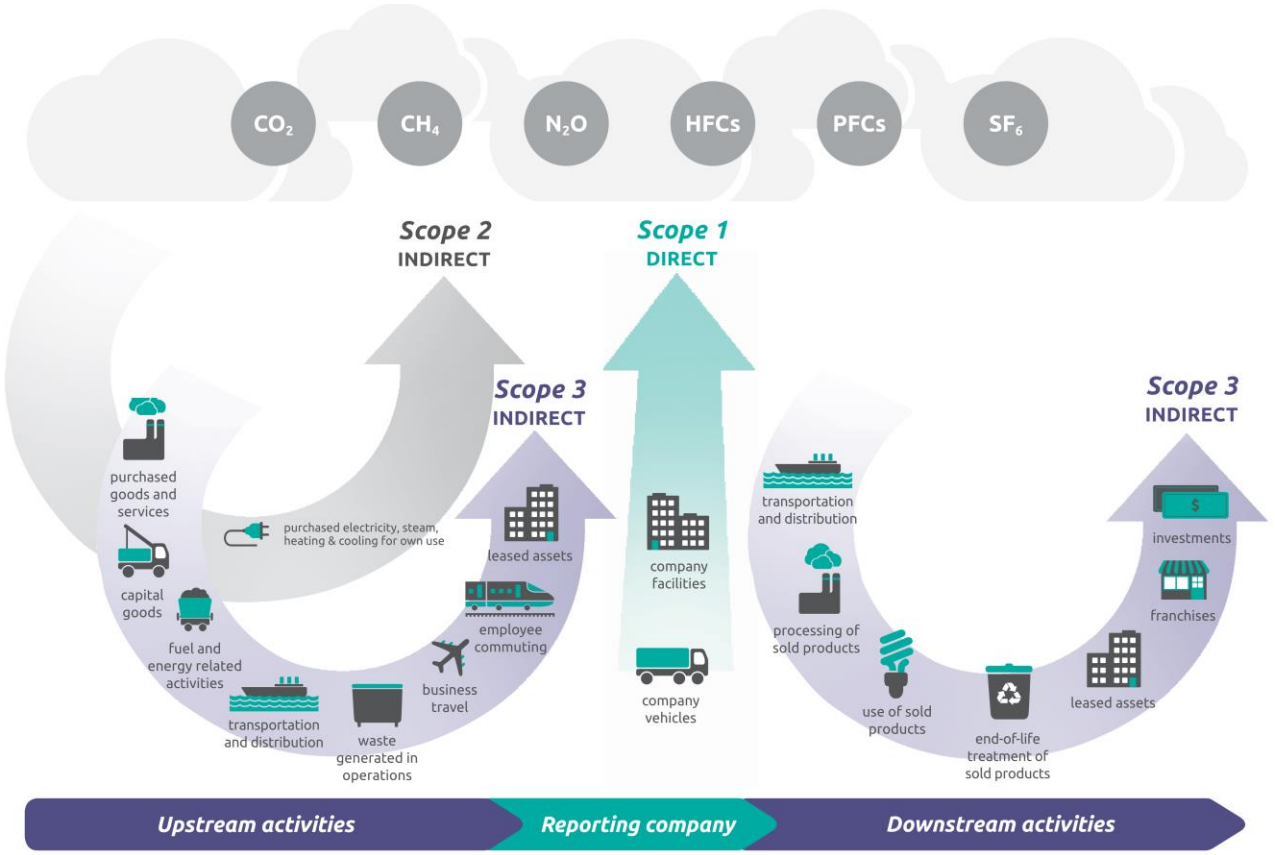


The Kyoto Protocol define seven Greenhouse Gases (GHG) which contribute towards an organisations emissions and these are measured in carbon dioxide equivalent [CO_2e]. The GHG Protocol categorises sources of these emissions into three scopes:

- Scope 1 – burning fossil fuels and refrigerant leaks
- Scope 2 – purchased electricity
- Scope 3 – supply chain emissions

CONTEXT

ACCOUNTING



Reference period

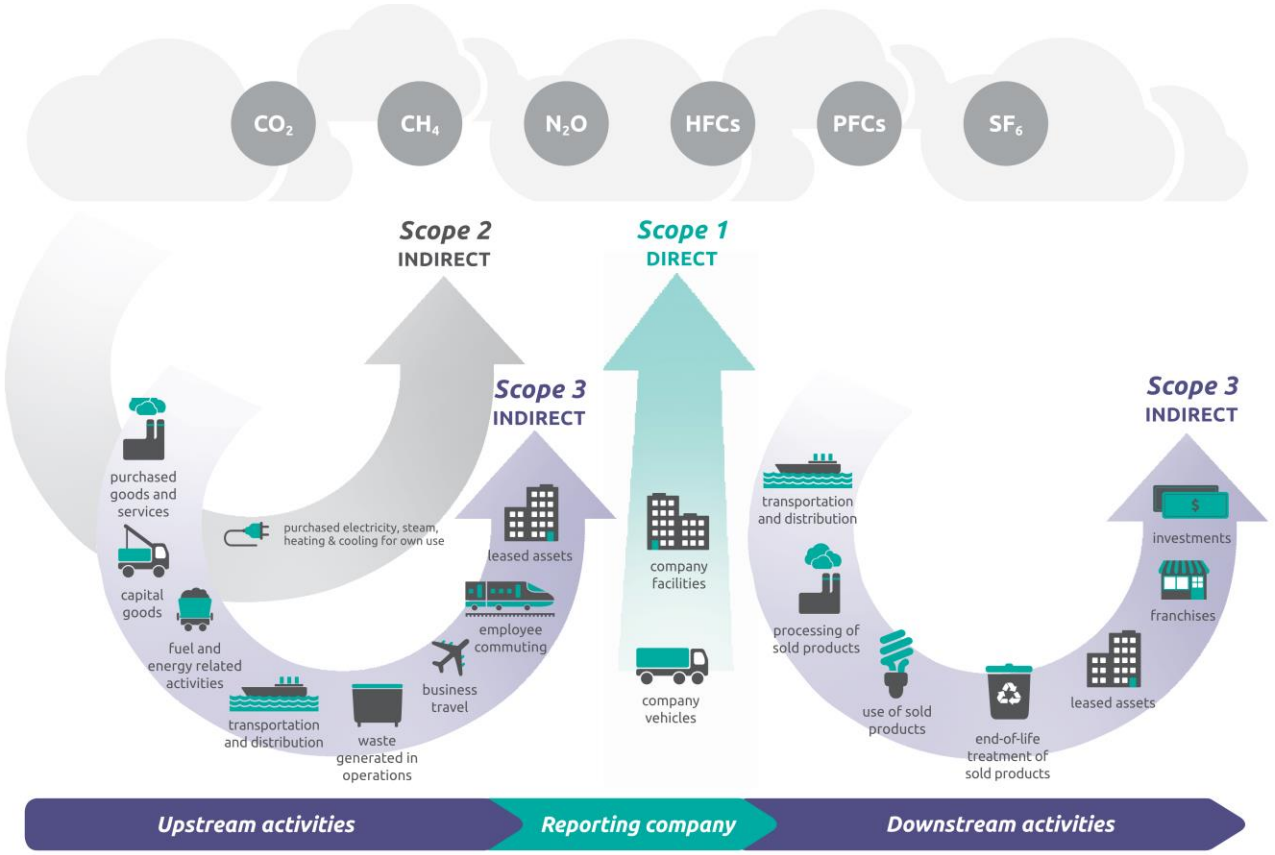
12 consecutive months e.g. financial, calendar

Consolidation approach

- Operational control,
- Financial control,
- Equity share

CONTEXT

ACCOUNTING



Principles:

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy

CARBON REPORTING PROCESS

1. DATA COLLECTION

- Conduct screening exercise and identify material emissions sources
- Build internal taskforce
- Identify data gaps and determine how best to plug them

2. CARBON FOOTPRINTING

- Calculate baseline carbon inventory
- Categorise emissions into Scope 1, 2 and 3

3. TARGET SETTING

- Forecast how emissions will change over time (BAU)
- Model decarbonisation pathways
- Develop near-, mid- and long- term targets
- Benchmark against industry and drive level of ambition

4. ACTION PLAN

- Establish a pipeline of projects for short, medium and long-term
- Assign roles and responsibilities
- Validate and gain buy-in from decision makers

5. DISCLOSURE

- If this exercise if being conducted internally, seek external verification of results
- Publicly disclose carbon inventory, targets and action plan/strategy on annual basis
- Ongoing monitoring and evaluation of progress

Stakeholder Engagement

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1. DATA COLLECTION
SCOPE 1, 2 and 3

- Screening of emissions sources to ensure completeness
- Identify internal stakeholders/ data owners to provide activity data for various sources
- Collect carbon data from across organisation

Description	Data source
Fuel in fleet cars/vans etc.	Total litres/kWh from delivery invoices and purchases made on fuel cards
Refrigerant gases*	Maintenance records supplied by the contractor undertaking the servicing of the units
Electricity	Total kWh from meter readings or electricity invoices
Procurement	Spend/physical data from finance management system
Waste*	Total m^3 or kg of different types of waste collected from sites (WTNs)
Commuting	Travel survey to collect distance and mode of transport

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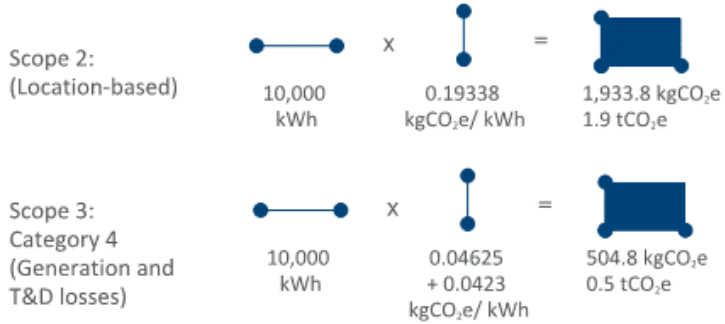
2. CARBON FOOTPRINTING METHODOLOGY

The carbon emissions of any activity are defined by the product of two drivers: the activity level and the carbon intensity.

Examples of activity levels and the associated carbon intensities are shown in the below table:

Activity level	Carbon Intensity
Data sourced from within organisation	*Emission factors*
kWh electricity consumed (kWh)	Amount of CO_2e emitted per kWh electricity consumed ($kgCO_2e$/ kWh)
Procurement spend on IT hardware (£)	Amount of CO2e emitted per £ pend on IT hardware ($kgCO_2e$/ £)
Kg of waste to landfill (kg)	Amount of CO2e emitted per kg of waste sent to a landfill ($kgCO_2e$/ kg)

Worked example:



- The total carbon emissions from Scope 2 and Scope 3 is therefore 2.4 tCO_2e.

TOP TIPS:
Check units are consistent!
Use emission factors for reputable sources
Document methodology

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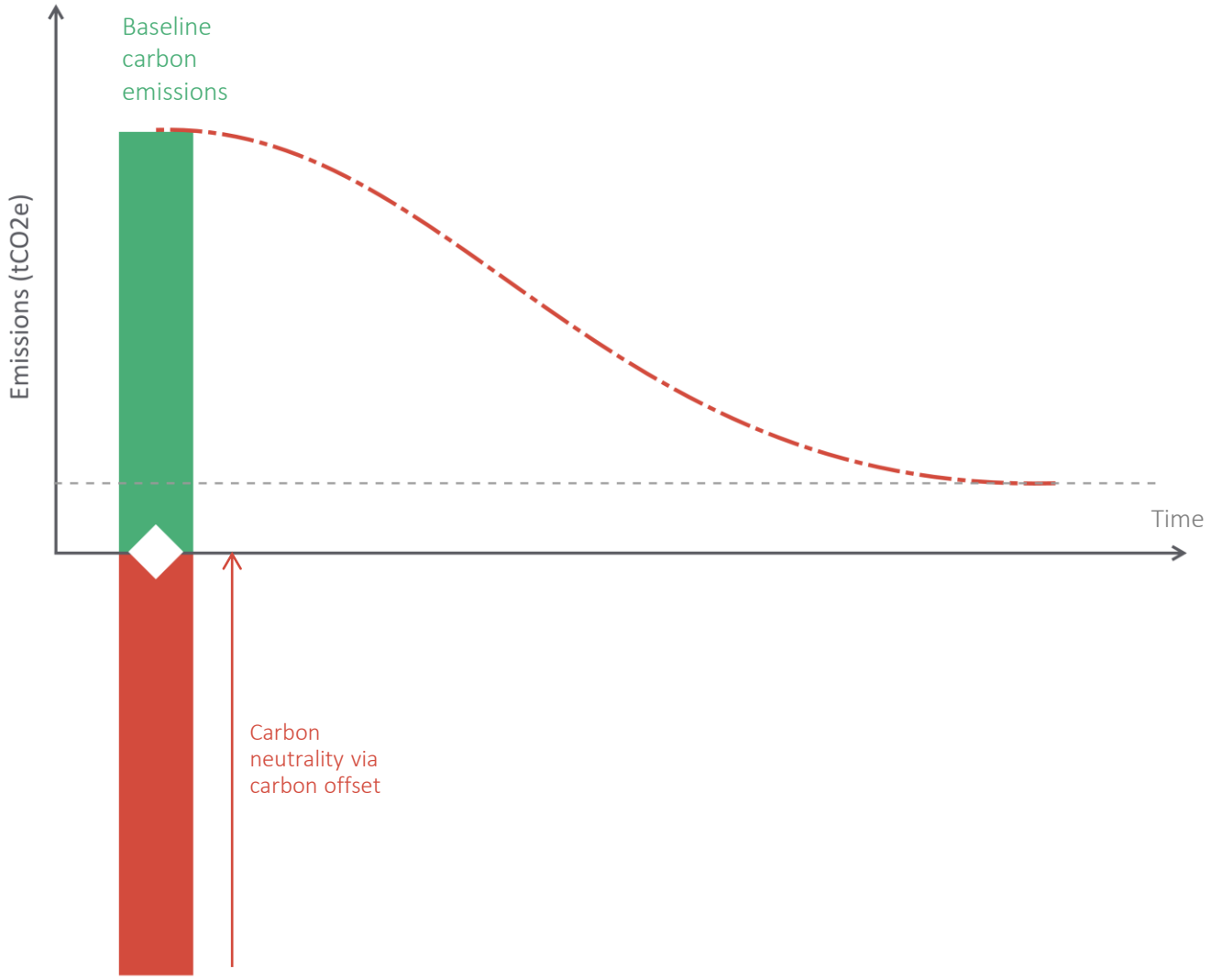
3. TARGET SETTING
CARBON NEUTRAL



"...where the sum of the greenhouse gas emissions (CO_2e) produced is offset by natural carbon sinks and/or carbon credits"

Carbon Neutral
PAS 2060 CERTIFIED

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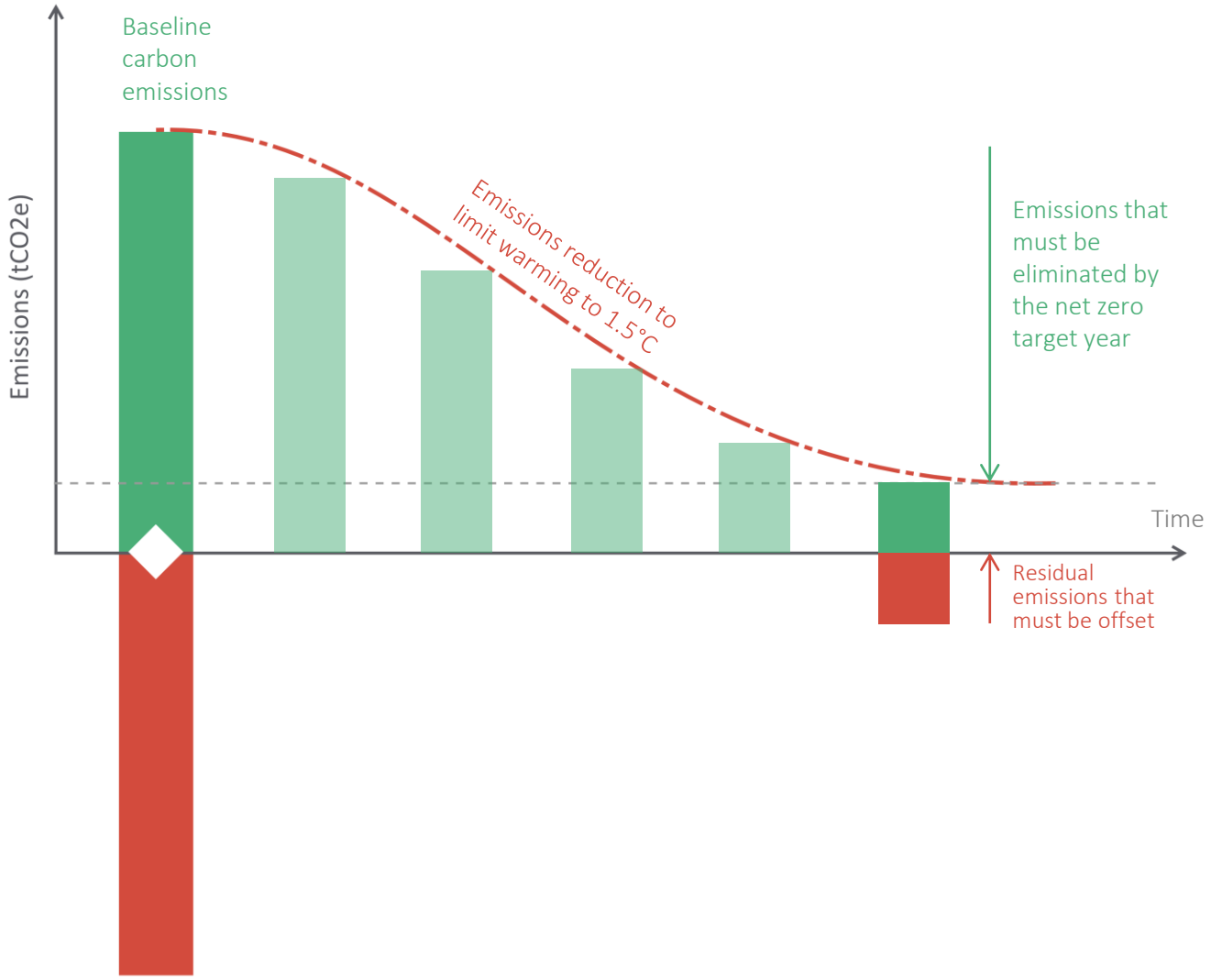
3. TARGET SETTING
NET ZERO



"Reducing emissions to zero or to a residual level that is consistent with reaching net-zero emissions at the global or sector level in eligible 1.5°C-aligned pathway…

And…

neutralising any residual emissions at the net-zero target date and any GHG emissions released into the atmosphere thereafter."

SCIENCE BASED TARGETS

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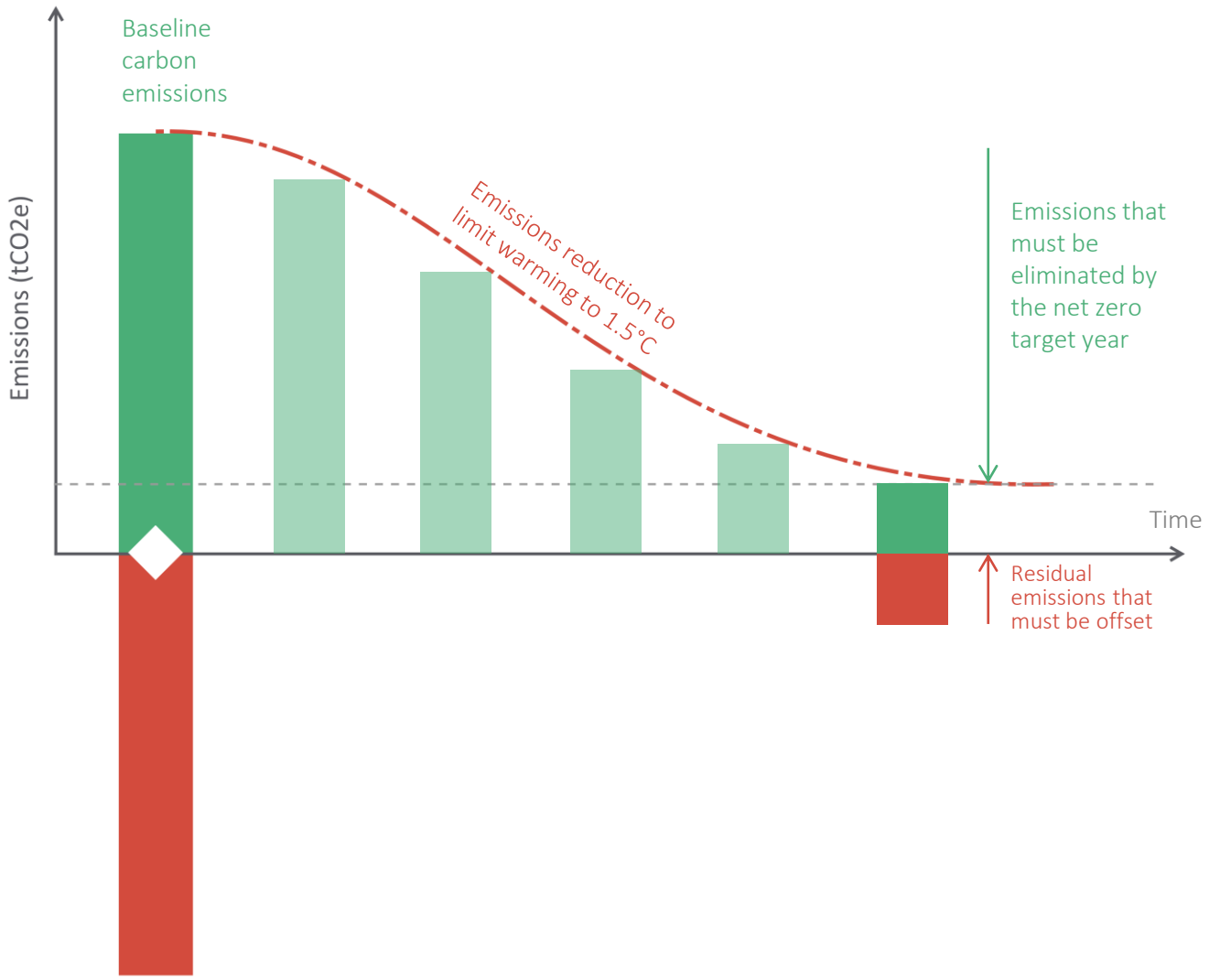
3. TARGET SETTING
NET ZERO



Target term:

Near (5-10 years)
Mid (10+ years)
Long (net zero target date)

Target scope/type:

Absolute target
Intensity target
Renewable energy target
Stakeholder engagement target

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Stakeholder Engagement

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ALMONDSBURY
BIRMINGHAM
BRISTOL
CAMBORNE
CARDIFF
EDINBURGH
GLASGOW
GLOUCESTER
HALE
LEEDS
LONDON
LUTTERWORTH (KTA)
MANCHESTER
NEWCASTLE
NORTHAMPTON
PLYMOUTH
PLYMPTON (KTA)
SOUTHAMPTON
STOKE-ON-TRENT
TAUNTON

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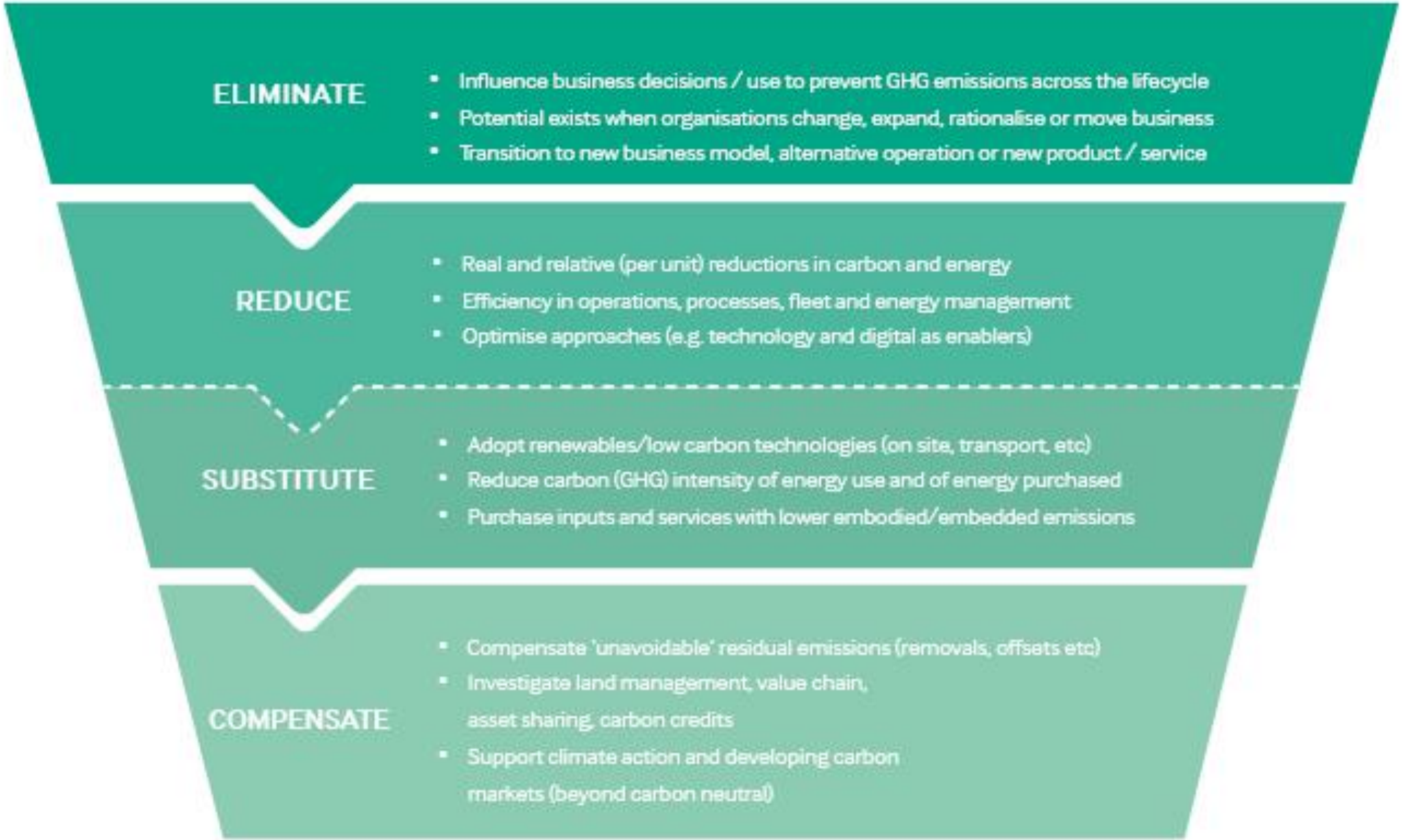
Carbon Net Zero / Carbon Neutral pledges by ASDC members

We The Curious	2030
Glasgow Science Centre	2030
Kew Gardens	2030
Science Museum Group	2033
Natural History Museum	2035
Oxford Museum of Natural History	2035
ThinkTank	2040

IEMA Greenhouse Gas Management Hierarchy (updated 2020)



Eliminate emissions

Energy efficiency

Substitute carbon source

Offsetting

Decarbonising the NHM

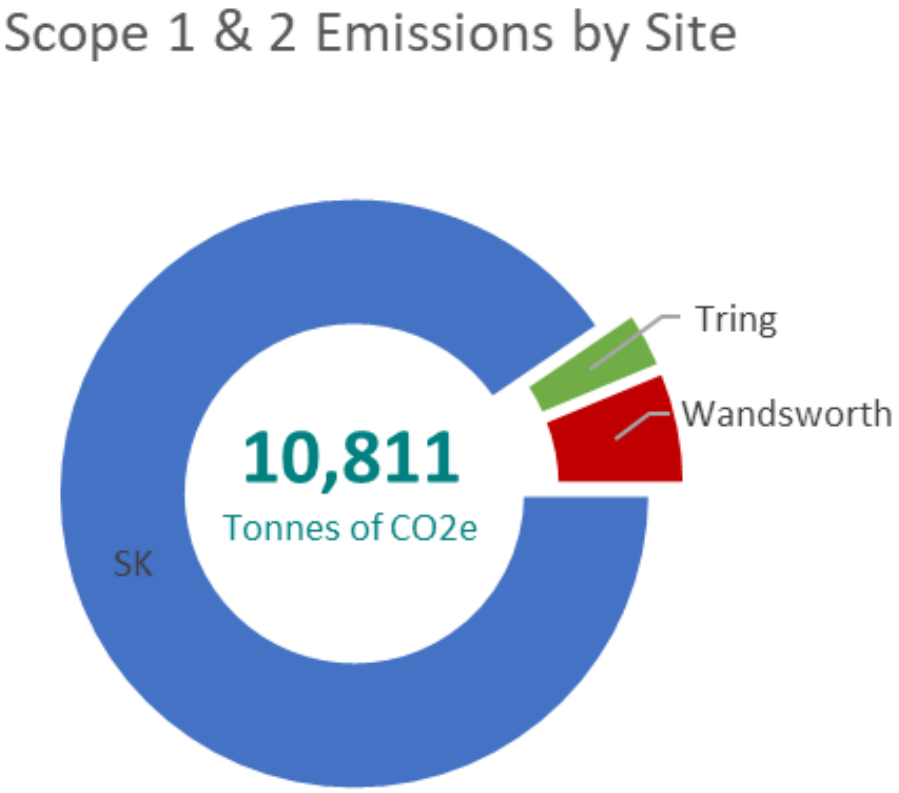
Kimberley Lewis, Head of Sustainability

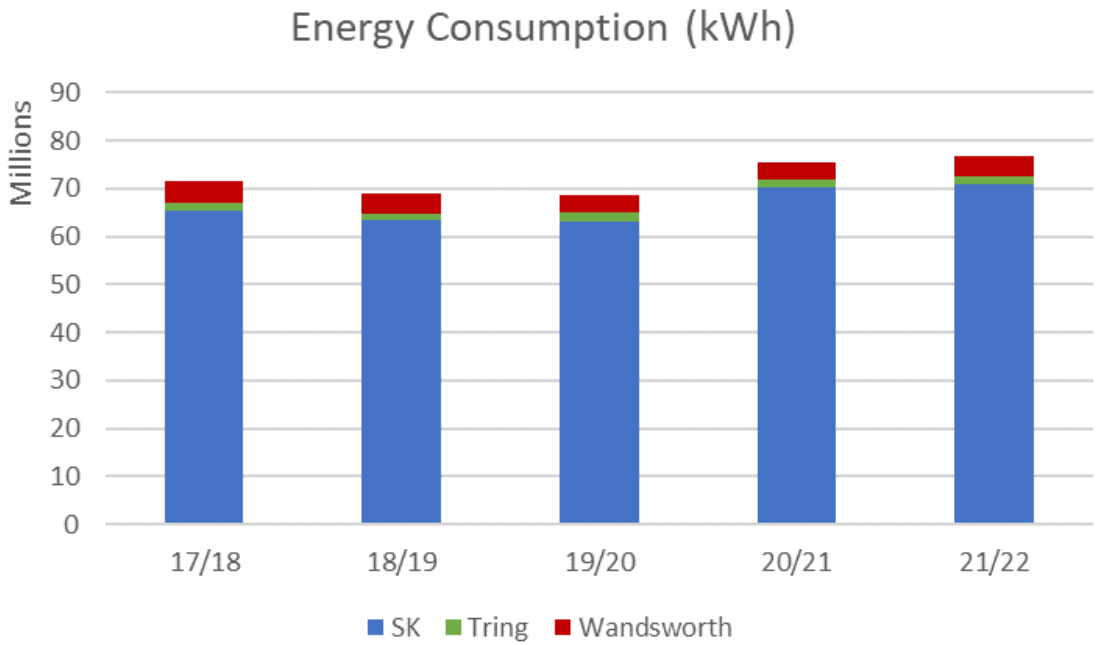
NATURAL HISTORY MUSEUM

About Us

- 3 sites
- Grade 1 and 2 listed buildings
- 80 million specimens
- 5m+ visitors per year
- World leading research
- Vision for a future where people and planet thrive
- Committed to achieving net zero by 2035 (Scopes 1 & 2)

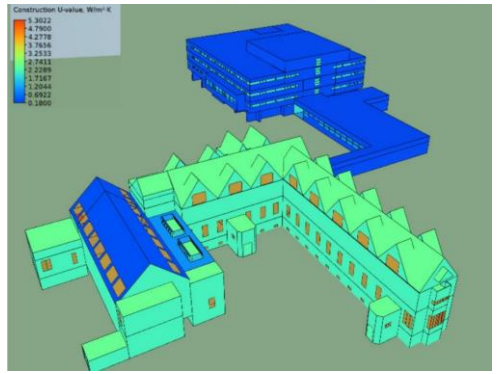
Understanding our footprint





Our approach

- Improve efficiency and drive down demand as much as possible.
  - Lose less by improving walls, roofs and glazing
  - Use less by improving efficiency of equipment
- Decarbonise heat by moving away from gas and shifting to electrification.
  - Introducing heat pump technology

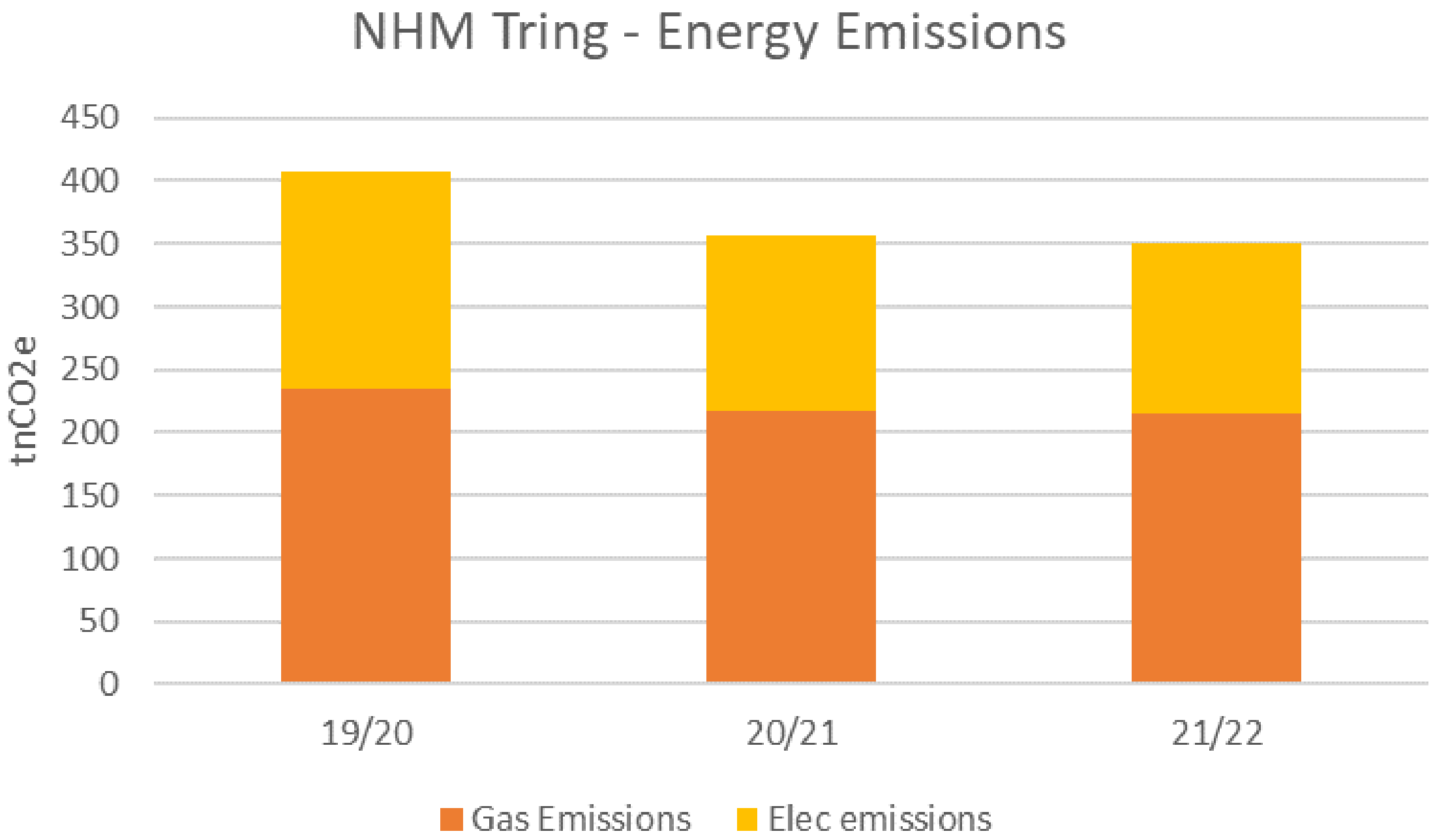


Our approach...cont.

- Introduce and procure renewables
  - Solar panels
  - Renewable energy supply, REGO backed on 2 sites
- Prepare and plan with business cases at the ready.
  - Collaborating with master planning
  - Incorporating within maintenance strategy

Case Study – NHM Tring

- LED Lighting upgrades
- Façade improvements
  - Enhanced thermal performance
- Solar panel installation
  - 318 solar panels
  - Generating 75,000 kWh / yr
  - Saving £9,000
  - Saving 21 tCO2e
- Heat decarbonisation plan


NHM Tring - Energy Emissions
450
400
350
300
250
200
150
100
50
0
tnCO2e
19/20
20/21
21/22
Gas Emissions
Elec emissions

Next steps:

- Understanding costs
- Detailed plans
  - Roof insulation
  - Pipework insulation
  - Improving air tightness (draft excluders, strips and seals)
  - Secondary glazing
  - Heat pumps
- Preparing business cases ready for funding

ASDC Decarbonisation Group

Representation from every ASDC member

Share challenges and successes

Knowledge from experts and each other

Combine our resources

ASDC Decarbonisation Group

Three aims for every member:

Measure your carbon emissions

Set a decarbonisation target

Hit your decarbonisation target

Q&A