Carbon Reduction plan

Phil Sheppard

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Part1.

Introduction

In line with the Climate Change Act 2008, The UK became the first major economy to pass a net zero emission law. New targets will require PLP-GB to reduce all greenhouse gases' (GHG) by approximately 78% by 2035 and a target to bring all GHG emissions to net zero by 2050. The Greenhouse Gas Protocol (GHG Protocol) provides a standardized method for companies to measure and reduce GHG emissions in line with the Paris Agreement.

The Paris Agreement, Under the United Nations Framework Convention on Climate Change, also called COP21 is an international treaty adopted in December 2015, which aimed to reduce the emission of GHG's. The Paris Agreement set out to improve and replace the Kyoto Protocol, an earlier international treaty designed to curb the release of greenhouse gases.

The GHG protocol inventory covers the seven direct greenhouse gases under the Kyoto Protocol:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3)

These gases contribute directly to climate change owing to their positive radiative forcing effect (global warming). In general terms, the largest contributor to global warming is carbon dioxide which makes it the focus of many climate change initiatives. Methane and nitrous oxide contribute to a smaller proportion, typically <20%, and the contribution of f–gases is even smaller (despite their high Global Warming Potentials-GWP) at <5% of the total (GHG Protocol 2023).

Also reported are four indirect greenhouse gases:

- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Non-methane volatile organic compounds (NMVOC)
- Sulphur dioxide (SO_2)

Nitrogen oxides, carbon monoxide and NMVOCs are included in the inventory because they can produce increases in tropospheric ozone concentrations, and this increases radiative forcing. Sulphur dioxide is included because it contributes to aerosol formation which can either warm (through absorption of solar radiation) or cool (from forming cloud droplets and reflecting radiation) the atmosphere.

Global warming and climate change have the potential to alter biological systems. Deviations in surface air temperatures will likely influence ecosystem functioning and thus the biodiversity of plants, animals, and other forms of life.

Overview-

The Knights Enham School Carbon reduction plan

Knights Enham School are introducing a Carbon reduction strategy in 2025, which commits us to achieving a reduction in our energy-related carbon emissions by 2035 and an aspiration to reach NetZero in 2050. In pursuit of this target, the plan identifies seven major areas of work for **Knights Enham School** to complete.

- Must establish a carbon baseline for year 2024 for scope 1 & 2 emissions (i.e., purchased electricity, gas, oil and transport fuel).

- Encouraged to measure a carbon baseline for scope 3 emissions (i.e., water, waste, business travel, commuting and procurement).

- Publish carbon reduction targets for scope 1 & 2 emissions for 2026 which must be less than those in 2025.

- Attainment of a target reduction (this figure will be available once baseline for 2024 established) on 2024 emissions by 2035.

- Produce a carbon management policy or strategy, and an implementation plan to achieve targets for scope 1, 2 & 3 emissions, including timescales and resources.

- Establish clear responsibilities for carbon management.

- Commit to monitor targets and report carbon emissions publicly annually to achieve Net Zero carbon by 2050 in the UK.

The management of environmental issues at **Knights Enham School** must be assisted by an Environmental Management System (EMS) based on ISO 14001. As part of the EMS, Knights Enham School will be developing a range of environmental objectives and targets which correspond with the aims of the Carbon reduction project - which will provide a framework to meet GHG Protocol requirements.

Knights Enham School Carbon strategy 2025

Knights Enham School strategy to achieve these targets include but is not limited to:

- Energy consumption reduction schemes: Implementing and capturing learning from pilot carbon reduction measures.
- Carbon reduction projects – **scope 1 and 2**. These are projects that will help to reduce **Knights Enham School** energy use and/or develop renewable energy sources.
- Carbon reduction projects – **scope 3**. These include a combination of measures that support pro-environmental behavioural changes; partnership working; and efficiency measures, for example, reducing energy use across site and increasing efficiency.
- Policy development and management: This mainly involves the integration of carbon issues within the financial planning and policy development processes of the school, to ensure carbon is a key consideration of everything we do.
- Engagement and behaviour change initiatives. For example, awareness campaigns aimed at staff and initiatives to improve data provision.
- Data gathering and reporting: Improving our energy monitoring processes so that we can identify and prioritise opportunities for carbon savings more effectively.
- Low carbon energy generation: Identifying opportunities to generate our own energy through low carbon technologies and carbon offsetting.

Knights Enham School will comply fully with environmental legislation and officially approved codes of practice and will make continued efforts to promote sound environmental management policies and practices in the work of all departments:

- To increase awareness of environmental responsibilities amongst staff and to work with other agencies locally, nationally, and internationally to promote appropriate environmental policies.
- To implement policies and procedures that contribute to a reduction in **Knights Enham School** carbon footprint.
- To minimise waste and pollution, and to operate effective waste management procedures.
- To reduce the consumption of fossil fuels and reduce water consumption.
- To promote a purchasing policy which will give preference, as far as practicable, to those products and services which cause the least harm to the environment.
- To avoid use, wherever possible, of environmentally damaging substances, materials, and processes.
- To encourage modes of transport by staff which minimise the impact to the environment.
- To communicate with interested parties on issues relating to the Environmental Policy including contacts in the immediate neighbourhood, regionally, nationally, and globally.

The long-term aspiration at **Knights Enham School** is to have zero carbon emissions for scopes 1 and 2 and minimal carbon for scope 3, which will be offset to obtain carbon neutrality. This will be defined through the **SBTi** (Science based targets initiative) which states that to reach Net Zero emissions for organisations implies two conditions:

1. To achieve a scale of **value-chain emission reductions** consistent with the depth of abatement achieved in pathways that **limit warming to 1.5 ℃** with no or limited overshoot and;

2. To neutralise the impact of any source of **residual emissions** that remains unfeasible to be eliminated by **permanently removing an equivalent amount of atmospheric carbon dioxide.**

Carbon management drivers relevant to **Knights Enham School** include:

- Carbon neutrality Strengthens **Knights Enham School** reputation – organisations that want to take climate action are increasingly expected to set science-based targets and doing so shows that you're taking responsibility.
- Make cost savings – for example, through lower energy costs.
- Attracting & retaining staff – many staff look for companies who have made a commitment to helping the environment.
- Students and parents/carers – we will be able to share our commitments to the environment which will attract and retain students.
- Help manage future risks – setting targets can boost resilience to future emissions-related regulations.

To attain NetZero combinations of carbon offsetting /energy recovery/and energy efficiency systems need to be in place. Scope 1 and 2 emissions (direct combustion of fuel for work related activities and use of electricity- scope 1 and 2 respectively) are within **Knights Enham School** direct control and possible to deliver net zero.

Throughout this Plan, carbon is expressed in terms of Carbon Dioxide Equivalent ($CO_2(e)$). This is calculated from metered energy consumption using conversion factors published by UK Government GHG Conversion Factors for Company Reporting.

It should be noted that the carbon intensity of the National Grid has been improving through the 1990s as coal-fired power stations have been replaced by gas, nuclear and renewable energy sources causing lower carbon emissions per unit of energy generation. This improvement may however reverse in coming years as nuclear and other low carbon-generating sources come to the end of their working lives.

Establishing GHG Protocol Scope emissions:

GHG emissions are categorised by 'scopes' (figure 1) under the GHG Protocol:

- **Scope 1:** Direct emissions that occur from sources that are owned or controlled by the organisation, for example emissions from combustion in boilers and vehicles.
- **Scope 2**: Emissions from the generation of purchased electricity consumed by the organisation.
- **Scope 3**: All other indirect emissions which are a consequence of the activities of the organisation but occur from sources not owned or controlled by the organisation, for example, water, waste, business travel, commuting and procurement.
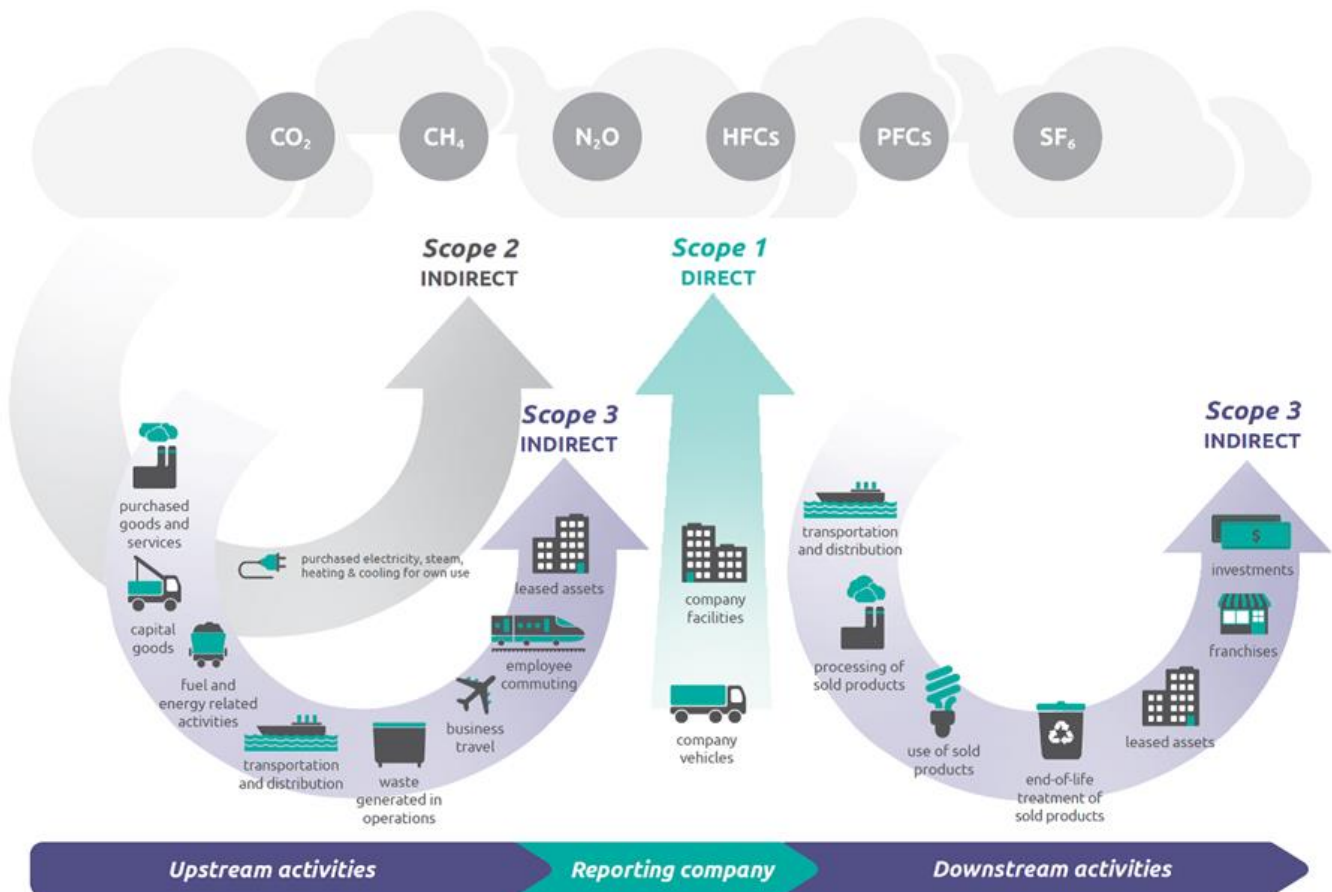

Figure 1:Scope emission classification, image courtesy of GHG Protocol -Technical guidance for calculating scope 3 emissions.

Scope 1 Emissions are produced though the combustion of fossil fuels that are used for heating or industrial applications (e.g., CHP). Examples of such fuels include natural gas and liquified petroleum gas. Emissions produced though the combustion of fossil fuels that are used for transport purposes. These range from traditional transport fuels (e.g., petrol and diesel) to alternative fuels (e.g., bioethanol and liquified petroleum gas).

Scope 1 includes all emissions produced by the organisation's owned or leased vehicles (across all modes of transport) and emissions released during the manufacturing process in specific industry sectors (e.g., glass, aluminium, cement). Also included in scope 1 emissions are any fugitive emissions produced from a range of sources such as refrigeration systems, natural gas distribution systems, air-conditioning systems.

Scope 2 emissions are produced from the consumption of purchased electricity, steam, or other sources of energy (e.g., heated or chilled water from a district scheme). This means that sources of energy purchased by the organisation and consumed in its owned or controlled equipment fall under this scope. They are referred to as energy indirect emissions. Any loss of purchased energy during transmission and distribution is not accounted for by the organisation as Scope 2, but as Scope 3 as usually the transmission and distribution assets are not owned or controlled by the organisation. These emissions would be accounted for by the utility company as a Scope 1 source.

Scope 3 emissions are produced from the operational activities of an organisation, but the sources are not directly owned or controlled by the organization'. Scope 3 emissions include purchased raw materials ("upstream Scope 3"), as well as distribution, transportation, and shipping products, plus customer usage and end-of-life treatment ("downstream Scope 3"). Scope 3 is the most complex category to measure carbon accounting accurately and fully.

The Corporate Value Chain (Scope 3) Accounting and Reporting Standard allows companies to assess the impact of GHG emissions and identify where to focus reduction activities. Scope 3 emissions are all a company's "indirect" or corporate value chain emissions. For many companies - particularly companies with a physical product and supply chain - Scope 3 emission will represent most of the organisation's carbon footprint.

There are 15 categories of Scope 3 emissions:

1. Purchased goods and services
2. Capital goods
3. Fuel- and energy-related activities
4. Upstream transportation and distribution
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Upstream leased assets
9. Downstream transportation and distribution
10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Downstream leased assets
14. Franchises
15. Investments

Breakdown of Scope 3 categories:

Upstream Activities

Upstream activities cover emissions created by an organization's purchases to provide their goods and services and support day-to-day operations: The GHG Protocol organizes the following categories under upstream activities:

Category 1: Purchased Goods and Services

Emissions from the production of all purchased or acquired products and services not covered in categories 2 to 8. Since it can encompass many purchases, organizations can group them further by use: production-related (like parts for their product), also referred to as direct purchasing, and non-production-related (like HR software), also referred to as indirect purchasing.

Category 2: Capital Goods

Emissions from the production of purchased or acquired capital goods. The GHG Protocol defines capital goods as final products with extended life that are used to:

- Provide a service
- Deliver, sell, or store merchandise
- Produce a product

The GHG Protocol requires organizations to account for the cradle-to-gate emissions in the year they've acquired capital assets, not unlike how they'd account for category 1 emissions.

Category 3: Fuel- and Energy-Related Activities

Emissions from fuel- and energy-related activities that aren't covered in scopes 1 and 2. "Energy" in this case refers to electricity, cooling, heating, and steam.

This category covers the following fuel- and energy-related activities:

- Upstream emissions of purchased energy or fuels, meaning the transportation, creation, and extraction of fuels consumed by the reporting company or fuels consumed in the generation of energy that is used by the reporting company
- Transmission and distribution (T&D) losses, meaning the generation of energy that's consumed by a T&D system
- Generation of purchased electricity sold to end users, meaning the generation of energy (including upstream emissions and combustion) purchased by the reporting organization and sold to end users - reported by the utility company or energy retailer
- This category does not cover emissions from the combustion of the fuel and energy consumed by the organization, since these are covered in scopes 1 and 2.

Category 4: Upstream Transportation and Distribution

Emissions generated from third-party transportation and distribution services paid for by the reporting company. This can include the emissions generated to transport supplies between warehouses and from the storage of goods in warehouses or distribution centres.

Category 5: Waste Generated in Operations

Emissions created by the third-party treatment and disposal of waste from a company's controlled or owned operations. This covers all future emissions from waste and includes both wastewater and solid waste. Emissions from category 5 can optionally include the transportation of waste from the reporting company to the waste vendor. These emissions include the scope 1 and scope 2 emissions of an organization's third-party waste management company(s), when available.

Category 6: Business Travel

Emissions generated from employee transportation for business-related activities in third party-owned or operated vehicles that are not for day-to-day commuting.

Organizations also have the option to include emissions from hotels. This category does not cover the following emissions:

- Travel in vehicles owned or controlled by the organization since this is covered in scope 1
- Employee commuting, since this is covered in scope 3, category 7
- Travel in leased vehicles, since this is covered in scope 3, category 8

Category 7: Employee Commuting

Emissions from employee commutes between their workplace and home.

Organizations can also include emissions generated from remote work if it is anticipated to be significant or they have had structural changes transitioning from in-office working to remote working.

Category 8: Upstream Leased Assets

This category looks at emissions from the operation of assets the reporting organization leases from other organizations in the reporting year and not yet included in the reporting organization's scope 1 or scope 2 inventories. Organizations will include the lessor's scope 1 and 2 emissions in their emissions for the leased asset.

Downstream Activities

Downstream activities look at how emissions created as goods and services make their way from the organization's operations to the end user. These activities can range from product distribution to retailers to customers' product disposal. The GHG Protocol organizes the following categories under downstream activities.

Category 9: Downstream Transportation and Distribution

Emissions generated from transportation and distribution services paid for by the company's customers - whether that's a downstream intermediate customer (e.g., Final manufacturer or wholesaler) or the end customer.

Organizations that sell an intermediate product should report on the transportation and distribution from the point of sale to either the end-user or the business customer when that transportation is paid for by the downstream entity.

Organizations can also optionally include emissions from storage and retail customer travel to and from stores.

Category 10: Processing of Sold Products

Emissions created when third parties process sold intermediate products following the sale by the reporting organization. Intermediate products are goods integrated into another product before use or used to produce another product, like paint or wood.

Organizations will include scope 1 and 2 emissions from downstream value chain entities involved in the process of these emissions. Since organizations don't always know the end use of their products, the GHG Protocol provides guidance for calculating scope 3, category 10 emissions in this scenario. The GHGP encourages organizations to pick a method based on their ability to collect data from partners and on their own business goals.

Category 11: Use of Sold Products

Emissions created from sold services and goods by the reporting organization. It encompasses the expected lifetime emissions for all relevant products across an organization's product portfolio for all products sold during the reporting year.

This category further divides sold products into two types:

- Direct use-phase emissions (required) include products that directly consume fuel or energy during use and GHG and products that form or contain GHG that are emitted during use
- Indirect use-phase emissions (encouraged if they're expected to be significant) include products that indirectly consume energy or fuel during use

Organizations reporting on avoided emissions must report separately from their scope 1, 2, and 3 inventories.

Category 12: End-of-Life Treatment of Sold Products

Emissions from waste treatment and disposal of sold products at the end of their life cycle. That includes the total expected end-of-life emissions from all products sold during the reporting year.

For sold intermediate products, organizations should account only for the emissions associated with the intermediate product at the end of life, and not for the final product it helped create.

Calculating these emissions requires assumptions about consumers' end-of-life treatment since it's difficult to know how consumers will dispose of products. Organizations should report on these assumptions and methods used to calculate these emissions.

Category 13: Downstream Leased Assets

Emissions generated from the operation of owned or leased assets leased or subleased to other entities that aren't included in scopes 1 or 2.

The GHG Protocol acknowledges that it may not be valuable to differentiate assets that are leased (category 13) and sold (category 11) to customers. In this case, the GHG Protocol recommends reporting these emissions under category 11 instead of category 13 to avoid double-counting.

Category 14: Franchises

Emissions from franchise operations. This is applicable for franchisors and includes scope 1 and 2 emissions from franchisees.

Scope 3 emissions from the franchisee can optionally be included if they are anticipated to be significant. Franchisors can also choose to include their franchisees' scope 3 emissions under category 1 depending on the purchasing model.

Category 15: Investments

Category 15 emissions are also called financed emissions and cover emissions associated with investments. This category is mainly for financial institutions, but it's relevant for all other organizations with investments.

This category is broken into four types:

- Project finance
- Debt investments
- Managed investments and client services
- Equity investments

Emissions should be allocated based on the organization's share of investment in the investee. Since portfolios can change over time, organizations should either choose a fixed point in time or use a representative average from the reporting year.

Organizations can look to the GHG Protocol's guidance on category 15 emissions along with guidance from the Partnership for Carbon Accounting Financials (PCAF) for further information on calculating financed emissions.

For each of the 15 Scope 3 categories, companies are required to calculate emissions of all the GHG's required by the United Nations Framework Convention on Climate Change (UNFCCC)/Kyoto Protocol at the time the inventory is compiled.

Knights Enham School have developed a Scope spreadsheet tool to input and calculate GHG Scope 1-3 emissions (figure 2)

Emission source	Activity data - value	Activity data -	Emission factor kg CO2e/unit (GWP for	Emission factor kg CH4e/unit	Emission factor kg N20e/unit (GWP for	Emission Tonnes CO2e	Emission Tonnes CH4e	Emission Tonnes N20e	Total GHG emissio	Comments
Scope 1: Building energy - fossil fuel consumption		Kwh	0.18219	0.00025	0.00011	0.00000	0.00000	0.00	0.00	
Scope 1: Company owned cars-Petrol		Litres	2.32567	0.00732	0.00671	0.00000	0.00000	0.00	0.00	
Scope 1: Company owned cars-Diesel		Litres	2.52058	0.00026	0.037	0.00000	0.00000	0.00	0.00	
Scope 1: LGP		KG	2554.39	3.44	1.34	0.00000	0	0.00	0.000	
Scope 1: Refrigerant fugitive emissions		Kg	1	25	298	0	0	0.00	0.00	
Scope 1: Subtotal (tonnes CO$_2$e)						0.00	0.00	0.00	0.00	
Scope 2: Purchased electricity (tonnes CO2e)		Kwh	0.191210	0.000800	0.001370	0.000000	0.000000	0.00	0.00	
Scope 2: Subtotal (tonnes CO$_2$e)						0.000000	0.000000	0.00	0.00	
Scope 3: CAT 1. Purchased Goods and services									0.00	
Scope 3: CAT 2. Capital goods									0.00	
Scope 3: CAT 3. Fuel and energy-related activites									0.00	
Scope 3: CAT 4. Upstream transportation									0.00	
Scope 3: CAT 5. Waste generated from operations									0.00	
Scope 3: CAT 6. Business travel									0.00	
Scope 3: CAT 7. Employee commuting									0.00	
Scope 3: CAT 8. Upstream leased assets									0.00	
Scope 3: CAT 9. Downstream transportation and distrubution									0.00	
Scope 3: CAT 10. Processing of sold products									0.00	
Scope 3: CAT 11. Use of sold products									0.00	
Scope 3: CAT 12.End-of-life treatment of sold products									0.00	
Scope 3: CAT 13. Downstream leased assets									0.00	
Scope 3: CAT 14. Franchises									0.00	
Scope 3: CAT 15. Investments									0.00	
Scope 3: Subtotal (tonnes CO2e)										
Total GHG emissions (Scope 1 to 3)									0.00	

*Figure 2: **Knights Enham School** - Scope analysis tool*

Scope Emission Methodology

Establishing current position:

This initial stage determines current GHG emissions. The boundary of the carbon footprint and the emission sources to be included must be determined at the outset. These are determined by the extent of the organisation and the goods and services over which the organisation has operational control.

It is important that good quality data is obtained for the carbon footprint calculations. A robust methodology should be set out to collect, collate and record the carbon footprint data and this should include procedures to check the accuracy of the data. To establish the organisation's current position, the facilities, and the various operations along with data and records must be audited.

The plan should also include an outline of:

> • relevant environmental and carbon legislation

> • carbon management drivers relevant to the organisation such as cost savings, reputational benefit, improved staff satisfaction, improved engagement with other stakeholders etc.

Auditing current position

This is a high-level audit across the entire organisation and involves identifying all relevant activities that result in GHG emissions. The aim of this stage is to calculate the **Knights Enham School**'s baseline GHG footprint.

Identifying opportunities for change

Identifying and appraising options for carbon reduction is a central part of the carbon management plan. The range of options available will depend on several factors unique to the organisation. A comprehensive list of potential interventions and solutions –both technical and non-technical (e.g. behavioural change)– needs to be produced. Individual interventions need to be quantified in terms of their carbon reduction potential (impact) and in terms of their cost. Some interventions may be low cost while others require a considerable investment. In most cases, reducing energy consumption is the most cost-effective mitigation route and is usually prioritised over the other opportunities.

Setting a reduction target

The cumulative carbon savings within the available resources (manpower and financial) helps the organisation set a realistic and viable carbon reduction target. Targets will vary between subsidiaries but should be ambitious and reflect the ability to deliver carbon savings. Targets should be **SMART**, which stands for specific, measurable, achievable, realistic and time bound. Benchmarking against other like organisations may help evaluate the potential for savings.

Creating a business case for implementation

The cost of implementing each of the identified carbon management projects should be estimated. This should include both the initial capital investment (if needed) and the ongoing operational expenses. Since carbon management is usually associated with energy management or achieving savings in other resources, it is very likely that there will be obvious financial savings that could –either partially or even fully– make up for the associated implementation costs.

Where possible, **Knights Enham School** normal procedures for investment appraisal should be used to evaluate carbon saving opportunities as this will maintain consistency and should reduce the administrative work. All the identified carbon management projects should be listed and prioritised based on the same criteria, which typically relate to the cost and projected carbon emission savings of each project.

Often projects are prioritised according to three capital cost categories:

- • no/low cost

- • medium cost

- • high cost.

In many cases no/low cost and even medium cost options are funded from annual revenue budgets. However, high-cost projects will normally have to be planned into capital budget provisions. Low or no-cost opportunities, such as behavioural change measures, are expected to generate net financial gains early on. Therefore, normally low or no-cost opportunities are evaluated using a simple payback approach i.e., the number of years during which savings on the energy bill are needed to payback all additional costs. High-cost opportunities should be looked at from a life-cycle perspective where the upfront investment is set against the energy and cost savings over the life of the intervention.

When evaluating opportunities, it is important to consider the cost of not acting. This involves looking at likely future energy prices, the price of carbon and any other benefits that can be valued. If an opportunity is not progressed, this may result in **Knights Enham School** paying more over time in energy bills and other costs.

Monitoring, reporting and continual review

Monitoring is a key element of carbon management. Progress against targets and in relation to the carbon baseline should be monitored and reported. Some organisations and public authorities are obliged to report their GHG emissions to comply with regulations.

The carbon management plan may be incorporated into a wider policy such as sustainability or environmental management systems to streamline the reporting work. There must be a management and reporting link to the senior management team as they have ultimate responsibility for the plan.

Mandatory reporting for large businesses in the UK:

- • **Streamlined Energy and Carbon Reporting (SECR)**

Streamlined Energy & Carbon Reporting (SECR) is the UK Government's energy and carbon reporting framework which came into force on 1st April 2019. The SECR framework is aimed at reducing the complexity of current energy and carbon reporting requirements. These regulations are designed to help large businesses prioritise energy efficiency and increase transparency about carbon emissions for stakeholders and the public.

- • **Energy Saving Opportunity Scheme (ESOS)**

The Energy Savings Opportunity Scheme (ESOS) is a mandatory requirement for all large enterprises in the UK. The scheme requires recording and reporting of energy data for buildings, transport, and industrial processes over a 12-month period. Additionally, the scheme requires energy surveys accompanied by cost-effective recommendations to reduce energy demand and improve energy efficiency. All evidence gathered must be signed off by an accredited ESOS Lead Assessor. Organisations that fail to comply with ESOS Phase 3 by the deadline date of 5th December 2023 are likely to face substantial financial penalties.

- • **PPN 06/21 and the Carbon Reduction Plan**

The government recently released **Public Procurement Note 06/21**, which states that all organisations supplying public sector contracts with a value of more than £5 million must have a Carbon Reduction Plan in place. A Carbon Reduction Plan is a statement from an organisation detailing their current carbon footprint, along with their commitment to help the UK achieve Net Zero emissions by 2050.

Scope 1-2 data calculation

Businesses must calculate their emissions in line with specific methodologies. The GHG protocol emission factors specify how emissions for different categories of pollutant should be calculated.

Scope data calculation methods

The four methods outlined by the GHG Protocol that can be used to calculate emissions for Scope emissions are as follows:

- **Spend-based method** — A combination of primary activity data on the amount spent on purchased products and secondary emission factors for purchased products per monetary value.
- **Average data (physical unit) method** — A combination of primary activity data on the mass or quantity of purchased products and secondary emission factors for purchased products per unit.
- **Hybrid method** — A combination of supplier-specific activity and emissions data and secondary data to fill gaps.
- **Supplier-specific method** — A combination of primary activity data on the mass or quantity of purchased products from specific suppliers and primary product and supplier-specific emission factors per unit.

The supplier-specific method is regarded as the most precise and accurate and should be considered above all other methods if data is adequate and abundant. More often a combination of data sources may need to be used (Hybrid)

List of approved (GHG Protocol) formulae used to calculate GHG Scope 1 and 2 emissions for CO2, CH4, N2O:

- Formula [0.1] (Stationary and mobile) emissions = ∑ fuel consumed X Net Calorific Value X Gas Emission Factor (kg)

- Formula [0.2] CO2 Mobile emissions (Vehicle Km travelled method) = ∑ [Distance travelled X emission factor]

- Formula [0.3] Fugitive emissions = ∑ No. of units × Refrigerant charge × Annual leakage factor equivalent

- Formula [0.4] Purchased Electricity emissions = ∑ [Power Consumption X emission factor] (Grid Specific)

The metrics required to calculate GHG emissions include:

Activity	Unit of Measurement	Data Sourced From
Electricity use	Total kilowatt hours (Kwh)	Electricity bill
Gas use	Total kilowatt hours (Kwh)	Gas bill
Water supply/treatment	M^3 of water supplied/treated	Water bill
Fuel usage – company vehicles	litres of fuel bought	Invoices/receipts
Company travel	Miles flown, mileage covered by car, train, and other transport	Distance calculations
Waste recycling	Tons of waste disposed of	Waste collection provider invoices

Table 1-GHG emission metric data sources.

Calculating Scope 3 emissions

Companies are required to report a description of methodology and assumptions used to calculate emissions.

Primary activity data can be obtained through procurement, finance, estate management, energy, waste, and distribution records (Table 1). Secondary activity data can be sourced through third party organisations such as the Greenhouse Gas protocol, Department of Energy and Climate change (DECC), the Department of Environment, Food and Rural services, government national statistics and industry averages and approximations.

Public sources of GHG emission rates associated with activities can be found through the GHG protocol, the Environmental Product Declaration (EPD), ICE (ICE Database V3) DEFRA, national statistics, and government records. Consumer data can be obtained directly or through secondary data sources such as national waste and recycling statistics.

Category 1. Purchased goods and services:

Supplier-specific method, supplier specific cradle to gate emission factors for purchased goods and services. Data collection can be completed through questionnaires asking for:

- Product life cycle GHG emissions data
- Description of methodologies used
- Data sources/emission factors used.
- Whether data is assured /verified type of assurance received
- Ratio primary data to secondary

Formula [1.0]: Purchased goods and services

Sum across purchased goods and services = ∑ **(Quantities of goods purchased (e.g., kg) x supplier -specific product emission factor of purchased good or service (e.g., kg co2e/kg))**

Hybrid method, reporting companies need to collect as much of the following activity data relating to purchased goods and services:

- Allocated scope 1 and 2 data
- Mass or volume of material inputs, mass or volume of fuel inputs used and distance from supplier
- Quantities of waste output emissions
- Mass or number of units purchased goods or services

Amount spent on purchased goods or services, by product type

Formula [1.1]: Purchased goods and services

Sum across purchased goods or services = **∑ scope and 2 emissions of tier 1 supplier relating to purchased goods and services (Kgco2e)**

+

Sum across material inputs of purchased goods and services = **∑ (mass or quantity of material inputs used by tier 1 supplier relating to purchased good or service (Kg/unit) X cradle to gate emission factor for material (Kgco2e/Kgco2e/unit)**

+

Sum across transport of material inputs to tier 1 supplier = **∑ (distance of transport of materials inputs to tier 1 supplier (km) X mass/volume of material input (tonnes/TEUs) X cradle to gate emission factor for the vehicle type (Kgco2E/tonne or TEU/km))**

+

Sum across waste outputs by tier 1 supplier relating to purchased goods and services = **∑(mass of waste from tier 1 supplier relating to purchased good or service (Kg) X emission factor for waste activity (KGco2E/Kg))**

+

Other emissions emitted on provision of good or service as applicable.

Average-data method, the company collects data on the mass/units of purchased goods and multiplies them by relevant secondary (industry average) cradle to gate emission factors:

- Mass or number of purchased goods or services for a given year (e.g., kg, hours spent).

Formula [1.2]: Purchased goods and services

Sum across purchased goods = **∑ (mass of purchased good or service (Kg) X emission factor of purchased good or service per unit of mass (Kgco2e/Kg)**

Or

∑ (unit of purchased good or service (e.g., piece) X emission factor of purchased good or service X emission factor of purchased good or service per reference unit (e.g., kgco2e/piece))

Spend-based method, Reporting companies should apply the average spend-based method by collecting data on the economic value of purchased goods and services and multiplying them by relevant Environmentally extended input output (EEIO)emission factors:

- Amount spent on purchased goods and services by product type, using market values (e.g., Pounds or dollars)
- Don't forget to account for inflation
- Cradle to gate emission factors of purchased goods or services per unit of economic value (e.g., Kgco2e/$)

Formula [1.3]: Purchased goods and services

Sum across purchased goods or services = ∑ **(value of purchased good or service ($) X emission factor of purchased good or service per unit of economic value (Kgco2e/%)**

Category 2: Capital Goods

Supplier-specific method, supplier specific cradle to gate emission factors for Capital Goods :

Formula [2.0]: Capital Goods

Sum across Capital Goods = ∑ **(Quantities of capital good purchased (e.g., kg) x supplier -specific product emission factor of Capital Good (e.g., kg co2e/kg))**

Hybrid method, reporting companies need to collect activity data relating to Capital Goods:

Formula [2.1]: Capital Goods

Sum across Capital Goods = ∑ **scope and 2 emissions of tier 1 supplier relating to capital goods (Kgco2e)**

+

Sum across material inputs of capital goods = ∑ **(mass or quantity of material inputs used by tier 1 supplier relating to capital goods (Kg/unit) X cradle to gate emission factor for material (Kgco2e/Kgco2e/unit)**

+

Sum across transport of material inputs to tier 1 supplier = ∑ **(distance of transport of materials inputs to tier 1 supplier (km) X mass/volume of material input (tonnes/TEUs) X cradle to gate emission factor for the vehicle type (Kgco2E/tonne or TEU/km))**

+

Sum across waste outputs by tier 1 supplier relating to capital goods= ∑ **(mass of waste from tier 1 supplier relating to capital goods (Kg) X emission factor for waste activity (KGco2E/Kg))**

+

Other emissions emitted on provision of capital goods as applicable.

Average-data method, the company collects data on the mass/units of purchased goods and multiplies them by relevant secondary (industry average) cradle to gate emission factors:

> Formula [2.2]: Capital Goods
>
> Sum across capital goods = ∑ (mass of capital goods (Kg) X emission factor of purchased good or service per unit of mass (Kgco2e/Kg)
>
> **Or**
>
> ∑ (unit of capital goods (e.g., piece) X emission factor of capital good X emission factor of capital good per reference unit (e.g., kgco2e/piece))

Spend-based method, reporting companies should apply the average spend-based method by collecting data on the economic value of capital goods and multiplying them by relevant Environmentally extended input output (EEIO) emission factors:

> Formula [2.3]: Capital Goods
>
> Sum across capital goods= ∑ (value of capital goods ($) X emission factor of capital goods per unit of economic value (Kgco2e/%)

Category 3: Fuel and energy related activities-not included Scope 1 or Scope 2:

Upstream emissions of purchased fuels:

To calculate upstream CO2e emissions of purchased fuels (extraction, production and transportation of fuels consumed by the reporting company) the following methods are used:

Supplier specific method, Collect data from fuel providers on upstream emissions.

Average-data method, estimate emissions by using secondary emission factors for upstream emissions per unit of consumption (e.g., Kgco2e/kWh).

> Formula [3.0]: Fuel and energy related activities
>
> Sum across each fuel type consumed = ∑ (fuel consumed (e.g., kWh) X upstream fuel emission factor (Kg co2e)/kWh))
>
> Where upstream fuel emission factor = life cycle emission factor – combustion emission factor.

Upstream emissions of purchased electricity:

Methods to calculate upstream CO2e emissions of purchased electricity (extraction, production and transportation of fuels consumed by the reporting company):

Supplier specific method, Collect data from electricity providers on upstream emissions.

Average-data method, estimate emissions by using secondary emission factors for upstream emissions per unit of consumption (e.g., Kgco2e/kWh).

Upstream co2e emissions of purchased electricity (extraction, production and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling that is consumed by the reporting company:

Formula [3.1]: Fuel and energy related activities

Sum across suppliers, regions, and countries = **∑ (electricity consumed (kWh) X upstream electricity emission factor (Kgco2e) /kWh))**

+

(Steam consumed (kWh) X upstream steam emission factor (Kgco2e) /kWh))

+

(Heating consumed (kWh)) X upstream heating emission factor (Kgco2e) /kWh))

+

(Cooling consumed (kWh) X upstream cooling emission factor (Kgco2e) /kWh))

Where upstream emission factor = life cycle factor – combustion emission factor- T&D losses.

Calculating emissions from Transmission and distribution losses:

To calculate T&D losses of electricity, steam, heating, and cooling that is consumed in a T&D system you should use either:

Supplier specific method, Collect data from electricity providers on T&D loss rates of grids.

Average-data method, estimate emissions by using average T&D loss rates.

Co2e emissions from energy (generation of electricity, steam, heating, and cooling that is consumed (lost) in a T&D system may be calculated:

Formula [3.2]: Fuel and energy related activities

Sum across suppliers, regions, and countries = **∑ (electricity consumed (kWh) X electricity life cycle emission factor (Kgco2e) /kWh) X T&D loss rate (%))**

+

(Steam consumed (kWh) X steam life cycle emission factor (Kgco2e) /kWh) X T&D loss rate (%))

+

(Heating consumed (kWh)) X heating life cycle emission factor (Kgco2e) /kWh) X T&D loss rate (%))

+

(Cooling consumed (kWh) X cooling life cycle emission factor (Kgco2e) /kWh) X T&D loss rate (%))

Calculating life cycle emissions from power that is purchased and sold:

Methods to calculate emissions from the generation of electricity, steam, heating and cooling that bis purchased and sold to end users include:

Supplier specific method, Collect emission data from power generators

Average-data method, estimate emissions by using grid average emission rates.

CO2 emissions from power that is purchased and sold (generation of electricity, steam, heating, and cooling that is purchased and sold by the reporting company can be calculated:

> Formula [3.3]: Fuel and energy related activities
>
> Sum across suppliers' regions and countries = $\sum$ **(electricity purchased for resale (kWh) X electricity life cycle emission factor (Kgco2e) /kWh))**
>
> **+**
>
> **(Steam purchased for resale (kWh) X steam life cycle emission factor (Kgco2e) /kWh))**
>
> **+**
>
> **(Heating purchased for resale (kWh) X heating life cycle emission factor (Kgco2e) /kWh))**
>
> **+**

Category 4: Upstream transportation and distribution:

Transportation:

To calculate scope 3 emissions from transportation companies may use the following methods:

Fuel-based method involves determining the amount of fuel consumed (scope 1 and 2 emissions of transport providers) and applying the appropriate emission factor for that fuel.

There are several ways to calculate this:

CO2e emissions from transportation:

> Formula [4.0]: Fuel based method-Transportation
>
> Sum across fuel types = $\sum$ **(quantity of fuel consumer(litres) X emission factor for the fuel (e.g., Kgco2e/litre fuel))**
>
> **+**
>
> Sum across grid regions = $\sum$ **(quantity of electricity consumed (kWh) X emission factor for electricity grid (e.g., kgco2e/kWh))**
>
> **+**
>
> Sum across refrigerant and air-conditioning types = $\sum$ **(Quantity of refrigerant leakage X global warming potential for refrigerant (e.g., kgco2e))**

If fuel consumption data is not available calculate quantities of fuel consumed (litres) from fuel spend:

> Formula [4.1]: Fuel use from fuel spend
>
> Sum across fuel types = $\sum \left(\dfrac{\textbf{Total fuel spend (e.g.,\$)}}{\textbf{Average fuel price (e.g.,\$ per litre)}} \right)$

To calculate fuel use from distance travelled, calculate quantities of fuel consumed (litres):

Formula [4.2]: Fuel use from distance travelled

Sum across transport steps = ∑ **(Total distance travelled (e.g., km) X fuel efficiency of vehicle (e.g., litres/km))**

If allocation is needed companies can calculate allocated fuel use by using the next formula [4.3]:

Formula [4.3]: Allocated fuel use

∑ = Total fuel consumed (litres) X $\left(\dfrac{\frac{mass}{volume} of\ company\ goods}{\frac{mass}{volume} of\ goods\ transported} \right)$

Distance based method, to calculate emissions reporting companies need to multiply the quantity of goods purchased in mass (including packaging and pallets) or volume by the distance travelled and then multiplied by the appropriate emission factor.

Formula [4.4]: Distance based method-transportation

Sum across transport modes and/or vehicle types = ∑ **(mass of goods purchased9 tonnes or volume) X distance transport leg (km) X emission factor of transport mode or vehicle type (Kgco2e/tonne or volume/km)**

Spend -based method, If the fuel-based method and distance method can not be applied companies should apply the spend based method:

Formula [4.5]: Spend based method

Sum across transport modes and /or vehicle types = ∑ **(amount spent on transport by type ($) X relevant EEIO emission factors per unit of economic value (kgco2e/$))**

Distribution:

For calculating Scope 3 emissions for upstream distribution three techniques exist:

Site-specific method, which involves site specific fuel, electricity, and fugitive emission data and applying appropriate emission factors:

Formula [4.6]: Site specific method-distribution

For each storage facility:

Emissions of storage facility (kgco2e) = ∑ **(fuel consumed (kWh) X fuel emission factor (kgco2e/kWh))**

+

(Electricity consumed (kWh) X electricity emission factor (kgco2e)/kWh)

+

(Refrigerant leakage (kg) X refrigerant emission factor (kgco2e)/kg))

Then, allocate emissions based on volume that the companies' products take within storage area:

$$Allocated\ emissions\ of\ storage\ facility =$$

$$\left(\frac{Volume\ of\ reporting\ companies\ purchased\ goods(m3)}{Total\ volume\ of\ goods\ in\ storage\ area\ (m3)}\right.$$

X emissions of storage facility (kgco2e)

Finally, sum across all storage areas:

∑ allocated emissions pf storage facility

Average-data method, is only used when supply chain specific data is not available:

Formula [4.7]: Average-data method

Sum across storage facilities = ∑ **(volume of stored goods (m3 or pallet or TEU) X average number of days stored**

X emission factor for storage facility (Kgco2e/m3 or pallet or TEU))

Category 5: Waste generated in operations

Companies may use one of the three outlined methods:

Supplier-specific method, this involves the collection of waste specific scope 1 and 2 emission data directly from waste treatment companies:

Formula [5.0]: Supplier-specific method

Sum across waste treatment providers = ∑ **allocated scope 1 and scope 2 emissions of waste treatment company.**

Waste-type-specific-method, Companies should differentiate between waste by its type and treatment method:

> Formula [5.1]: Wate-type-specific method
>
> Sum across waste types = **∑ (Waste produced (tonnes or m3) X waste type and waste treatment specific emission factor (kgco2e/tonne or m3))**

Average-data method, Companies using this method should collect data based on total waste diversion rates from reporting organisation.

> Formula [5.2] Average-data-method
>
> Sum across waste treatment methods = **∑ (Total mass of waste produced (tonnes) X proportion of total waste being treated by waste treatment method X emission factor of waste treatment method (kgco2e/tonne))**

Accounting for emissions from recycling:

Emission reductions associated with recycling are due to two factors:

- The difference in extracting and processing virgin material versus preparing recycled material for reuse.
- A reduction in emissions that would otherwise have occurred if the waste had been sent to landfill or other waste treatment method.

Negative or avoided emissions refer to a comparison of the emissions from processing the recycled material relative to the emissions from producing the equivalent virgin material.

Accounting for emissions from incineration with energy recovery:

A company should account for upstream emissions from purchased energy generated from waste in scope 2. Emissions from preparing and transportation of waste should go in category 5.

Accounting for emissions from wastewater:

Emissions from wastewater are highly variable- companies should calculate wastewater emissions using the *2006 IPCC Guidelines for National GHG inventories Vol.5 Waste.*

Category 6: Business travel

Business travel can be calculated using two methods:

Fuel-based method involves determining the amount of fuel consumed (scope 1 and 2 emissions of transport providers) and applying the appropriate emission factor for that fuel.

> Formula [6.0]: Fuel based method- Business travel
>
> Sum across fuel types = ∑ **(quantity of fuel consumer(litres) X emission factor for the fuel (e.g., Kgco2e/litre fuel))**
>
> +
>
> Sum across grid regions = ∑ **(quantity of electricity consumed (kWh) X emission factor for electricity grid (e.g., kgco2e/kWh))**
>
> +
>
> Sum across refrigerant and air-conditioning types = ∑ **(Quantity of refrigerant leakage X global warming potential for refrigerant (e.g., kgco2e))**

Distance-based method if data is unavailable companies may use the distance method:

> Formula [6.1]: Distance travelled method
>
> Sum across vehicle types = ∑ **(Total distance travelled by vehicle type (vehicle- km or passenger-km) X vehicle specific emission factor (kgco2e/vehicle-km or kgco2e/passenger -km))**
>
> +
>
> **(optional)**
>
> ∑ **(annual number of hotel nights X hotel emission factor (kgco2e/night))**

Spend -based method, If the fuel-based method and distance method cannot be applied companies should apply the spend based method:

> Formula [6.2]: Spend based method
>
> Sum across transport modes and /or vehicle types = ∑ **(amount spent on transport by type ($) X relevant EEIO emission factors per unit of economic value (kgco2e/$))**

Category 7: Employee commuting

There are three ways to calculate emissions from employees commuting between their homes and worksites:

Fuel based method, which determines the amount of fuel consumed during commuting and applying the appropriate emission factor for that fuel:

> Formula [7.0]: Fuel based method- Business travel
>
> Sum across fuel types = $\sum$ **(quantity of fuel consumer(litres) X emission factor for the fuel (e.g., Kgco2e/litre fuel))**
>
> +
>
> Sum across grid regions = $\sum$ **(quantity of electricity consumed (kWh) X emission factor for electricity grid (e.g., kgco2e/kWh))**
>
> +
>
> Sum across refrigerant and air-conditioning types = $\sum$ **(Quantity of refrigerant leakage X global warming potential for refrigerant (e.g., kgco2e))**

Distance-based method, calculates emissions through distance travelled data and mode of transport used for commuting:

> Formula [7.1]: Distance -based method
>
> First, sum across all employees to determine total distance travel using each vehicle type:
>
> Total distance travelled by vehicle type (vehicle-km or passenger-km)
>
> =$\sum$ **(daily one-way distance between home and work (km) X 2 X number of commuting days per year)**
>
> Then, sum across vehicle types to determine total emissions:
>
> Kgco2e from employee commuting
>
> =$\sum$ **(total distance travelled by vehicle type (vehicle-km or passenger-km) X vehicle specific emission factor (Kgco2e/vehicle-km or kgco2e/passenger-km))**

Average-data-method, Data should be collected about average daily commuting distances, modes of transport and commuting days per year:

> Formula [7.2]: Average-data method
>
> Sum across each transport mode =$\sum$ **(total number of employees X % of employees using mode of transport X one way commuting distance (vehicle-km or passenger-km) X 2 X working days per year X emission factor of transport mode (kgco2e/vehicle-km or kg co2e/passenger-km))**

Category 8: Upstream Leased assets

This category is applicable for companies operating leased assets.

Asset-specific method, involves collect asset specific fuel and energy use data and process and fugitive emissions from scope 1 and 2 data from individual leased assets:

> Formula [8.0]: Asset-specific method
>
> Calculate the scope 1 and 2 emissions associated with each leased asset:
>
> Sum of leased assets = **∑ scope 1 and scope 2 emissions of each leased asset.**

Companies that lease a portion of a building where energy is not separately sub-metred by the tenant may estimate the energy consumed using the reporting companies share of the buildings total floor space and total building energy use:

> Formula [8.1]: Allocating emissions from leased buildings that are not sub-metred
>
> Energy use from leased assets (kWh)= **∑ (reporting companies' area(m2) / (building total area (m2) X buildings occupancy rate (e.g.,0.75)) X buildings total energy use.**

Lessor-specific method involves collecting scope 1 and 2 emissions from lessor(s) and allocating emissions relevant to the lease assets.

> Formula [8.2]: Lessor-specific -method
>
> Calculate the scope 12 and 2 emissions associated with each lessor:
>
> Then allocate emissions from each lessor and then sum across lessors:
>
> **=∑ (scope 1 and scope 2 emissions of lessor (kgco2e)**
>
> **X ((Area ,volume, quantity of leased asset)/(Total area, volume, quantity of lessor assets.))**

Average-data method involves estimating emissions for each leased asset based on average statistics and secondary data such as average emissions per asset type or floor space.

> Formula [8.3]: Average-data method for leased buildings (where floor space data is available.)
>
> Sum across building types = **∑ (Total floor space of building type (m2) X average emission factor for building type (kgco2e/m2/year))**

If no floor space data is available:

Formula [8.4]: Average-data method for leased assets other than buildings for leased buildings where floor space data is unavailable

Sum across asset types = ∑ (number of assets X average emission per asset type (kgco2e/asset type/ year))

Category 9: Downstream transportation and distribution

This category includes emissions from retail and storage and transportation /distribution sold products.

CO2e emissions from transportation:

Formula [9.0]: Fuel based method-Transportation

Sum across fuel types = ∑ (quantity of fuel consumer(litres) X emission factor for the fuel (e.g., Kgco2e/litre fuel))

+

Sum across grid regions = ∑ (quantity of electricity consumed (kWh) X emission factor for electricity grid (e.g., kgco2e/kWh))

+

Sum across refrigerant and air-conditioning types = ∑ (Quantity of refrigerant leakage X global warming potential for refrigerant (e.g., kgco2e))

If fuel consumption data is not available calculate quantities of fuel consumed (litres) from fuel spend:

Formula [9.1]: Fuel use from fuel spend

$$\text{Sum across fuel types} = \sum \left(\frac{\textbf{Total fuel spend (e.g.,\$)}}{\textbf{Average fuel price (e.g.,\$ per litre)}} \right)$$

To calculate fuel use from distance travelled, calculate quantities of fuel consumed (litres):

Formula [9.2]: Fuel use from distance travelled

Sum across transport steps = ∑ (Total distance travelled (e.g., km) X fuel efficiency of vehicle (e.g., litres/km))

If allocation is needed companies can calculate allocated fuel use by using the next formula [4.3]:

> Formula [9.3]: Allocated fuel use
>
> $$\sum = \text{Total fuel consumed (litres) X } \left(\frac{\frac{mass}{volume} \text{ of company goods}}{\frac{mass}{volume} \text{ of goods transported}} \right)$$

Distance based method, to calculate emissions reporting companies need to multiply the quantity of goods purchased in mass (including packaging and pallets) or volume by the distance travelled and then multiplied by the appropriate emission factor.

> Formula [9.4]: Distance based method-transportation
>
> Sum across transport modes and/or vehicle types = **∑ (mass of goods purchased9 tonnes or volume) X distance transport leg (km) X emission factor of transport mode or vehicle type (Kgco2e/tonne or volume/km)**

Spend -based method, If the fuel-based method and distance method cannot be applied companies should apply the spend based method:

> Formula [9.5]: Spend based method
>
> Sum across transport modes and /or vehicle types = **∑ (amount spent on transport by type ($) X relevant EEIO emission factors per unit of economic value (kgco2e/$))**

Category 10: Processing of sold products

This category focuses on the processing of sold intermediate products by third parties. The recommended methods to calculate emissions are:

Site-specific method, which involves determining the amount of fuel and electricity used and the amount of waste generated from processing of sold intermediate products and applying the appropriate emission factors.

Formula [10.0]: Site-specific method

Sum across fuel consumed in the processing of sold intermediate products: = ∑ **(quantity of fuel consumed (e.g., litre) X life cycle emission factor for fuel source (e.g., kgco2e/litre))**

+

Sum across electricity consumed in the processing of sold products = ∑ **(quantity electricity consumed (e.g., kWh) X life cycle emission factor for electricity (e.g., kgco2e/kWh))**

+

Sum across refrigerants used in the processing of sold intermediate products = ∑ **(quantity of refrigerant leakage (kg) X Global warming potential for refrigerant (kgco2e/kg))**

+

Sum across process emissions released in the processing of sold products

+

To the extent possible, sum across waste generated in the processing of sold intermediate products = ∑ **(mass of waste output (kg) X emission factor for waste activity (kgco2e/kg))**

Average-data method, Companies collect data on the type of downstream process involved in transforming or processing sold intermediate products into final products and applying relevant average emission factors.

Formula [10.1] Average-data method

Sum across intermediate products = ∑ **(mass of sold intermediate product (kg) X emission factor of processing of sold products (kgco2e/kg of final product))**

Category 11: Use of sold products

category 11 includes the total life expected emissions from all relevant products sold by a company in a reporting year. These include the scope 1 and 2 emissions of end users and typically require product design specifications and assumptions about how customers use products. Methods for calculating emissions:

Direct use-phase emissions:

Formula [11.0]: Direct use-phase emissions that directly consume energy during use

Sum across fuels consumed from use of products: = ∑ **(total lifetime expected use of product X number sold in reporting period X fuel consumed per use (kWh) X emission factor for fuel (kgco2e/kWh))**

+

Sum across electricity consumed from use of products: = ∑ **(total lifetime expected use of product X number sold in reporting period X electricity consumed per use (kWh) X emission factor for electricity (kgco2e/kWh))**

+

Sum across refrigeration leakage from use of products: = ∑ **(total lifetime expected use of product X number sold in reporting period X refrigeration leakage per use (kg) X global warming potential (kgco2e/kg))**

Formula [11.1) Direct use-phase emissions from combusted fuels and feedstocks

Sum across fuels /feedstock sold = ∑ **(total quantity of fuel /feedstock sold (kWh) X combustion emission factor for fuel/feedstock (e.g., kgco2e/kWh))**

Formula [11.2] Direct use-phase emissions from GHG and products that contain or form GHG that are emitted during use

Sum across GHG's released in a product or product group = ∑ **(GHG contained per product X total number of products sold X % of GHG released during lifetime use of product X GWP of the GHG)**

Then:

Sum across products or product groups= ∑ **(use phase emissions from product or product group)**

Note: if the % released is unknown 100% should be assumed.

Formula [11.3]: Indirect use-phase emissions that indirectly consume energy during use

Sum across fuels consumed from use of products: = ∑ **(total lifetime expected use of product X % of total lifetime uses using this scenario X number sold in reporting period X fuel consumed per use in this scenario (kWh) X emission factor for fuel (kgco2e/kWh))**

+

Sum across electricity consumed from use of products: = ∑ **(total lifetime expected use of product X % of total lifetime uses using this scenario X number sold in reporting period X electricity consumed per use in this scenario (kWh) X emission factor for electricity (kgco2e/kWh))**

+

Sum across refrigeration leakage from use of products: = ∑ **(total lifetime expected use of product X % of total lifetime uses using this scenario X number sold in reporting period X refrigeration leakage per use in this scenario(kg) X emission factor for refrigerants (kgco2e/kg))**

+

Sum across GHG emitted indirectly from use scenarios = ∑ **(total lifetime expected use of product X % of total lifetime uses using this scenario X number sold in reporting period X GHG emitted indirectly (kg) X GWP of the GHG**

Category 12: End of life treatment of sold products

This category includes the emissions from waste disposal and treatment of products sold by the reporting company:

Formula [12.0] Waste -type specific method

Sum across waste treatment methods = ∑ **(total mass of sold products and packaging from point of sale to end of life after consumer use (kg) X % of total waste being treated by waste treatment method X mission factor of waste treatment method (kgco2e/kg))**

Category 13: Downstream leased assets

This category is applicable for companies operating leased assets.

Asset-specific method, involves collecting asset specific fuel and energy use data and process and fugitive emissions from scope 1 and 2 data from individual leased assets:

Formula [13.0]: Asset-specific method

Calculate the scope 1 and 2 emissions associated with each leased asset:

Sum of leased assets = ∑ **scope 1 and scope 2 emissions of each leased asset.**

Companies that lease a portion of a building where energy is not separately sub-metred by the tenant may estimate the energy consumed using the reporting companies share of the buildings total floor space and total building energy use:

Lessor-specific method involves collecting scope 1 and 2 emissions from lessor(s) and allocating emissions relevant to the lease assets.

> Formula [13.2]: Lessor-specific -method
>
> Calculate the scope 12 and 2 emissions associated with each lessor:
>
> Then allocate emissions from each lessor and then sum across lessors:
>
> **=∑ (scope 1 and scope 2 emissions of lessor (kgco2e)**
>
> **X ((Area, volume, quantity of leased asset)/(Total area, volume, quantity of lessor assets.))**

> Formula [13.1]: Allocating emissions from leased buildings that are not sub-metred
>
> Energy use from leased assets (kWh)= **∑ (reporting companies' area(m2) / (building total area (m2) X buildings occupancy rate (e.g.,0.75)) X buildings total energy use.**

Average-data method involves estimating emissions for each leased asset based on average statistics and secondary data such as average emissions per asset type or floor space.

> Formula [13.3]: Average-data method for leased buildings (where floor space data is available.)
>
> Sum across building types = **∑ (Total floor space of building type (m2) X average emission factor for building type (kgco2e/m2/year))**

If no floor space data is available:

> Formula [13.4]: Average-data method for leased assets other than buildings for leased buildings where floor space data is unavailable
>
> Sum across asset types = **∑ (number of assets X average emission per asset type (kgco2e/asset type/ year))**

Category 14: Franchises

Franchisors should account for emissions that occur from the operation of franchises (i.e. , scope 1 and scope 2 emissions of franchises)

Franchise-specific method, involves collecting site specific activity data for scope 1 and 2 emissions data from franchises:

> Formula [14.0]: Franchise-specific method
>
> Sum across franchises = ∑ **(Scope 1emissions +scope 2 emissions of each franchise (kgco2e))**

Franchises that operate in a portion of a building where energy use is not separately sub-metered may estimate energy consumed using franchises share of buildings total floor space and total building energy use:

> Formula [14.1]: Allocated emissions from franchise buildings that are not sub-metred
>
> **Energy use from franchise (kWh) = ∑ Franchise area (m2) / (buildings total area (m2) X buildings occupancy rate (e.g., 0.75)) X buildings total energy use (kWh)**

Average-data method, involves estimating emissions for each franchise, or groups of franchises based on average statistics:

> Formula [14.2] Average-data method for other asset types/leased buildings where no space data available
>
> Sum across building/asset types =∑ **(number of buildings or assets X   average emissions per building or asset type per year (kgco2e/building or asset type/year)**

Category 15: Investments

A reporting companies' scope 3 emissions from investments are the scope 1 and scope 2 emissions of investees. The GHG standard divides financial investments into 4 types:

- Equity investments
- Debt investments
- Project finance
- Managed investments and client services

Investment-specific method involves collecting scope 1 and 2 emission data from the investee company and allocating the emissions based upon share of investment.

> Formula [15.0] Investment-specific method
>
> Sum across equity investments = ∑ **(Scope 1 and 2 emissions of equity investment X share of equity (%))**

Average-data method involves using revenue data combined with EEIO data to estimate the scope 1 and scope 2 emissions from the investee company and allocating emissions based upon share of investment.

> Formula [15.1] Average-data method
>
> Sum across equity investments = ∑(**(investee company total revenue ($) X emission factor for investee's sector (kgco2e/$ revenue)) X share equity (%)**

Calculating emissions from project finance and from debt investments with known use of proceeds:

Project-specific method involves collecting scope 1 and 2 emissions for the relevant projects and allocating these emissions based on the investors proportional share of total project costs (total equity plus debt)

> Formula [15.2] Project-specific method
>
> Sum across projects = ∑ **(Scope 1 and scope 2 emissions relevant project in the reporting year X share total project costs (%))**

Average-data method involves using EEIO data to estimate scope 1 and 2emissions from investee company and allocating emissions based on share of total project costs (total equity plus debt)

> Formula [15.3] Average-data method for calculating emissions from project finance and debt investments with known use of proceeds
>
> Sum across projects in the construction phase = ∑ **((project construction cost in the reporting year ($) X emission factor of relevant construction sector (kgco2e/$revenue)) X share of total project costs (%))**
>
> Sum across projects in operation phase = ∑ **((Project revenue in the reporting year ($) X emission factor of relevant operating sector (kgco2e/$ revenue)) X share of total project costs (%))**

Calculating total projected lifetime emissions from project finance and debt investments with known use of proceeds:

> Formula [15.4] Method for calculating projected total lifetime emissions from project finance and debt investments with known use of proceeds
>
> = ∑ **((Projected annual emissions of project X projected lifetime of a project) X share of total project costs)**

Further guidance on completing scope 3, category 15 can be found at http://www.ghgprotocol.org/feature/finiacial-sector-guidance-corporate-value-chain-scope-3-accounting-and-reporting.

Verification of Carbon Footprint

The Carbon Footprint Standard offers an internationally recognised standard for demonstrating low carbon credentials and applies a unified and independent method to manage carbon and energy use. It recognises all stages of carbon management - from **assessment** to carbon **reductions** and carbon **neutrality** and is applicable to organisations, businesses, products, projects, services, and events. Verification gives consumers and business confidence in their own processes, demonstrates environmental credentials, enhances market reputation, and motivates employees. Licences are provided for 12 months and once a business has achieved the standard, they may display the Carbon Footprint Standard Ltd Logo on their marketing materials to demonstrate their carbon credentials.

Carbon Footprint Ltd provides calculation and verification services to companies of all sizes for their compliance greenhouse gas reporting or voluntary reporting on systems as the CDP(previously known as the Carbon Disclosure Project), Carbon Footprint Ltd is the founding member of the quality assurance standard(QAS) for carbon offsetting, providing confidence to businesses that the calculation methodology being used has been independently verified and the offset project meets the highest standards. The scheme includes an audit process to verify that offset providers are following this standard and fulfilling the full offsetting obligations for their customers.

Carbon Footprint Ltd has its own Quality Management System (QMS) which is certified by BSI to ISO 9001:2015 and their own Environmental Management System certified by BSI to ISO 14001:2015.

Methodology:

To qualify for the **Carbon Footprint Standard -CO2e Assessed**, the footprint must be completed against one of the leading international recognised methodologies:

Organizational foot printing:

- WRI Greenhouse Gas Protocol reporting
- BEIS Voluntary Reporting Guidelines (previously DECC)

Product and service foot printing:

- BSI PAS 2050:2011
- ISO 14001:2015
- Greenhouse Gas Protocol Product Standard

Events:
- BSI PAS2060
- ISO 20121

A statement should be developed to determine the scope and boundaries of the assessment, this would typically include all of Scope 1 and 2 emissions as defined by WRI's Green House Gas Protocol plus any Scope 3 emissions that are easily calculated. The assessment must include all emissions from buildings, fuel and transport under the company's direct control. The assessment must also define the Greenhouse Gases included and as a minimum must include **Carbon Dioxide, Nitrous Oxide** and **Methane.** If any are not included a statement must be produced stating so and why. The boundary definition must include whether the system assessed is a cradle to gate, cradle to customer, cradle to cradle or cradle to grave.

Emission Factors:

Emission factors must be used from leading sources – and the most recently available versions of these published factors. The Carbon Footprint Standard recognises these sources as:

- BEIS (DECC)
- ICE
- IPCC
- WRI'S GHG Protocol
- Nationally produced factors by government bodies-Environment protection Agency
- IEA- for international country specific electricity factors
- Ecoinvent
- Bath University ICE factors

To achieve the **Carbon Footprint Standard- Reducing CO2e**, the Carbon footprint a-CO2e Assessed will have to be achieved at least twice over multiple years. There are three ways of showing emission reductions:

- Reducing Absolute emissions (i.e total carbon footprint)
- Reducing emissions per unit of turnover-should be corrected for inflation
- Reduced emissions by unit of production

Although not a specific requirement of the standard, it is recommended to set a carbon reduction target, and measure against this target on an annual basis.

To qualify for the **Carbon Footprint Standard- Carbon Neutral-** a product, service organisation or event must have first achieved co2e assess status, following this all emissions must be offset using carbon credits that have been generated by projects that meet the requirements outlined. The standards currently approved by the QAS for carbon offsetting include:

- Verified Carbon Standard (VCS)
- Gold Standard Verified Carbon Reduction (Gold Standard VER)
- Certified Emissions Reductions (CER)
- Gold standards CERs

More information on QAS can be found at www.qascarbonneutral.com

Carbon offsetting requirements must be completed within the 12-month period of entity the offsetting relates to. All carbon credits must be purchased via a QAS approved carbon offset provider or be able to demonstrate that carbon credits have been retired on behalf of the company and relating to the product or service and the assessment period being offset against. For all levels of Carbon Footprint Standard, transparency is a key factor. To achieve all three levels of the standards, the organisation applying for the standard must provide evidence of:

Assessment:

- Methodology followed
- The definition of the Scope and Boundaries of the assessment
- The results of the Assessment

Reduction:

- Tracked emissions over two or more years

Neutrality:

- The information about the project used- name of project, standard its verified against and the amount of emissions offset.

To Apply for the Carbon Footprint Standard:

Email:infor@carbonfootprint.com

Part 2.

Knights Enham School Progress towards meeting Scope emissions.

Actions to be taken:

1. Initiate pilot GHG inventory study to identify Knights Enham School scope 1 and 2 GHG emissions.
2. Decide which GHGs to measure: Initially carbon, as biggest contributor to atmospheric GHG inventory. Once preliminary scope analysis complete will include the two mandatory GHG's, N2O and CH4.
3. Define organizational and operational boundaries to include only Knights Enham School activities.
4. Determine scope boundaries: Initially base line Scope 1 and 2 of 2024 and scope 1 and 2 for 2025
5. Collected necessary data:

   - **Energy audit-** Gas (Scope 1) and electricity (Scope 2)
   - **Fuel audit**-company travel (Scope 1).
   - **Refrigeration audit**-fugitive emissions (Scope 1).
   - **LPG**- (Scope 1)
   - **Emission factors** -GHG protocol/ICE/IEA (Scope 1 and 2).
   - **Lighting audit**
   - **Water audit** – consumption/wastage- (Scope 3).

6. Calculate GHG emissions for scopes 1-2.
7. Calculated scope 3.
8. Baseline comparison determined a reduction in GHG emissions from 2020-2022 of approximately 83 tonnes for GHG Scopes 1 and 2.

Next steps:

1. Identify emission hotspots-energy usage.
2. Partial audit of current systems-identify inefficiencies, out of date lighting, poor insulation, structural damage etc.
3. Opportunities to improve these inefficiencies with the introduction of improved procedures for staff, equipment and behavioural changes.
4. Creation of spreadsheets to collate data and perform emission calculations.
5. Lighting audit- to identify areas needing upgrading to LED.
6. Begin collecting data for N20 and CH4.

How

- Identify and implement energy reduction and efficiency schemes to reduce Knights Enham School GHG emissions:

  - Weekly maintenance records, sign off sheets to say checks have been completed- helps cover our backs with HSE, ensures efficient running of equipment, identifies inefficiencies.
  - Scheduled maintenance on equipment to ensure running effectively

  - Ensure switch it off policy is being followed…signage is always a nice cheap way to encourage turning off.
  - Water leak map produced and handed to maintenance team.
  - Check boiler pressure- ensure using correct pressure-efficient use.

- **Lighting audit**-LED-perform lighting audit- suggest upgrades to LED to increase energy performance.
- **Water Audit –** Develop consumption and water waste records to identify volumetric quantities – Consumed/wastewater and effluent. I will need these for evidence of scope emissions.
- **Waste-general-** Develop Waste records to identify quantity of waste taken and generated – I will need these for evidence of scope emissions.
- **Waste- recycled-** Improvement in recycling of products and use of. Investigate waste treatment and evaluate waste management procedures.
- **Air conditioner** audit of all systems, collate data-analysis
- Audit of **thermal control** mechanisms, introduction timer switches.
- **Maintenance**- Regular calibration of equipment- ensure efficiency.
- **Behavioural** changes.
- **Data capture** of individual processes -interval data provides more detail on how energy is being used, and where it is being wasted.
- Create **energy profile**s for all processes, link patterns of energy usage against operations.
- **Change gas supplier –** to 100% renewables
- Investigate **energy wastage**.
- **Reduce** out of hours consumption.
- Introduce **greener logistics** in the distribution chain-biofuels
- **Consider how all processes impact energy consumption.**
- **Benchmark Knights Enham School** energy performance.

Overview:

- Complete audit of all systems.
- Recalculate Scope 1 and 2 emissions for baseline and current year.
- Improve scope emissions (implement energy reduction and efficiency schemes).
- Verification of Scope 1 and Scope 2.
- Begin addressing Scope 3 categories and planning data capture.
- Map emissions as part of a plan and scale-identify how much control we have over them, where modifications to upstream and downstream operations can be implemented.
- Carbon offsetting of scope 3 emissions.
- Scope 3 verification.
- Monitor and review yearly.
- Scope certification.

Reducing Scope emissions

Knights Enham School will be required to reduce energy usage due to concerns over increased costs owing to energy price rises across the UK's ambitions to decarbonisation by 2050.

Estimated costs:

- As of January 2025, the cost of electricity per kWh in Hampshire, UK, is approximately 24.86 pence per kWh, based on the current energy price cap, which includes a standing charge of 60.97 pence per day.

- As of January 2025, the average cost of gas per kWh in Hampshire, following the Ofgem Energy Price Cap, is around 6.34 pence per kWh.

These prices were effective from January 2025 with further increases expected in March 2025.

Energy Reduction Goal:

- Electrical energy benchmark of XXXX kWh per month.

- Goal is to keep monthly electrical energy consumption below XXXX kWh by March 2025.

This goal is to be reached through the application of:

Small projects:

Small projects that can be completed in a short time frame, day-to-day with a small budget or even cost free. For example, updating to an energy efficiency program, enhanced maintenance scheduling and installation of remote thermostat control.

Energy auditing:

Collecting department specific data across the school This can be achieved by the use of PICO loggers or enhanced breakdown of energy bills. Through negotiation with energy companies, it is possible to record energy readings every 15 seconds. These can potentially identify energy black spots and account for lost energy and used to create an energy site map.

Data tracking:

Tracking energy consumption through meter readings and utility invoices to measure the effect of efficiency projects.

Energy reduction:

Energy saving opportunities identified and acted upon. Energy data auditing and the trial of new efficiency procedures will help identify energy black spots and inefficiencies across the school.

Knights Enham School Progress towards meeting Scope 3

Knights Enham School understand the risk to the environment and human health of burning fossil fuels and believe in the promotion of a sustainable economy. **Knights Enham School** solar photovoltaic (PV) project, installed 2023 is currently operating with the potential to cut **Knights Enham School** electricity usage , reduce peak network charges and supplement revenue (category 3).

Decarbonisation through renewable solar energy generation reduces consumption from the National Grid during peak times, saving money and providing a backup energy source if the National Grid has service issues. Other benefits include improved allocation of on-site demand with renewable PV generation.

Knights Enham School are currently under contract for our commercial gas and electric supply, once this is up **Knights Enham School** will change suppliers to renewable sources. We have identified a local biogas supplier that will be able to meet our gas demands once we are free from contract. Our current electricity supplier, (XXXX- SMARTEST ENERGY GOOD CHOICE) supply our electricity at the cheapest half hour tariff with a guarantee that up to 96% of their electricity has been generated through renewable sources (category 1).

Knights Enham School promote the use of sustainable travel and actively encourage staff to car share and use green transport methods to and from the premises. This year we are going to introduce a cycle to work scheme – THROUGH HCC OR KES? (Category 7).

The Cycle to Work scheme is a UK Government tax exemption initiative introduced in the Finance Act 1999 to promote healthier journeys to work and to reduce environmental pollution. It allows employers to loan cycles and cyclists' safety equipment to employees as a tax-free benefit. The exemption was one of a series of measures introduced under the Government's Green Transport Plan.

Knights Enham School operate a reuse and recycle policy. We recycle all plastic, cardboard, paper and aluminium (category 5). To further reduced waste generated on site, waste from packed lunches is now to be taken home and efforts are being made to monitor and classify waste in order to identify waste reduction initiatives. Batteries and ink cartridges/toners are also collected. (Category 5).

Knights Enham School operates with water retailer, XXXX- Business Stream, which has reduced its carbon emissions by 25.3% in one year and has announced ambitious plans to lower its footprint further in the year ahead. To accelerate its plans to achieve net zero, the retailer has launched a second pledge to reduce its carbon emissions by a further 20% by April 2025.