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# CARBON-ZERO



## CARBON MANAGEMENT PLAN

Prepared for: Space Solutions

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## 1. Executive Summary

This Carbon Management Plan sets out ambitions for Space Solutions (Scotland) Ltd, (Space Solutions) and acts a roadmap for progress. Reducing carbon emissions is not just about commitment to the environment. The same processes used to identify carbon emissions reduction will also identify and realise financial savings through improved efficiency in the procurement and operation of buildings, transport, manufacturing, and supply processes. The actions outlined within this Carbon Management Plan form part of an efficiency plan to reduce consumption and provide value for money.

Reductions could be achieved through a range of projects including, switching to hybrid or electric vehicles, implementing travel policies, upgrading heating infrastructure and changing electricity providers to one supplying renewably sourced electricity. This Carbon Management Plan is viewed as a 'live' document and should be updated annually with project updates and progress tracking.

The 2021 Space Solutions baseline carbon footprint was calculated to be **139 tonnes** of carbon dioxide equivalent (tCO<sub>2</sub>e). This was split across their regional offices, Transform division, supply chain, material use and staff travel.

**By 2026, Space Solutions can reduce their carbon emissions by 10% on a baseline of 2021.  
This equates to a reduction in emissions of 14 tCO<sub>2</sub>e.**

## 2. Introduction

Space Solutions headquarters is based in Aberdeen and has regional offices in Dundee, Glasgow, Edinburgh, and Livingston. In addition to the regional offices, it also has a Transform Division that undertakes office refurbishments and upgrades.

Space Solutions 2021 Carbon Footprint Baseline Assessment outlines the division of emissions between Space Solutions and their clients, the end user. It stated the emissions from all materials used as part of the final built would belong to the end user and the emissions from any materials used not part of the final build and any waste generated would be assigned to Space Solutions.

Space Solutions waste has been split into office 'commercial' waste and waste generated from the provision of their fitting services. This waste has been categorised based on materiel type such as Demolition, Plasterboard, Metals etc.

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## 3. Context and Drivers for Carbon Management

Organisations and businesses face a complex set of drivers for managing carbon emissions. These drivers should not be considered in isolation and should be considered in reference to the overall goal of minimising environmental impact while contributing to society and the economy.

The following represent the key carbon drivers for this carbon management plan:

- Scottish Government targets
- UK & European targets
- Rising energy costs
- Recognition of contributing to the broader consequences of Climate Change
- Social responsibility

## 4. Emissions Baseline and Projections

### 4.1 Scope and Boundaries of the Carbon Footprint

In keeping with the Greenhouse Gas Protocol<sup>1</sup> (WRI 2004), the operational boundary should include all Scope 1 and Scope 2 emissions (e.g., on-site fuel combustion, company owned vehicles and purchased electricity consumption). Space Solutions have opted to include their Scope 3 emissions which include the embodied carbon within spent raw materials, manufacturing processes, shipping, and logistics requirements, including travel, of the organisation.

For reporting and monitoring purposes Space Solutions carbon emissions have been grouped the following business categories.

Source	Example
Fuel Use	Natural gas
Vehicle Use	Vehicle mileage
Electricity	Electricity use and generation
Business Travel	Business travel and hotel stays
Freighting and Deliveries	Deliveries and freight services
Material Use	Use of Protects sheets/boards
Supply Chain	Delivery of incoming materials
Waste Disposal	Waste disposal and recycling
Water Supply	Mains water supply
Wastewater	Wastewater

Components that were excluded from the assessment scope:

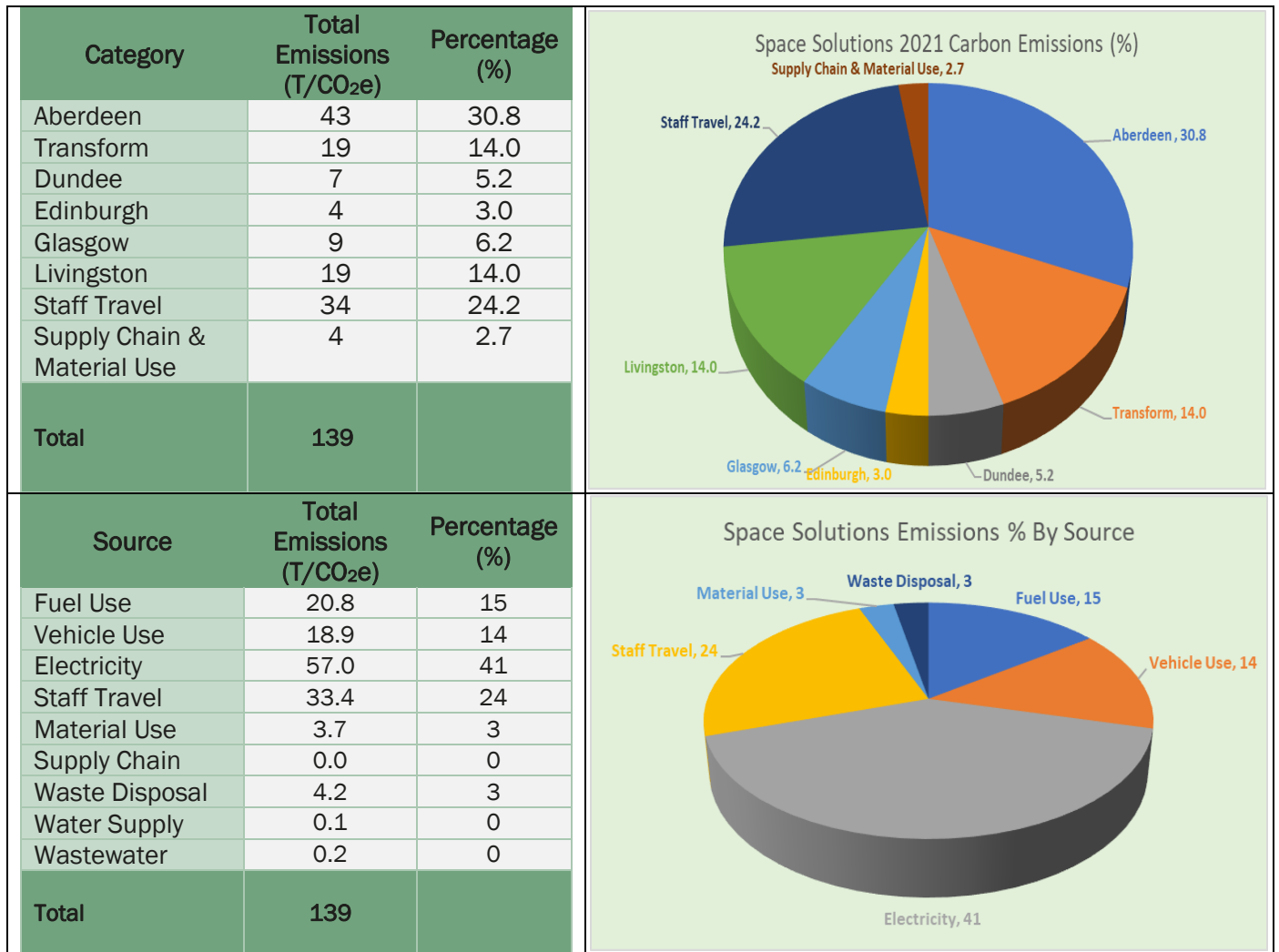
- Material used as part of the final build.
- Shipping material used as part of the final build.
- Office consumables that have a negligible carbon footprint such as pens and poly pockets.

Data was collated and converted to a tCO<sub>2</sub>e equivalent. The reporting year was the 2021 calendar year, therefore the 2021 factors were used for all baseline calculations

## 4.2 Carbon Footprint Baseline

Space Solutions carbon footprint for the baseline year of 2021 was 139 tCO<sub>2e</sub>.

The emissions breakdown by business category and their percentage emissions share is shown below in Table 3. Table 4 below highlights the emissions breakdown by source type.



Space Solutions key areas of emissions are electricity consumption (41%), staff travel (24%), fuel use (15%) and vehicle use (14%)

If staff travel by car (non-company owned) was combined with company vehicle usage the emissions would be 51.4 T/CO<sub>2e</sub>. This equates to 37% of Space Solutions total emissions.

### 4.3 Carbon Footprint Projections

The scenario forecast for Space Solutions shows emissions consistent with business growth (assumed to be 3%). Carbon Zero understands there are no immediate plans to drastically scale the business.

Within the next 5 years, the organisation could potentially see annual emissions reach 161 tCO<sub>2</sub>e. The figure below highlights the baseline emissions (year 0), projected emissions with company growth of 3%.

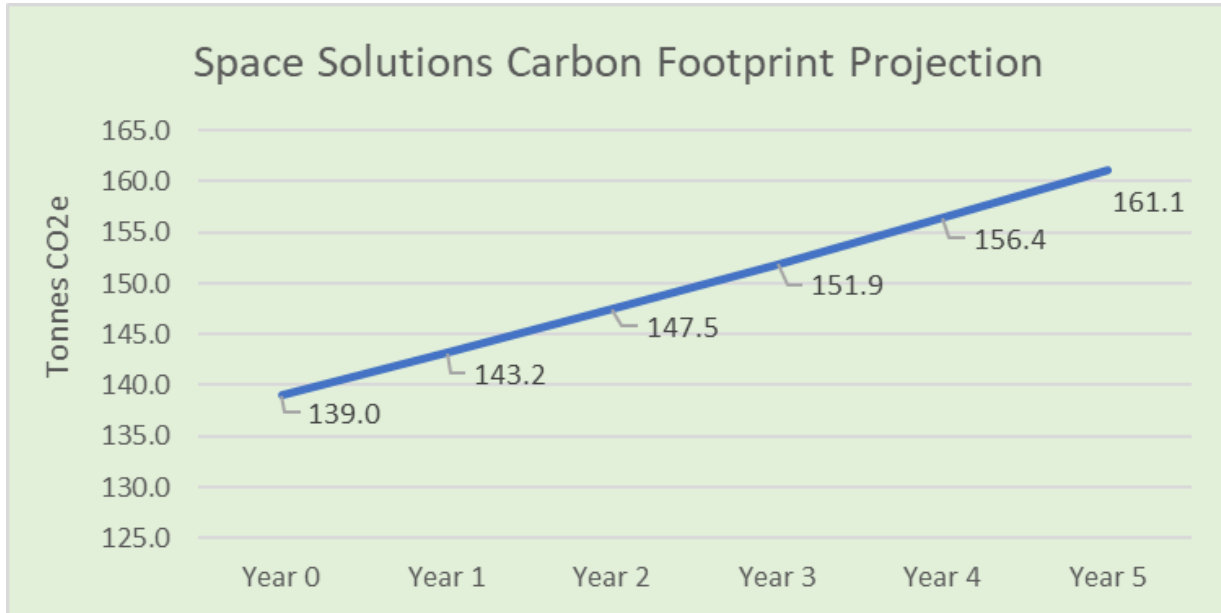


Figure 1 Carbon Footprint Projection

## 5. Carbon Reduction Opportunities

In order to continue achieving emissions reductions Space Solutions is committed to identifying opportunities for carbon reduction and implementing carbon saving projects. The following sets out some of the opportunities identified through the business carbon assessment as areas to consider for targeting carbon reduction.

#### Aberdeen Facility:

- Ground/ Air Source Heat Pumps
  - See Section 6.1
- Solar Panels
  - See Section 6.2.2

#### All Sites:

- Purchase of Renewable energy from a REGO approved supplier
- Electric (or Hybrid) vans/cars when due for replacement to reduce transport emissions
- Reducing travel emissions by opting for lower carbon transport methods for business travel
- Reuse protective sheets to reduce material use emissions

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## 6. Carbon Management Projects

The following sets out details of potential carbon saving projects where opportunities have been identified.

### 6.1 Adoption of a Renewable Energy Tariff

By switching to a REGO approved supplier and obtaining electricity from zero emissions provider, Space Solutions will be able to remove their entire annual kWh usage for electricity consumption from their carbon footprint. Based on this year's figures that would remove 57 tonnes/CO<sub>2</sub>e (41% of total emissions) when compared to a non-REGO certified provider. Switching tariffs may require landlord approval in rental premises therefore may not be possible at all of Space Solutions facilities. The table below highlights the potential saving at each facility if switching to a renewable tariff was possible.

Location	Units	Quantity	Carbon Emissions (tonnes CO <sub>2</sub> e)	Potential Savings (tonnes CO <sub>2</sub> e)
Aberdeen	kWh	112,309	23,847	23,847
Dundee	kWh	20,631	4,381	4,381
Edinburgh	kWh	19,083	4,052	4,052
Glasgow	kWh	36,803	7,814	7,814
Livingston	kWh	37,772	8,020	8,020
Transform	kWh	42,045	8,927	8,927
<b>Total</b>	kWh	<b>268,643</b>	<b>57,041</b>	<b>57,041</b>

### 6.2 Upgrades to Headquarters Facility

It is understood that while the Aberdeen facility is not owned by Space Solutions, they occupy the entire premises therefore making upgrades to the facility may possible. The following projects may also be possible at Space Solutions other premises however these have not been included in this Carbon Management Plan as changes to these facilities will likely be more difficult in shared occupancy agreements.

#### 6.2.1 Air or Ground Sourced Heat Pump

The use of an air or ground sourced heat pump for office heating would eliminate natural gas use and thus reduce carbon emissions. The Aberdeen office currently uses 62,066 kWh of natural gas per year for heating.

- Based on the 2021 Business Carbon Assessment the use of natural gas for heating is associated with in the order of 11.37 t CO<sub>2</sub>e.

Heat pumps absorb heat from the environments and transfer it to a fluid, which is compressed to increase its temperature. The heat is then transferred to a central heating system from the fluid, for both heating and hot water. Air source heat pumps (ASHPs) absorb heat from air and ground source heat pumps (GSHPs) absorb heat from the ground. At certain times of the year, an ASHP is more efficient than a GSHP but GSHPs are generally more efficient overall than ASHP as heat is transferred through the ground via water movement, with water holding more heat than air. ASHPs work harder in the colder parts of winter to maintain temperature. <sup>1</sup>

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<sup>1</sup> <https://energysavingtrust.org.uk/air-source-heat-pumps-vs-ground-source-heat-pumps/>

**Table 1 Carbon Footprint of Current System**

Category	Units	Quantity	Description	Carbon Emissions (tonnes CO2e)
Fuels – Natural Gas	kWh	62,066	Office heating	11.37

The office requires in the order of 62,066 kWh of gas annually for heating. An air source heat pump produces in the order of 3kWh heat per 1kWh electricity.<sup>2</sup> A ground source heat pump produces in the order of 4kWh heat per 1kWh electricity.<sup>3</sup>

**Table 2 Potential Carbon Footprint**

Description	Category	Units	Quantity	Carbon Emissions (tonnes CO2e)	Potential Savings	
					(tonnes CO2e)	(%)
Air Source Heat Pump	Electricity Use	kWh	20,689	4.4	7.0	61%
Ground Source Heat Pump	Electricity Use	kWh	15,517	3.3	8.1	71%

The above shows that using a heat pump would reduce the carbon emissions associated with the heating of the Aberdeen office by approximately 61-71%. If point 6.1 is actioned and renewable energy is purchased, this would remove all emissions associated with both electricity and heating if a heat pump was installed. This would reduce heating emissions by the full 11.3 TCO<sub>2e</sub> currently emitted.

ASHPs are in the order of £7,000 – £13,000 while GSHPs are in the order of £14,000-£19,000 due to the additional groundworks required.<sup>4</sup>

A heat pump would replace the current gas boiler, with gas currently priced around 3.55 pence per kWh<sup>5</sup> it is assumed the annual heating cost would be £2,203. The current average electricity cost per unit for Northern Scotland is 19.3 pence per kWh<sup>5</sup>. It is noted that gas and electricity prices are in period of fluctuation and may be subject to significant change. Due to the current high cost of electricity per unit it would not be possible for annual savings to achieve a financial payback for the pumps as both pump options would increase annual cost over the gas alternative.

**Table 3 Heat Pump Payback**

Description	Annual power use (kWh)	Cost per Year (£)	Investment required* (£)	Payback from savings** (Years)
Air sourced heat pump	20,689	£3,993	£13,000	n/a
Ground source heat pump	15,517	£2,995	£19,000	n/a

\* It is noted that the investment required may also require upgrades to internal heating components such as larger radiators or pipework, however this has not been quantified in this overview.

\*\* Excluding additional cost of system power usage.

<sup>2</sup> <https://www.imsheatpumps.co.uk/blog/air-source-heat-pump-running-costs/>

<sup>3</sup> <https://www.kensaheatpumps.com/what-is-the-efficiency-of-a-heat-pump/#:~:text=A%20ground%20source%20heat%20pump%20can%20deliver%203%20to%204,kWh%20of%20electricity%20it%20consumes>

<sup>4</sup> <https://energysavingtrust.org.uk/air-source-heat-pumps-vs-ground-source-heat-pumps/>

<sup>5</sup> <https://energysavingtrust.org.uk/air-source-heat-pumps-vs-ground-source-heat-pumps/>

<sup>5</sup> Approx. average price taken from May 2022 Average UK gas and electricity prices per kWh unit | usave.co.uk



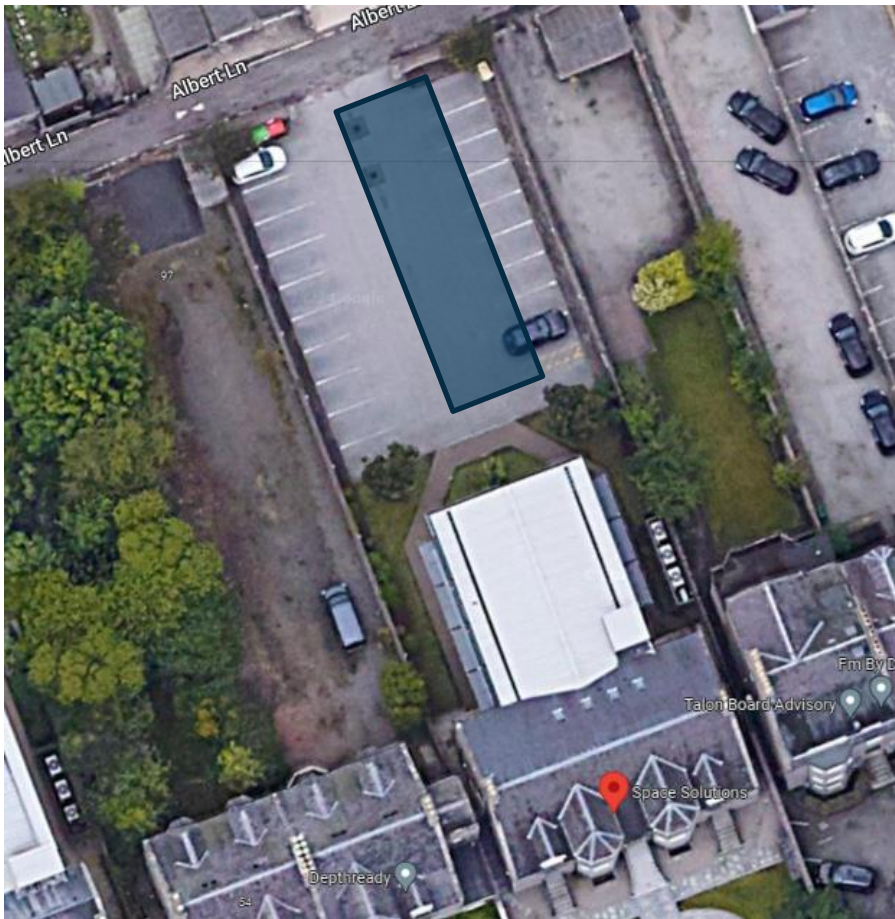
Given the high cost of installation and the general push from government policy to install heat pumps there may be funding opportunities to put towards a heat pump system. Home energy Scotland are currently offering interest-free loans funded by the Scottish Government to help make home energy saving improvements.

See Home Energy Scotland at <https://homeenergyscotland-advice.est.org.uk/fundingfinder/Schemes> for details of potential funding grants and loans.

### 6.2.2 Installation of Solar PV

Another option available to Space Solutions for decarbonisation at their Bishop House premises, is the installation of solar paneling.

If Space Solutions were to utilise the Northwest side carpark (section highlighted below) of their Bishop House office for solar photovoltaic (PV) installation, they could use the East side of the carpark to install rows of South /Southeast facing panels. Given 10 parking spaces, at an average width of 2.7m and length of 5.5m, they would have approximately 150m<sup>2</sup> (5.5m\*(2.7m\*10m)) worth of available space to install solar PV panels.



Accounting for 2m spacing between rows, and at an optimal installation angle of 35° and size of 1.6m<sup>2</sup>, there would space for 3 panels per row and 7-8 rows of PV panels, for a total of 21-24 panels across the allocated space.

PVGIS-5 estimates of solar electricity generation are summarised below as an annual expected production of around 5,500kWh:

**Provided inputs:**

Location [Lat/Lon]:	57.144,-2.124
Horizon:	Calculated
Database used:	PVGIS-SARAH2
PV technology:	Crystalline silicon
PV installed [kWp]:	7.2
System loss [%]:	14

**Simulation outputs:**

Slope angle [°]:	35
Azimuth angle [°]:	70
Yearly PV energy production [kWh]:	5509.2
Yearly in-plane irradiation [kWh/m <sup>2</sup> ]:	943.49
Year-to-year variability [kWh]:	192.79
Changes in output due to:	
Angle of incidence [%]:	-3.76
Spectral effects [%]:	1.61
Temperature and low irradiance [%]:	-3.57
Total loss [%]:	-18.9

Unused electricity from the solar PV system can be exported to the grid. The **Smart Export Guarantee (SEG)** makes sure that small-scale low-carbon generators receive payment for any electricity they export to the grid. It requires licensed electricity suppliers to offer export tariffs to anaerobic digestion (AD), hydro, onshore wind, and solar photovoltaic (PV) generators. The PV installation and installer must be suitably certified to qualify, with an export meter installed. The level of payment and length of contract varies depending on the purchaser of the electricity. Different suppliers contracts may have different specifications and requirements.

The generation capacity of the system with only the Northwestern carpark array fitted (5,500 kWh generated annually) would likely generate somewhere around £303/year income from the SEG (based on an average rate of 5.5p/kWh). The SEG may vary with supplier and market forces.

**Table 4 Solar PV Payback**

Description	Annual income generated (£)	Investment required (£)	Payback (Years)
Northwest Carpark	£303	£8,600	28 years

Further information on the Smart Export Guarantee can be found here:

<https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg>

## 6.3 Implementation of Lower Carbon Transport Methods

### 6.3.1 Switch to Electric Vehicles

In total 37% of Space Solutions emissions are generated from company and personal vehicle use. Grey fleet use accounts for the majority of these emissions with 32 tCO<sub>2</sub>e, compared to 19 tCO<sub>2</sub>e from company vehicles. Making vehicle changes to the grey fleet can be difficult as it requires employees to make financial commitment therefore this plan focuses on changing company vehicles to EV only.

The average fuel use per company van in 2021 was 1,481 litres. The consumption of this fuel would emit 3,721 kg/CO<sub>2</sub>e. If the van were switched to class III electric alternative the average emissions per van per year

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would be 1,476 kg/CO<sub>2e</sub>, a saving of 2,245 kg/CO<sub>2e</sub>. However, only 5% of van use emissions have been assigned to Space Solutions therefore their saving would be 112 kg/CO<sub>2e</sub> per van switched per year.

The average fuel use per pool car in 2021 was 783 litres. The consumption of this fuel would emit 1,967 kg/CO<sub>2e</sub>. If these cars were switched to average size electric alternatives the average emissions per car per year would be 558 kg/CO<sub>2e</sub>, a saving of 1,409 kg/CO<sub>2e</sub>. All emissions from pool car use have been assigned to Space Solutions therefore their saving would be the full 1,409 kg/CO<sub>2e</sub> per car switched per year.

### 6.3.2 Adopting Lower Carbon Transport Methods

Space Solutions had over 1,700 expense claims for private vehicle use in 2021. While it may not be possible to change grey fleet vehicles to electric alternatives, Space Solutions could look to limit the use of private vehicles, instead opting for lower carbon public transport options. Glasgow to Edinburgh was Space Solutions' most frequently travelled route in 2021, and to complete this route by private car would emit 29 kg/CO<sub>2e</sub> compared to 6 Kg/CO<sub>2e</sub> by rail, a reduction of 79%. Implementing travel policies encouraging the use of public transport would lower emissions in future years. It should be noted that changing the transport method to public transport for all journeys may not be possible if access to remote sites is required.

Space Solutions only had two flights recorded in 2021, both from Aberdeen to Bristol, which emitted 638 kg/CO<sub>2e</sub>. Had these journeys been taken by rail the emission would have been 92 kg/CO<sub>2e</sub>, a reduction of 86%. Space Solutions could consider creating a 'No Fly Zone' policy prohibiting the use of air travel for travelling within the UK in attempt to reduce future travel emissions.

## 7. Target Setting

The projects presented within this Carbon Management Plan offer variety of options that will decrease Space Solutions emissions from their 2021 baseline levels.

**Based on the 2021 baseline emissions figures of 139 T/CO<sub>2e</sub>, a reduction target of 10% (14 tCO<sub>2e</sub>) by 2026 has been set.**

The following activities have been selected for implementation during the 2021-2026 period to enable Space solutions to meet this target.

1. Switch Aberdeen's electricity to a REGO approved supplier, providing renewable sourced electricity.
2. Replace at least 3 vans and 1 pool car with electric alternatives

If successfully implemented during the timespan these two activities will generate an emissions reduction of 25.6 tCO<sub>2e</sub>, which equates to a reduction of 18% on the 2021 baseline, exceeding the 10% target.

There is the potential for the organisation to further exceed this target depending on level of implementation of projects outlined in Section 6. There are no known proposed major changes to business operations that will impact Space Solutions ability to achieve this carbon reduction target.

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## 8. Management and Delivery

In order to ensure that there is effective and ongoing ownership of the Carbon Management Plan, it is important to have a fully defined governance structure with buy in at all corporate levels.

The Carbon Management Plan and carbon saving target should be approved by Space Solutions senior management, providing endorsement and a clear commitment at the highest level, reinforcing the need for action across the business.

The specific objectives of the Carbon Management Plan will be included in the organisation's strategic plan and other high-level plans. Key stakeholders at all levels of the business will provide overall support for promoting a culture of carbon reduction. The key to success of this Carbon Management Plan is effective engagement within the different areas of the business.

## 9. Progress Reporting

This Carbon Management Plan is considered as a 'live' document – envisaged to change with the needs and scope of business operations. To ensure the Plan remains fit for purpose the document should be reviewed annually.

The following areas of the Carbon Management Plan will be subject to annual review:

- Progress towards the overall carbon reduction target (in terms of tCO<sub>2e</sub>)
- Progress of identified carbon reduction projects, including;
  - Any financial savings achieved
  - Costs of implementing projects
  - Wide benefits of projects

The annual progress review shall be incorporated within annual Business Carbon Assessment reporting.

## 10. Contact Details

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