



SCOTTISH
FIRE AND RESCUE SERVICE

Working together for a safer Scotland

Scottish Fire and Rescue Service

Carbon Management Plan (CMP) 2020 – 2025

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Foreword from the Director of Finance and Contractual Services

Within its Strategic Plan 2019-2022, the Scottish Fire and Rescue Service set four key outcomes that the organisation aims to achieve over the three-year period, which collectively support our Purpose of working in partnership on prevention, protection and response, to improve the safety and well-being of people throughout Scotland.

Within these outcomes is the aspiration to deliver a sustainable fire and rescue service, including delivering environmental benefits for the communities of Scotland. We have set out in broad terms how we plan to achieve this over the long term in our Climate Change Response Plan 2045, namely by supporting our communities to tackle climate change and by tackling our own carbon emissions.

This Carbon Management Plan sets out in detail how we will approach carbon reduction over the next five years, as we work towards the Scottish Government's ambitious target of net zero by 2045.

The Plan is supported by our Board and Strategic Leadership Team, and we recognise that for it to be successful we will require the support and involvement of all staff, to adopt more sustainable working practises, resource efficiencies and behaviours.

Sarah O'Donnell
Director of Finance and Contractual Services

1 Executive Summary

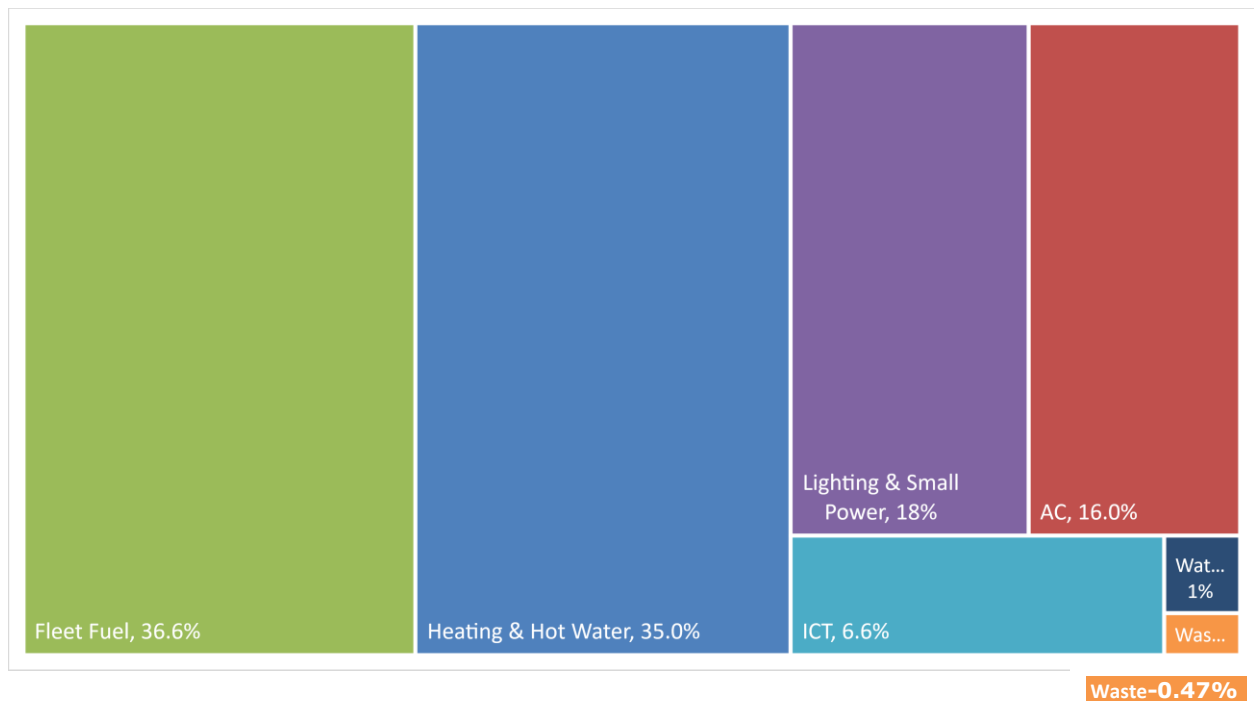
The Scottish Government has set a legally binding target of net-zero greenhouse gas emissions by 2045, with interim targets to reduce by 75% from 1990 levels by 2030 and 90% by 2040.

Through its Asset Management Strategy 2019-2029, the Scottish Fire and Rescue Service has adopted seven asset management principles, including addressing our environmental responsibilities and reducing harmful impacts. In December 2019, the Service adopted its Climate Change Response Plan 2045, committing to the Scottish Government’s target, and to setting 5-yearly Carbon Management Plans to co-ordinate and monitor carbon reduction activity.

In 2015/16 SFRS measured and set a **carbon emission baseline of 23,326 tCO2e per annum**. Since then, the Service has reduced its annual emissions by **22.35% (5,215 tCO2e)**.

The SFRS Energy and Carbon Strategy 2020 – 2030 has identified the drivers of energy and associated carbon use within SFRS at present, as shown in the diagram below, and sets out a roadmap for our carbon management programme to follow, adopting the Scottish Government’s Energy Efficiency Route Map.

Fig 1: SFRS Carbon Map 2020



Building on the themes within our Energy and Carbon Strategy, and incorporating the carbon impact of waste, this Carbon Management Plan sets out our approach to carbon reduction over the next five years, with specific projects, aimed at **further savings totalling 30%, 7,000 tCO2e**.

The projects, which **will require total investment of £48.4 million over the next five years**, have been selected to target improvements across all of the key carbon drivers, for example introducing battery operated electric light fleet, developing improvements in heating controls, and developing a detailed map of our power use patterns and needs to manage



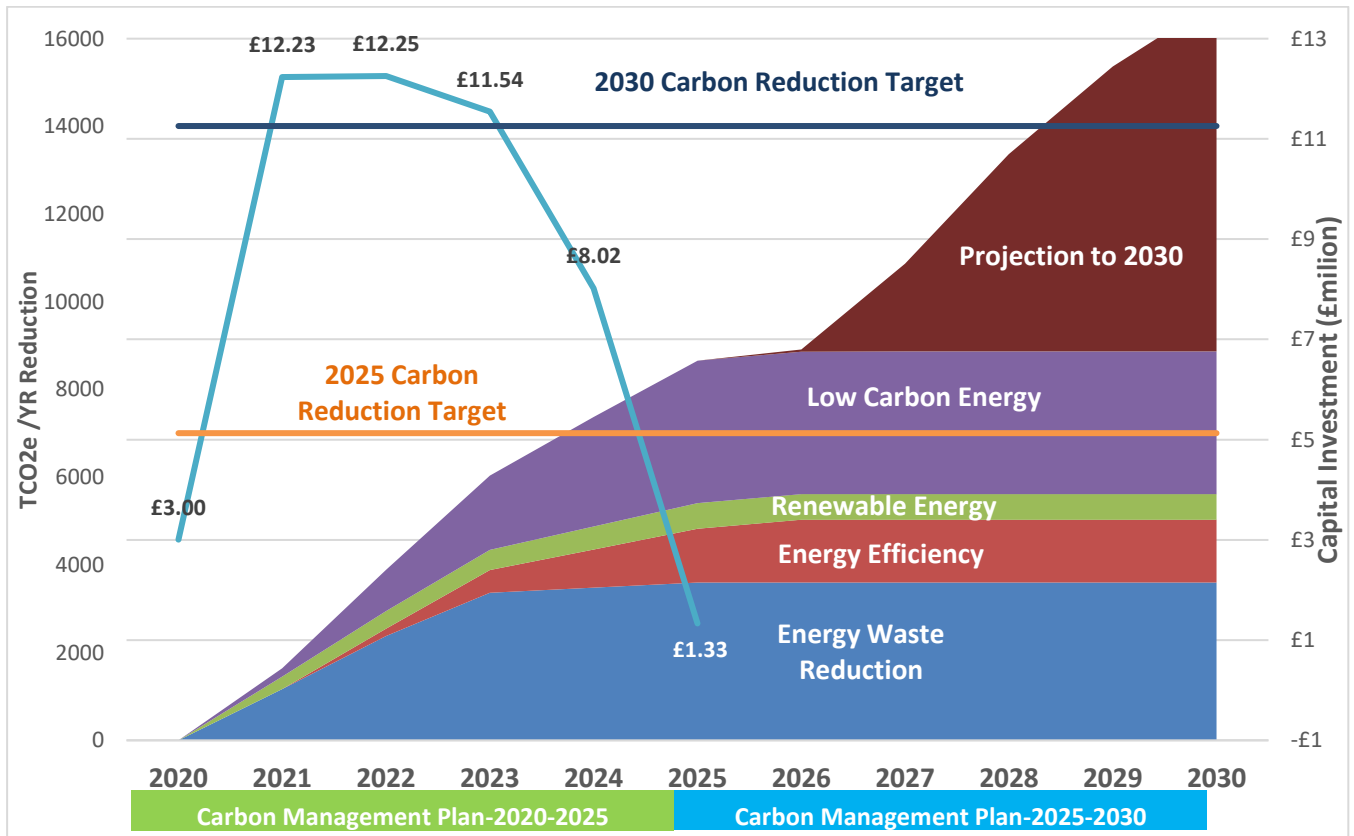
down electrical use. A key strand of our Plan is based on behaviour change, challenging each of us to do more to reduce energy consumption and waste.

To reach the Government’s interim target by 2030 will require a further reduction of 1400 tCO2e per annum in the following ten years, a total of 14,000 tCO2e from the current position.

Access to funding is key to the success of this Plan. As such, significant work is underway to engage with Scottish Government, Transport Scotland and other partner bodies to maximise access all relevant funding streams.

The diagram below summarises the anticipated impact of currently planned projects within the broad themes, both in terms of capital investment and annual carbon reduction relative to current emissions and the interim targets, over the current and next Carbon Management Plan periods.

Figure 2: SFRS Carbon Reduction Targets and Project Impact Projections



In addition to carbon savings, these interventions will realise financial savings through improved efficiency in the way our buildings and vehicles perform and how we use them. Based on identified carbon saving projects, the projected cumulative **financial savings** to the organisation are in the region of **£7.1million** over the period 2020 to 2025.

By 2025, it is anticipated that the Service will have achieved a 50% reduction in carbon emissions from the baseline position, leaving the balance of 50% to be delivered in the remaining 20 years to 2045.

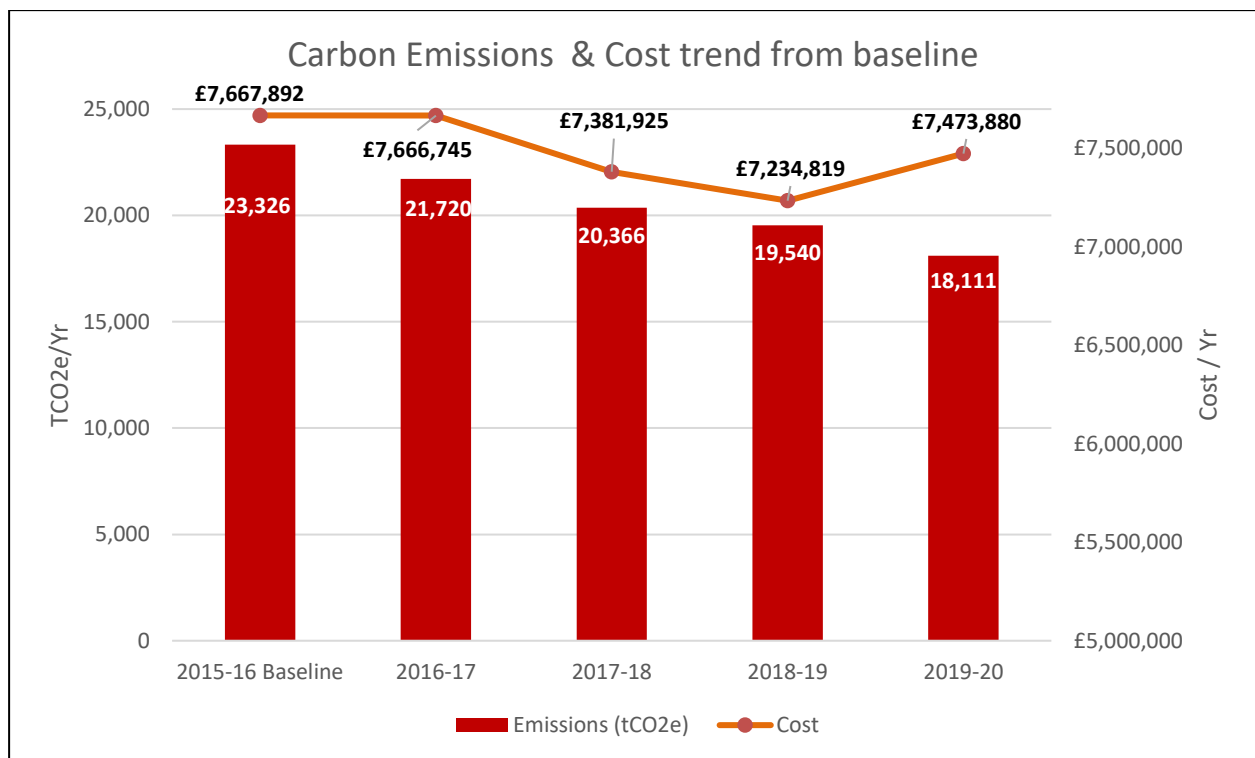
2 Performance to date on Carbon Management

SFRS began its national carbon management journey in 2015/16, having implemented energy saving measures as separate services for several years.

The Scottish Government has now set interim targets to reduce greenhouse gases by 75% from 1990 levels by 2030, and 90% by 2040; with the overall aim of achieving net zero by 2045. In order to achieve this target, **from 2020/21 onwards SFRS will require to deliver a 6% or 1400 tCO₂e reduction from the 2015/16 baseline each year until 2030.**

As of April 2019 (latest data), all 180 Public Bodies within Scotland had reduced their overall carbon emissions by 17.1% since 2015/16. As of April 2020, SFRS has reduced its carbon footprint by 22.35% from our 2015/16 baseline, as illustrated in Figure 3, which puts us ahead of this curve, but not yet achieving an annual 6% reduction.

Figure 3: SFRS carbon reduction and costs from baseline






As SFRS is still very early in its carbon reduction journey, there are opportunities to implement measures that will have significant impacts. Ongoing decarbonisation of the national grid and rapidly developing technologies and practises within energy and environmental management resulted in a steady carbon reduction from our baseline year however from 2019, as officer cars became SFRS assets with a shift away from private leasing, the scope changed to include these assets. This resulted in a carbon emission increase as illustrated above where previously 'hidden' emissions are now controlled by SFRS and within our reporting system.

3 Carbon Emissions

3.1 Background to the Organisation

Within an organisation, carbon is generated by both people, through their actions, and assets, through their design and use. In order to reduce emissions, it will be necessary to target both asset design and behaviour. The table below shows the size and scale of SFRS.

Table 1: SFRS Building / Fleet Composition

 PEOPLE	 Fleet	 Estate
2019/20 Staff Figures: Wholetime 3,628 RVDS 3,277 Support 817 Control 194 TOTAL 7,389 Note: Total figure is smaller than personnel type combined due to some roles being dual contracts	Heavy fleet 812	Whole time stations 74 Retained stations 247 Volunteer stations 31
	Light Fleet 755	Training hubs & Asset Resource centres 4
		Office and Control sites 7

3.2 Scope

To chart progress in relation to carbon reduction, it is necessary to be clear on its definition.

The Greenhouse Gas Protocol¹ is the standard adopted worldwide to measure and manage greenhouse gas (carbon) emissions and defines emission sources for an organisation within three broad categories as outlined below, Direct Emissions, Energy Indirect and Other Indirect emissions:

¹ For more information on identifying and calculating emission sources, see the Greenhouse Gas Protocol: <https://ghgprotocol.org/corporate-standard>



Scope 1 (Direct Emissions)	Scope 2 (Energy Indirect)	Scope 3 (Other Indirect)
Activities owned or controlled directly by an organisation that release emissions straight into the atmosphere. Examples include emissions from combustion in owned or controlled boilers or owned vehicle emissions.	Emissions being released into the atmosphere associated with an organisations's consumption of purchased electricity, heat, steam and cooling but which occur at sources outside ownership or control.	Emissions that are a consequence of the organisations activities but which occur at sources outside ownership or control and which are not classed as Scope 2 emissions. for example business travel by means not owned or controlled by your organisation.

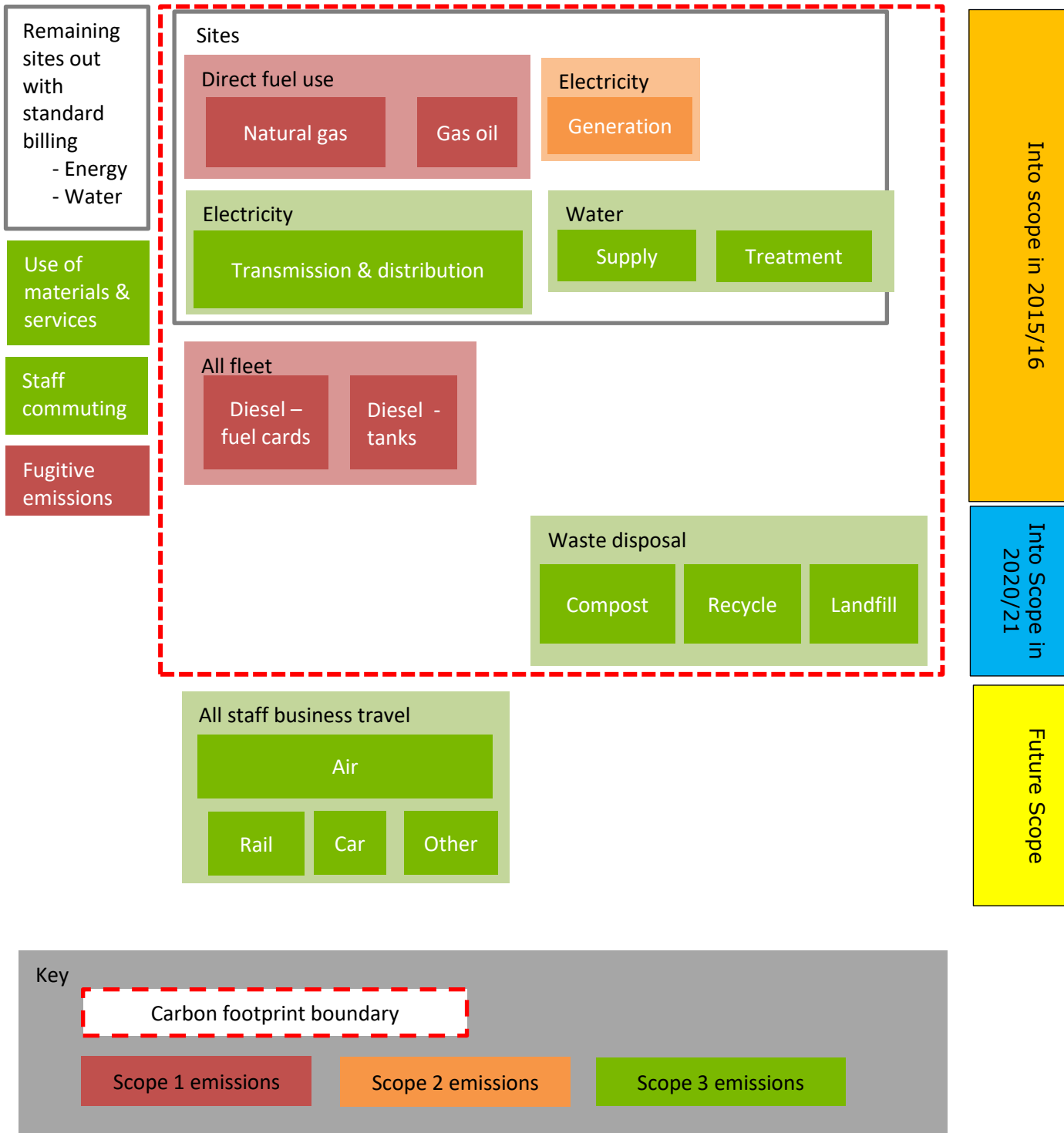
Scope 1 emissions are easier to record, being directly controlled by the organisation, however Scope 2 and 3 are also important in the pursuit of carbon neutrality. Over time it is expected that information will improve, enabling organisations to record and report more comprehensively on their carbon footprint.

The Carbon Footprint Boundary of an organisation is the area within which carbon emissions can be identified and tracked, incorporating Scope 1, 2 and 3 activities. Many organisations already record Scope 1 and 2 emissions plus selected Scope 3 emissions.

Within SFRS, Table 4 below illustrates the measurable carbon footprint boundary for 2020/21 and the various sources of Scope 1,2 and 3 emissions;



Table 2: SFRS Carbon Footprint Boundaries 2020/21



Those emission sources within the Carbon footprint boundary are recorded and reported in the emission figures. Those which lie out with the boundary are not yet captured in a reliable and comprehensive manner so are not reported.

With the implementation of the new single waste contract in March 2019, baselines for waste recycling and landfill have been measured over a twelve-month period and are now included within the scope of this CMP from April 2020 onwards. Staff Business travel will be included in scope at a future date with carbon emissions and associated costs obtained from our central booking agency Redfern.



Table 3 below shows the emission sources that remain out with the carbon footprint boundary and the steps that are being taken to understand and record their impact;

Table 3: Developing and excluded emission scopes

Excluded Emission Sources	Reasoning
Staff business mileage	2019/20 Data has been obtained, Business travel will be included in scope of CMP in 2021/22 once a plan of action can be developed and included into CMP projects register
Staff commuting (Home-to-office) mileage	No visibility at present – no plans to capture this at present; but it is anticipated that the organisation may indirectly impact this via increased staff awareness and the introduction of 'Transport Efficiency Guidance' procedures via the SFRS Environmental Management System.
Use of materials & services	The embedded carbon of products and services procured by SFRS is large and far reaching. This aspect is out with the organisational boundaries of SFRS and is a vast area. There may be future developments in SFRS procurement policy that specifies certain sustainably sourced materials and sources which may come into the scope of our CMP reporting in future.
Remaining sites out with standard billing - Energy - Water	A small number of small SFRS sites are not within the scope of our Energy monitoring and billing due to local supply agreements in place: IE, Locally owned and operated grids and energy supplies

3.3 Emissions Baseline

Having defined the scope, it is also necessary to establish a baseline position. Table 4 below summarises the 2015/16 baseline, against which our progress is measured, showing both carbon emissions and associated cost;

Table 4: SFRS Carbon Footprint Baseline and Costs

	Total (2015/16 Baseline)	Buildings	Transport	Water	Waste (2019/20)	Total Baseline (2019/20)
Baseline CO₂ emissions (tonnes)	23,326	17,779	5,390	157	91	23,417
Baseline Cost (£)	£7,667,892	£4,305,891	£2,567,573	£794,428	£301,117	N/A



3.3 Emission Reduction Trends So Far

By Source

Analysing emission trends by carbon source since the baseline was established (Fig 4 and Table 5 below), the greatest downward movement is attributed to electricity, showing a 53.3% decrease. This is primarily due to the ongoing decarbonisation of the national grid and development of more renewable energy sources. Gas use has steadily decreased by 9.8% from its baseline. However, a steady rise in emissions associated with our Fleet has occurred since 2017/18. The switch to provided cars is indicated to be the cause of the upward trend in fleet energy use. However, this trend looks to be improving with a marked reduction since April 2019.

Figure 4: SFRS carbon sources trends 2015/16 to 2019/20

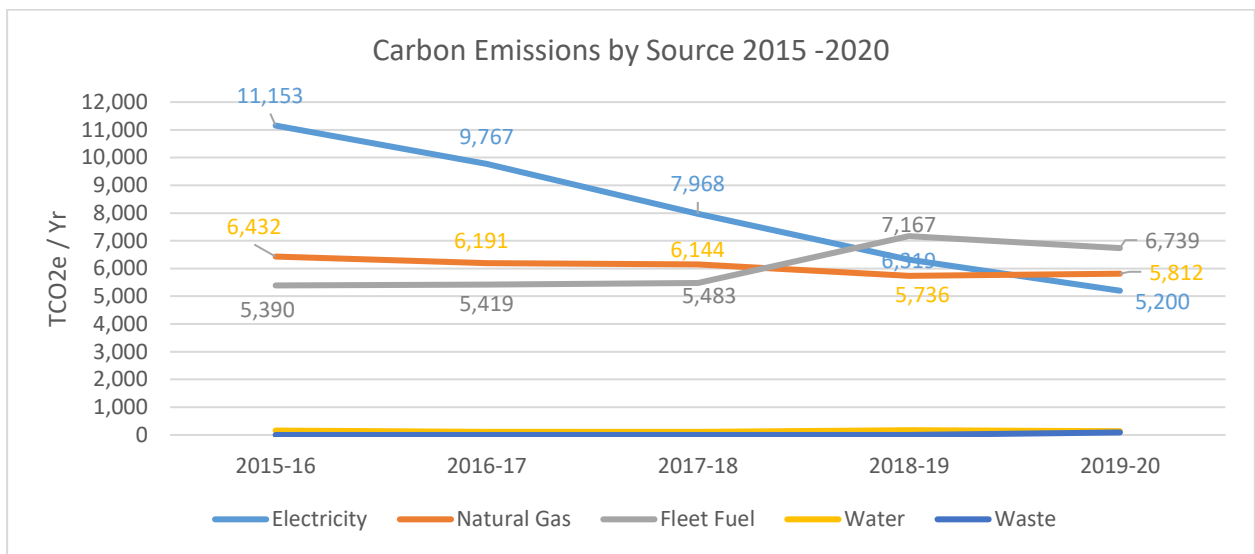


Table 5: Comparison between 2015/16 baseline and 2019/20 carbon emissions

Fuel	2015/16 carbon (tCO ₂ e)	2019/20 carbon (tCO ₂ e)	Increase/Decrease from baseline (%)
Electricity	11,153	5200	-53.3%
Gas	6,432	5812	-9.6%
Petrol/Diesel*	5,390	6739	+25%
Water	157	136	-13.3%
Heating oil and LPG	194	133	-31.4%
Waste (2020 baseline)	91	91	0%



TOTAL	23,326	18,111	-22.35%
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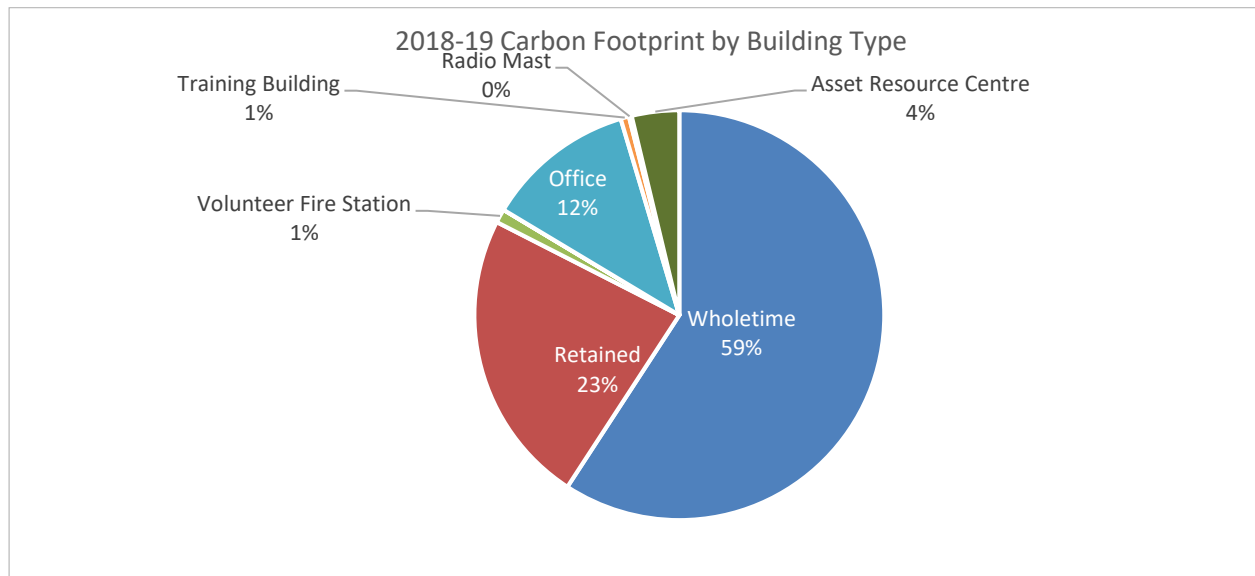
**Introduction of provided cars for flexi duty officers and the widely variable fuel use of on call appliance pumping has contributed to the increase in fleet carbon from its baseline*

Comparing the 2015/16 baseline to the 2019/20 carbon emissions we see that Fleet fuel constitutes the largest portion of our emissions and, changes in scope have resulted in an increase of 25% since 2016. Water use can vary up and down each year but has fallen 13.3% from its baseline.

Buildings, By Type

Figure 5 below analyses emissions associated with building operations. Carbon emissions associated with our whole-time fire stations at 59% are significantly higher than other building types, representing 53% of total building floor area and being in 24hr operation. Retained fire stations are the next biggest carbon emitter which will mainly be from electricity use of both building appliances and space heating.

Figure 5: SFRS carbon footprint by building type



Fleet, By Type

SFRS has an extensive fleet consisting of 1,567 vehicles. As displayed in Table 6, the majority of these are heavy vehicles, with the balance being cars and vans. Whilst the cars travel the most miles, the heavy vehicles are responsible for over four times the carbon emissions. The light support vehicle fleet is generally support vans and cars that are used for transferring stock and equipment between stations and stores. In 2019 we introduced 45 electric Renault Zoë's to our pool car fleet. These have offset 11 tonnes of carbon emission from our diesel cars so far, while not a large number due to reduced travel from Covid, this is expected to rise.



Table 6: SFRS Fleet vehicle types and carbon emissions

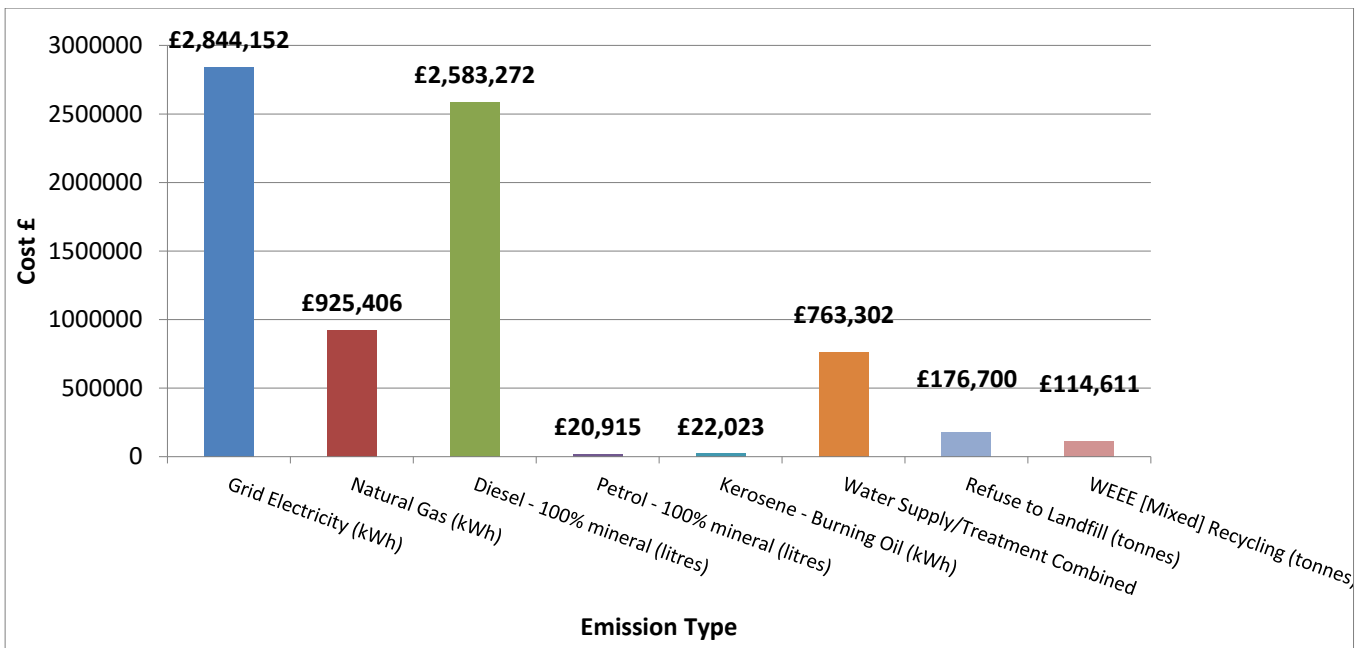
Fleet Group	Fleet Size	Annual Mileage (Miles)	Annual CO ₂ Emissions (Tonnes)	Avg CO ₂ /Unit (Tonnes)
EV's (Renault Zoe's)	45	44,778	4	0.1
Provided/Flexi Duty Cars	338	2,124,503	469	1.4
Pool Cars /vans	279	1,697,579	463	1.6
Light Support Vehicles	78	755,008	236	3.0
Heavy Vehicles*	755	3,112,673	5,571	7.3
Total	1,495	7,734,541	6,743	-

*Fuel use of Heavy appliances is a mix of on road driving and on call fire pump operation.

By Cost

SFRS currently spends £7.45m annually on fuel and utilities that result in carbon emissions, which is analysed by source in Fig 6 below. The largest costs associated with our footprint are from electricity and diesel. Water, while representing a relatively small carbon footprint, has a high associated cost of £0.76m

Figure 6: Carbon sources cost 2019/20



4 Carbon Management 2020-2025

4.1 Target

In seeking to reach the Scottish Government's aim of 75% reduction in carbon emissions by 2030, SFRS has targeted a reduction of 6% per annum over the next 5 years e.g. 30% in total, 7,000 tCO₂e.

4.2 Strategic Approach

SFRS recognises that successful attainment of its carbon reduction targets is contingent upon the following key elements being in place:

- Clearly identified responsibility and accountability for delivery against carbon reduction targets from the outset.
- Identification of a realistic suite of carbon reduction projects across a range of areas relevant to the carbon footprint; this list must be regularly reviewed and flexible to adapt to emerging needs and opportunities for funding.

Responsibility and Accountability

The Carbon Management Plan (CMP) has been developed through the Sustainability Team, in conjunction with the Environment and Carbon Management Board (ECMB), which is chaired by the Director of Finance and Contractual Services and comprises Heads of Function from across the organisation. The ECMB is responsible for ensuring the CMP is implemented and for regular reporting of progress.

The CMP is approved and monitored by the Strategic Leadership Team and the Board.

Reporting to the ECMB, the Carbon & Energy Officer will co-ordinate the delivery of the CMP, utilising appropriate project management tools to track progress against targets, both from specific carbon reduction projects and also from regular fixed and mobile asset investment. The delivery of carbon-saving initiatives will be managed centrally but delegated, as necessary, to the appropriate functional managers. Programmes specific to the CMP involving behavioural change and carbon awareness will be managed by the communications and sustainability teams.

Reporting

The organisation has a duty to report to the Scottish Government on all carbon producing activities and a process has now been developed for measuring and monitoring carbon emissions and a project and opportunities register to capture and record carbon savings.

Quarterly progress reports will be developed and reported through the ECMB, particularly focussing on project progress and risk.

In addition, an annual report will be presented to the SLT and Board, ahead of the formal submission of our Annual Climate Duties Reporting Requirement through SSN to Scottish Government detailing the following;

- Progress with identified carbon reduction projects,
- Progress towards overall carbon reduction target including CO₂e savings against target,
- Financial savings achieved as a result of carbon reduction projects,
- Current and future risks associated with the delivery of the CMP,



- Proposed changes to future projects to take account of technological developments and achieve targets.

4.3 Carbon Reduction Projects

The SFRS Carbon and Energy Strategy 2020-2030 has identified Six strategic project themes to improve our use of energy in support of carbon reduction, which are based on the Scottish Government’s Energy Hierarchy. The priority of specific energy & carbon reduction projects will be informed by the hierarchy and its key themes.

For example, before installing renewable generation on a site we will;

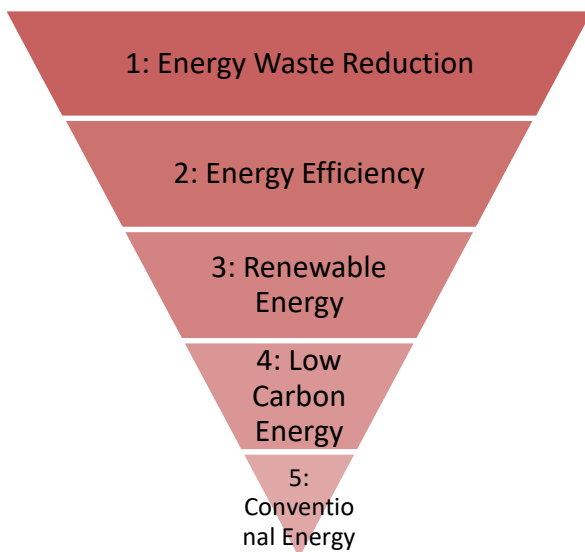
- Assess current energy use in the building
- Identify and mitigate against energy waste, (Energy Waste Reduction)
- Improve building fabric and insulation levels where feasible (Energy Efficiency)
- Then design new heating, power and lighting systems to meet the reduced load identified. (Low carbon energy)

This consistent approach will deliver benefits which would typically include;

- Reduced energy load and carbon emissions from our buildings and fleet,
- Reduction in infrastructure required to deliver the reduced energy load,
- Savings in energy consumption,
- Savings in capital investment in active energy systems,

Whole system approach maximising resource efficiency

These are as follows;



Light Fleet Low Carbon Transition

SFRS Fleet plan is to transition 50%(326 vehicles) of the light fleet to EV’s by 2025 and 100% by 2030. Table 7 below outlines the carbon impact projections of 50% of the light fleet transitioning to EV’s within this Carbon Management Plan period. Significant parallel investment is being undertaken to install a large EV charging infrastructure to support this transition. It is estimated that £12m of investment over the next four years into new EV charging will be required, representing about 400 individual charge points across all SFRS sites.



Technology to transition heavy fleet vehicles to zero carbon is still in its infancy and no market replacement for a diesel fire appliance is available yet. SFRS is working with key stakeholders including Scottish Enterprise and Transport Scotland scoping out and shaping the best future technologies, actively driving the transition to provide the best future solution for the Service. The projected market change has been predicted by key vehicle manufacturers as gaining traction from the early 2030's. Options for a zero carbon heavy fleet will feature in future carbon management plans, however for the purpose of this plan only light fleet transition is included. Heavy fleet does still hold great potential for significant carbon reduction. One key area of SFRS research is the ongoing detailed analysis of unwanted false alarms which currently account for one third of all calls, this area of research holds great potential in driving down unnecessary risk and associated carbon emissions

Table 7: Projected carbon reductions from Light fleet transition 2020-2025

Year	Number of Replaced Vehicles	Replaced Vehicles Emissions (TCO2e/Yr)	New EV's Emissions (TCO2e/Yr)	Carbon Reduction (TCO2e/Yr)
2021	100	154	47	106
2022	60	139	23	116
2023	60	313	103	209
2024	58	389	39	350
2025	48	157	79	79
Totals	326	1152	291	860

Note: As grid electricity continues to decarbonise and SFRS fleet utilise more onsite generation from renewable sources, EV's emissions will fall and carbon reduction potential will increase from current projection.

Summary of Projects

The following projects have been identified for implementation within the period 2020 to 2025. Associated energy, carbon and cost savings have been estimated for each measure, along with a capital cost and payback period. Detailed summaries and business cases of each proposed project are included in Appendix B.

Project costs are based on costed proposals where available, and where not possible, on estimates. The type of measures identified, and the carbon savings associated with each are outlined in Table 8 below. Current identified opportunities are projected to enable us to achieve 129% of our 2025 target.

Table 8: CMP Carbon Reduction Measures 2020-2025

	Project Name	Project Theme	Capital Investment	Start Date	% of 2025 Target	Carbon Savings TCO2e	Annual Cost Reduction/increase (£)
1	Monitoring & Targeting Software	Energy Waste Reduction	£121,250	2020	1.79	125	£48,575
2	Desktop Computers Power down	Energy Waste	TBC	2020	0.87	61	£30,206
3	Wholetime station Low Carbon Heating	Low Carbon Energy	£8,059,000	2022	32.67	2287	£200,000



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4	Cambuslang HQ Biomass	Renewable Energy	£15,000	2020	3.47	243	-£34,000
5	Light Fleet EC/ULEV Transition (Leased Vehicles)	Low Carbon Energy	£7,286,000	2020	12.29	860	£141,695
	EV Charging Network	Low Carbon Energy	£12,000,000	2020	N/A	N/A	£0
6	BMS & Energy Assets- Remote Access Project	Energy Waste Reduction	£808,470	2020	12.67	887	£246,823
7	Heating Controls- Wholetime & Corporate Sites	Energy Waste Reduction	£949,700	2020	24.20	1,694	£240,396
8	Staff Engagement	Energy Waste Reduction	£25,000	2020	3.26	228	£69,665
9	Loft Insulation- Retained Stations	Energy Efficiency	£1,003,800	2020	10.64	745	£366,432
10	Retained Stations Smart Heating Controls	Energy Waste Reduction	£1,173,600	2020	8.47	593	£291,633
11	Oil Heated Sites	Low Carbon Energy	£241,000	2022	0.57	40	£15,297
12	ARC Energy Hub's	Renewable Energy	£673,184	2020	1.29	90	£41,799
13	Solar PV and Batteries- Wholetime Stations	Renewable Energy	£1,816,389	2020	3.56	249	£123,188
14	Smart Lighting Controls	Energy Efficiency	£1,130,380	2022	4.96	347	£175,176
15	W/T Replacement Windows & doors	Energy Efficiency	£13,100,000	2021	8.40	588	£96,049
TOTAL			£48,402,773		129.10	9,037	£2,052,934



Table 9: CMP Carbon Projects-Capital Investment Profiles

Project Name	Financial Year						Total
	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	
Monitoring & Targeting Software	£24,250	£24,250	£24,250	£24,250	£24,250	£0	£121,250
Desktop Computers Power down	£0	£0	£0	£0	£0	£0	£0
Cambuslang HQ Biomass	£15,000	£0	£0	£0	£0	£0	£15,000
Light Fleet EC/ULEV Transition	£0	£1,375,000	£1,491,000	£1,608,000	£1,480,000	£1,332,000	£7,286,000
EV Charging Network	£1,800,000	£3,400,000	£3,400,000	£3,400,000	£0	£0	£12,000,000
BMS & Energy Assets-Remote Access Project	£269,490	£269,490	£269,490	£0	£0	£0	£808,470
Heating Controls-Wholesale & Corporate Sites	£316,566	£316,566	£316,566	£0	£0	£0	£949,698
Staff Engagement	£5,000	£5,000	£5,000	£5,000	£5,000	£0	£25,000
Loft Insulation-Retained Stations	£0	£250,950	£250,950	£250,950	£250,950	£0	£1,003,800
Retained Stations Smart Heating Controls	£234,720	£234,720	£234,720	£234,720	£234,720	£0	£1,173,600
Oil Heated Sites-Low Carbon Conversion	£0	£0	£241,000	£0	£0	£0	£241,000
ARC Energy Hub's	£336,592	£336,592	£0	£0	£0	£0	£673,184
Solar PV and Batteries-Wholesale Stations	£0	£454,097	£454,097	£454,097	£454,097	£0	£1,816,388
W/T Replacement Windows & doors	£0	£3,270,000	£3,270,000	£3,270,000	£3,270,000	£0	£13,080,000
Wholesale station Low		£2,014,750	£2,014,750	£2,014,750	£2,014,750	£0	£8,059,000



Carbon Heating							
Smart Lighting Controls	£0	£282,259	£282,259	£282,259	£282,259	£0	£1,129,036
Total Investment	£3,001,618	£12,233,674	£12,254,082	£11,544,026	£8,016,026	£1,332,000	£48,381,426

The graph below shows the forecast carbon reduction impact of our planned projects over the next five years relative to the target, compared to doing nothing, which is known as the Value at Stake. This chart will be updated each year to show actual carbon performance against predicted savings.

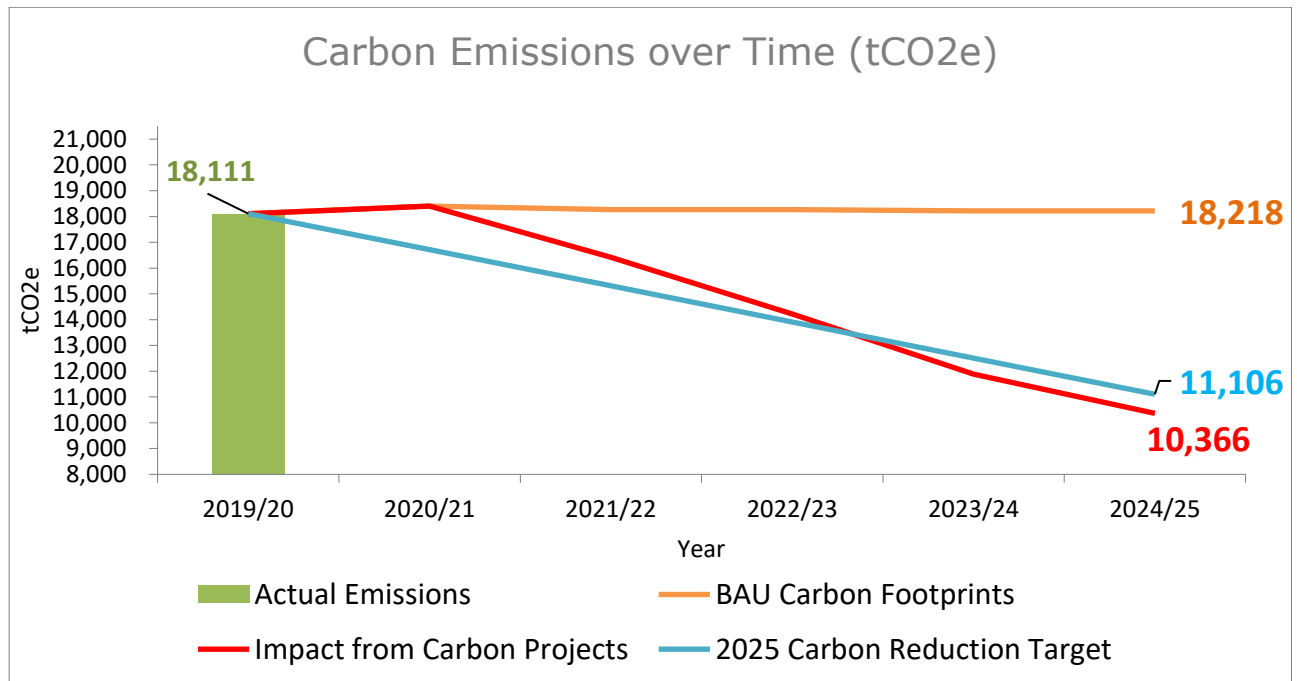
With predicted changes in the electricity Grid emission factor, even if the organisation does not take action to reduce carbon emissions, electricity will still gradually fall over time to a certain degree, however this is predicted to slow down from previous years reductions.

Changes in estate footprint such as the development of the new West Asset Resource Centre, Portlethan Training Centre and the closure of old assets will have an impact on the business as usual projections. All known estate changes over next five years have been factored into the business as usual projections and will be reviewed and updated each year.

In addition, if all carbon reduction projects are implemented as identified, it is projected that our carbon footprint will have reduced to 10,366 tCO₂e by 2025. **This figure may change over CMP period as new projects are identified and progressed.**

Figure 7: Value at Stake* – Projected carbon emissions against target

*Value at Stake (VAS) is a forecast of the potential impact from either undertaking planned action or doing nothing.



5 Carbon Management Plan Financing

While to reduce the carbon footprint of SFRS will require investment, it is expected that such investment will deliver financial benefits as well as environmental improvements. Without such planned reductions in energy usage, it is anticipated the Service would suffer substantial utility cost inflation as tariffs rise sharply.

5.1 Project Cost

It remains critical that SFRS evidences its own sustained carbon reduction journey through funded projects to ensure strong, effective and sustained public investment. Scottish Government have been very clear in their intention to use all available forms of investment to drive Scotland's Low Carbon Future. This includes reviewing and assessing all funded projects to ensure that they don't lock in long term carbon emissions and that they deliver multiple 'place based' benefits as set out within the findings of the recent Infrastructure Commission.

The current estimated capital cost of financing the Carbon Management Plan 2020-2025 is £48,402,773, with an overall estimated reduction in carbon emissions of 9,037 tCO₂e.

It should be noted that investment is not generally expected to deliver savings until the following financial year. Similarly, none of the associated savings from projects scheduled for implementation in the final year of this CMP (2025) will be realised within the scope of this current CMP.

Not all carbon reduction measures require large capital investment. Behaviour change initiatives such as the National Green Action competition between all UK fire services will have an impact. Long term continuous awareness raising through mediums such as LCMS, SFRS iHub and the planned development of a SFRS Green Ladder network should instil more sustainable working practises among SFRS staff.

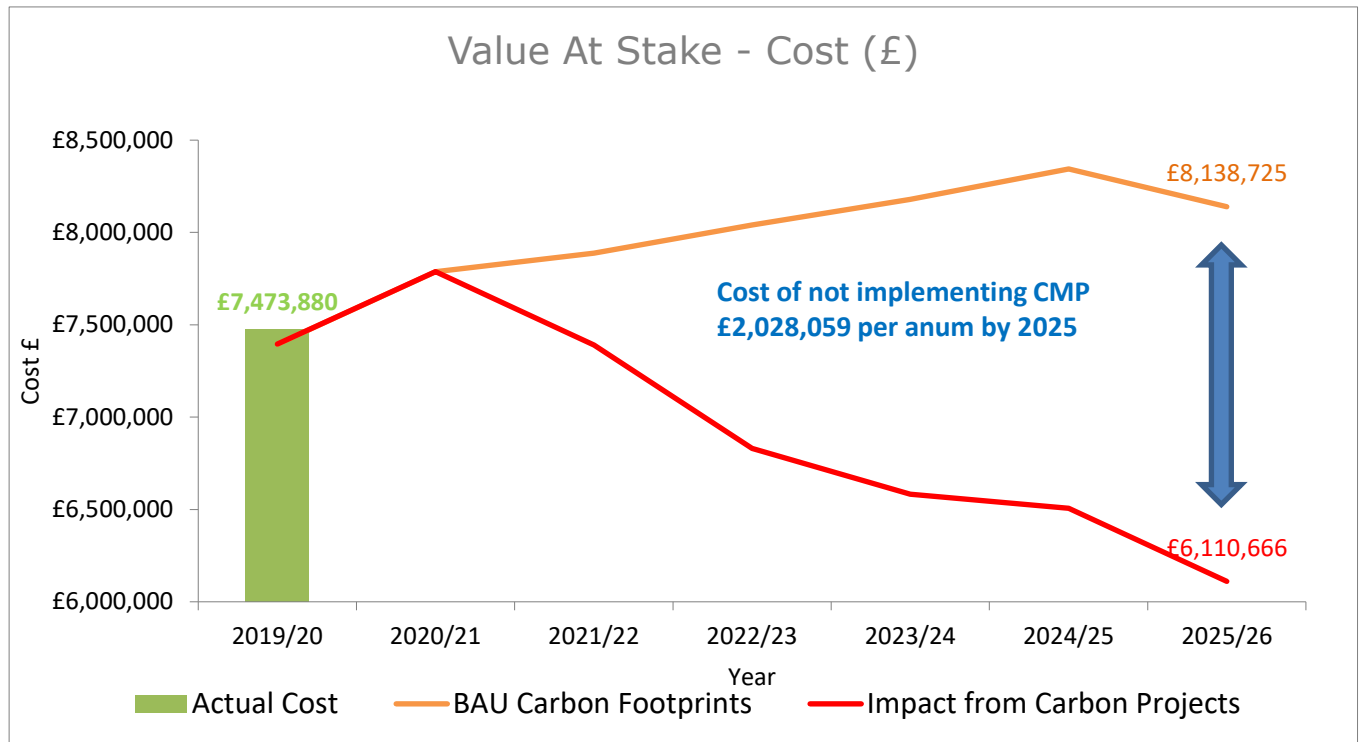
5.2 Benefits and Savings

The financial Value at Stake analysis, Fig 8 below, shows the differential between total anticipated utility expenditure if we do nothing, relative to implementing the planned carbon reduction projects.

The Business as usual scenario assumes a year on year cost increase of 4% for Utilities (Electricity & Gas) and follows various government pricing predictions for, waste, fuel and water. If no action is taken, costs are predicted to rise from £7,473,880 in 2020 to £8,138,725 by 2025. Alternatively, if all currently identified measures are successfully implemented the total current predicted reduction in consumption will save SFRS £2,028,059 /annum and cumulative savings of £7,097,046 by 2025.



Figure 8: Value at Stake – Cost (£)



5.3 Funding of Projects

Delivery of CMP projects will depend on a sustainable blend of SFRS and external grant funding. The CMP is modelled on internal financial support at £1M per annum, regular ongoing property investment and external grant opportunities as they arise. This baseline will be augmented as and when the opportunity arises from a number of Scottish Government funding opportunities.

SFRS has already secured significant grant funding from Transport Scotland for the roll out of EV charging infrastructure and for the provision of EV's. SFRS is optimistic that this funding support will remain in place for a number of years to allow the complete installation of a national EV fleet and associated charging infrastructure.

SFRS has also responded to the Government's call for grant funding to decarbonise our heating systems and make our buildings more energy efficient. We have submitted bids for various projects outlined in table 10. These are projects 3, 7, 9, 10,11,12,13,14 &15. Internal energy projects budget will be allocated to these projects also as and when available

Work is also ongoing to collaborate with partner organisations with the aim of ensuring maximum benefit from these investments.



Table 10: Project Funding Sources

No.	Project Name	Cost	Funding Source	Funding Status
1	Monitoring & Targeting Software	£121,250	Resource	Energy & Carbon Budget
2	Desktop Computers Power down	TBC	Resource	TBC-Grant Pending
3	Wholetime station Low Carbon Heating	£8,059,000	Capital	TBC-Grant Pending
4	Cambuslang HQ Biomass	£15,000	Resource	TBC
5	Light Fleet EC/ULEV Transition (Leased Vehicles)	£7,286,000	Capital	SG Grant
5.1	EV Charging Network	£12,000,000	Capital	SG Grant
6	BMS & Energy Assets-Remote Access Project	£808,470	Resource	TBC
7	Heating Controls-Wholetime & Corporate Sites	£949,700	Capital	Grant Application Pending/ Energy Project Bid
8	Staff Engagement	£25,000	Resource	TBC
9	Loft Insulation-Retained Stations	£1,003,800	Capital	Grant Application Pending/ Energy Project Bid
10	Retained Stations Smart Heating Controls	£1,173,600	Capital	Grant Application Pending/ Energy Project Bid
11	Oil Heated Sites	£241,000	Capital	Grant Application Pending/ Energy Project Bid
12	ARC Energy Hub's	£673,184	Capital	Grant Application Pending/ Energy Project Bid
13	Solar PV and Batteries-Wholetime Stations	£1,816,389	Capital	Grant Application Pending/ Energy Project Bid
14	Smart Lighting Controls	£1,130,380	Capital	Grant Application Pending/ Energy Project Bid
15	W/T Replacement Windows & doors	£13,100,000	Capital	Grant Application Pending/ Energy Project Bid



5.4 Summary

The table below summarises the estimated costs and savings associated with the Carbon Management Plan. The financial assumptions are detailed in Appendix C.

Table 11: Quantified financial benefits of CMP implementation

CMP Period	Projects Costs	Resource Budget Savings	Cumulative Project Costs	Cumulative Cost Savings	Funding Source
2020/21	£3,001,618	£0	£3,001,618	£0	Capital Budget
2021/22	£12,233,674	£484,778	£15,235,292	£484,778	Capital Budget/Grants
2022/23	£12,254,082	£1,246,810	£27,489,374	£1,694,794	Capital Budget/Grants
2023/24	£11,544,026	£1,632,221	£39,033,400	£3,290,221	Capital Budget/Grants
2024/25	£8,016,026	£1,873,559	£47,049,426	£5,126,987	Capital Budget/Grants
2025/26	£1,332,000	£2,006,853	£48,381,426	£7,097,046	Capital Budget/Grants

6 Appendices

6.1 A - Calculation of Carbon Footprint

Data sources

SFRS routinely collects data for and reports performance via a number of mechanisms, both mandatory and voluntary. The flow of data through the organisation is discussed in the table below.

The data sources used in the calculation of the carbon footprint are detailed in Table 12 below.

Table 12: Data sources for SFRS's carbon footprint 2019/20

Category	Subcategory	Main Source/s	Supplementary source/s
Buildings Energy Use	<ul style="list-style-type: none"> Electricity Natural Gas 	<ul style="list-style-type: none"> Monthly Meter Reads entered into Energy Viewer Portal, Power Now Smart Metering 	Utility Billing
Travel/Transport	<ul style="list-style-type: none"> Fleet Business Travel 	<ul style="list-style-type: none"> Carbon/Fuel reports from Fuel Cards, Tranman Air & Rail from Redfern Central Booking agency 	N/A
Water	<ul style="list-style-type: none"> Supply 	<ul style="list-style-type: none"> Monthly Meter reads entered into Energy Viewer Portal 	Utility Billing
Waste water	<ul style="list-style-type: none"> Treatment 	<ul style="list-style-type: none"> Waste Water assumed to be 95% of Supply water consumption 	N/A
Waste (In Scope-2019/20)	<ul style="list-style-type: none"> Landfill waste Recycled Waste 	<ul style="list-style-type: none"> Sodexo Soft FM contract reporting requirements 	N/A



Emission factor sources 2020

Data on energy use, transport, water supply, wastewater treatment have been converted into carbon emissions using recognised GHG Protocol consistent emission factors provided by Defra in the 2020 Guidelines to Defra/BEIS's Greenhouse Gas Conversion Factors for Company Reporting.

Carbon factors, particularly the factor for electricity, change over time and this can have a significant impact on the carbon footprint calculation.

Carbon emission factors baseline year

The following Emission Factors from Defra's Guidelines to Defra/DECC's Greenhouse Gas Conversion Factors for Company Reporting 2016 were applied in the modeling of the SFRS footprint for 2016 baseline year.

Table 13: Defra emission factors used in the calculation of the 2016 baseline carbon footprint

Category	Emission Factor
Electricity (Inc T&D Losses Factor)	0.3072 kgCO ₂ /kWh
Natural Gas	0.1840 kgCO ₂ /kWh
Transport : Medium/large diesel van (>1.25 ≤3.5t)	0.284 CO ₂ factor (kg/km)
Water supply	0.34400
Wastewater supply	0.70800

6.2 B – Project Register – Individual Project Summaries

Project 1	Monitoring & Targeting Software
Owner(s)	Carbon Energy Officer
Department	Property Department
Description	<p>A new Energy bureau service and software package was procured in April 2020. This new smart software will allow for closer monitoring of energy consumption at each SFRS site for all utilities.</p> <p>The technology will allow the Energy Officer to identify and mitigate against:</p> <ul style="list-style-type: none"> • Quickly identify and react to high energy use events. • Track the impact of any new energy projects or measures implemented at each site. • Track overall energy use trends across our estate • Produce and report league tables of energy performance of each fire station to DACO'S, LSO's and all building users. <p>Note: Project savings is estimated to be a 2% reduction in energy use each year across all utilities, however this is a conservative estimate and will most likely fluctuate higher or lower each year.</p>
Benefits	<p>Financial savings: £48,575/Year CO₂ Emissions reduction: 228 tonnes of CO₂/Yr. 1.8% of reduction target</p> <p>Increased visibility of energy use across estate Increased awareness of energy use at station level Improved energy data allows for better project feasibility and analysis</p>
Funding	<p>Project cost, £25,000/year Source of funding: Resource-Ongoing over contract lifetime of 4 years,</p>
Resources	Delivered within Property Department resources
Risks	Failure of bureau contract to deliver
Ensuring Success	An energy action log will be kept monitoring any impacts or changes to energy use from identification through this system
Measuring Success	Any positive impacts from use of this technology will be instantly measurable through the cloud based visualisation and reporting platform.
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> • Start Date: April 2020
Notes	Ongoing

Project 2	Desktop Computers Power down
Owner(s)	ICT
Department	ICT
Description	This project proposes that a strategy be put in place to have all non-critical SFRS desktop computers power down after use. Current policy is for computers to be left on 24Hrs/day so that automatic updates can be performed overnight. However, software to remotely turn on/off computers when needed to perform this task is available.
Benefits	Financial savings: £30,205/Year CO ₂ Emissions reduction: 61 tonnes of CO ₂ /Yr. 0.8% of reduction target Note: Figures above assume 3060 desktops (90% of all desktops) on Standby mode 24hrs/day drawing 14.2 Watts/hr each
Funding	Project cost, TBC Source of funding: Capital-TBC
Resources	TBC
	Inadequate internal resource to implement Unable to apply this strategy to some computers
Dependencies	For this project to be successful will need full support from ICT department to review current computer infrastructure and identify opportunities to implement this measure
Measuring Success	Power usage of a sample number of computers will be monitored before and after implementation to gauge impact.
Timing	Milestones / key dates e.g. Start Date: April 2021
Notes	Ongoing

Project 3	Wholetime Station Low Carbon Heating
Owner(s)	Regional and Property Officers (Site Specific)
Department	Property Team
Description	This project involves the swapping out our exiting gas boilers with a low carbon alternative such as Air Source Heat Pumps (ASHP) in 74 of our whole-time stations. Technology in this area is developing rapidly and the market now has solutions suitable low carbon solutions to deliver high temperature heating required to replace our traditional gas boilers. Decarbonisation of Heat is high on Scottish government climate change policy.
Benefits	Financial savings: £200,000/Year CO ₂ Emissions reduction: 2287 tonnes of CO ₂ /Yr. 32.6% of reduction target
Funding	Project cost, £8,059,000 (EST) Operational costs, Nil Source of funding: Capital- SG Grants-Pending
Dependencies	Grant Funding
Resources	Delivered within Property Department resources
Risks	Grant applications unsuccessful, funding not available
Ensuring Success	Full implementation of this project will go ahead if funding is allocated.
Measuring Success	Gas and electricity consumption will be monitored and a full measurement and verification process will be undertaken to measure the impact of the project.
Timing	Milestones / key dates e.g. <ul style="list-style-type: none"> Program will be split into work packages over CMP period, 20% of sites per annum
Notes	Ongoing



Project 4	Cambuslang HQ-Biomass (Commission)
Owner(s)	Sustainability Manager
Department	Property Department
Description	This project proposes to commission into service the existing 300KW Biomass boiler at Cambuslang HQ. This will replace the existing gas boilers as the lead heat generator for both the Cambuslang HQ and training building. This project will yield significant carbon reduction for relatively little effort.
Benefits	<p>Financial savings: Nil-Increase in OPEX-£34,000/YR CO₂ Emissions reduction: 243 tonnes of CO₂/Yr. 3.4% of reduction target</p> <p>Would allow for SFRS HQ to become low carbon site Increased resilience Utilisation of existing assets</p>
Funding	<p>Project cost: £15,000 (Est) Source of funding: Resource-TBC</p>
Dependencies	Procurement of a suitable heat supply contract and RHI application will be critical to the success of this project.
Resources	Need to get professional advice on RHI application
Risks	<p>Deadline for RHI application is missed or is unsuccessful Unable to source secure fuel supply chain</p>
Ensuring Success	For this project to be successful, a successful application for RHI payments needs to be submitted. As RHI funding ceases in 2021, this project will be prioritised to ensure this timeline isn't missed
Measuring Success	Reduction in carbon emissions and costs for heating the Cambuslang site will be measured against existing levels
Timing	Milestones / key dates e.g.
Notes	Ongoing



Project 5	Light Fleet transition to EV/ULEV																																																	
Project 5.1	EV Charging Network																																																	
Owner(s)	Fleet/Property Department																																																	
Department	Fleet / Property Department																																																	
Description	<p>Transport Scotland awarded a grant to SFRS for 45 ULEV vehicles with EV cars in 2019. This was phase one of an ongoing planned transition of the light fleet to EV's. It is planned to replace 50% of the light fleet to EV's within this CMP period to 2025. To facilitate smooth transition to EV's a large EV charging infrastructure will be required to be installed across all SFRS sites. This is projected to be around 400 chargers.</p> <p>Below is the projected numbers of vehicles and costs to implement this. Funding for this transition is through grant funding from transport Scotland.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Replacement figures</th> <th>Lease Cars</th> <th>Purchased</th> <th>New EV Costs (£)</th> <th>EV Charger Network Costs (£)</th> <th>Total Year Costs</th> </tr> </thead> <tbody> <tr> <td>2021</td> <td>100</td> <td>45</td> <td>55</td> <td>£1,375,000</td> <td>£1,800,000</td> <td>£1,375,000</td> </tr> <tr> <td>2022</td> <td>60</td> <td>0</td> <td>60</td> <td>£1,491,000</td> <td>£3,400,000</td> <td>£1,491,000</td> </tr> <tr> <td>2023</td> <td>60</td> <td>0</td> <td>58</td> <td>£1,608,000</td> <td>£3,400,000</td> <td>£1,608,000</td> </tr> <tr> <td>2024</td> <td>58</td> <td>0</td> <td>56</td> <td>£1,480,000</td> <td>£3,400,000</td> <td>£1,480,000</td> </tr> <tr> <td>2025</td> <td>48</td> <td>0</td> <td>50</td> <td>£1,332,000</td> <td>£0</td> <td>£1,332,000</td> </tr> <tr> <td>Total</td> <td>326</td> <td>45</td> <td>279</td> <td>£7,286,000</td> <td>£12,000,000</td> <td>£19,286,600</td> </tr> </tbody> </table>	Year	Replacement figures	Lease Cars	Purchased	New EV Costs (£)	EV Charger Network Costs (£)	Total Year Costs	2021	100	45	55	£1,375,000	£1,800,000	£1,375,000	2022	60	0	60	£1,491,000	£3,400,000	£1,491,000	2023	60	0	58	£1,608,000	£3,400,000	£1,608,000	2024	58	0	56	£1,480,000	£3,400,000	£1,480,000	2025	48	0	50	£1,332,000	£0	£1,332,000	Total	326	45	279	£7,286,000	£12,000,000	£19,286,600
Year	Replacement figures	Lease Cars	Purchased	New EV Costs (£)	EV Charger Network Costs (£)	Total Year Costs																																												
2021	100	45	55	£1,375,000	£1,800,000	£1,375,000																																												
2022	60	0	60	£1,491,000	£3,400,000	£1,491,000																																												
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2024	58	0	56	£1,480,000	£3,400,000	£1,480,000																																												
2025	48	0	50	£1,332,000	£0	£1,332,000																																												
Total	326	45	279	£7,286,000	£12,000,000	£19,286,600																																												
Benefits	<p>Financial savings: £141,000 per annum CO₂ Emissions reduction: 860 Tonnes/CO₂e/Yr. % of 2025 reduction target -12.29%</p>																																																	
Funding	<p>Project cost, £7,286,000 + £12,000,000 = £19,286,600 Operational costs, Source of funding: Capital-SG Grant awards</p>																																																	
Resources	Joint delivery by SFRS fleet and property department																																																	
Risks	<p>Insufficient SG funding EV charging network isn't adequately funded, implemented Reduction in old vehicles doesn't take place (one in/out policy) meaning carbon impact is reduced</p>																																																	
Ensuring Success	To ensure success of a transition to a greener fleet, a strategic national EV Charging network will need to be in place.																																																	



Measuring Success	Reductions in fuel spend and fuel use will be tracked through fuel cards. SFRS Ev Car use trends will be monitored through Charge Place Scotland smart EV charging HUB's.
Timing	Milestones / key dates e.g. Planned EV
Notes	Ongoing

Project 6	BMS & Energy Assets Remote Access Project
Owner(s)	Energy Officer, Regional and Property Officers (Site Specific)
Department	Property Team
Description	This project involves the review and upgrading of existing Building Management Systems (BMS), updating the software to maximise energy reduction opportunities and also develop an overarching asset management platform to allow for remote management of SFRS assets such as BMS, renewable generation, metering and EV charging.
Benefits	<p>Financial savings: £249,823/Year CO₂ Emissions reduction: 887 tonnes of CO₂/Yr. 12.7% of reduction target</p> <p>Increased life cycle of plant and equipment Reduced engineer call outs Improved Thermal comfort of buildings Increased energy efficiency of buildings</p>
Funding	<p>Project cost, £808,470 (EST) Operational costs, Nil Source of funding: Capital-TBC</p>
Dependencies	Support from ICT is required to facilitate the connection of these systems to SFRS internal network.
Resources	Delivered within Property Department resources
Risks	<p>Unable to connect these systems to SFRS internal Comms Adequate funding is not available</p>
Ensuring Success	Full implementation of this project will go ahead if funding is allocated.
Measuring Success	Energy consumption will be monitored and a full measurement and verification process will be undertaken to measure the impact of the project. Also, additional benefits such as Longer lifecycle of plant and equipment and reduced engineer call outs will be monitored and reported on
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period-20% of program to be completed each year
Notes	Ongoing



Project 7	Heating Controls-Wholetime & Corporate
Owner(s)	Regional and Property Officers (Site Specific)
Department	Property Team
Description	This project involves the review of the controls and zoning of the heating systems of 100 Whole-time and corporate sites. Measures include zoning of heating system, installation of dehumidifiers in drying rooms and upgrade of occupancy controls.
Benefits	<p>Financial savings: £240,396/Year CO₂ Emissions reduction: 1694 tonnes of CO₂/Yr. 24.2% of reduction target</p> <p>Improved drying room operations for staff Improved thermal comfort Increased energy efficiency</p>
Funding	<p>Project cost, £949,700 (EST) Operational costs, Nil Source of funding: Capital-Grant pending / energy project budget</p>
Dependencies	n/a
Resources	Delivered within Property Department resources
Risks	<p>Adequate funding not available Adequate Internal resource not available to deliver</p>
Ensuring Success	Full implementation of this project will go ahead if funding is allocated.
Measuring Success	Gas and electricity consumption will be monitored and a full measurement and verification process will be undertaken to measure the impact of the project
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period, 20% of sites per annum
Notes	Ongoing



Project 8	Staff Engagement
Owner(s)	All SFRS staff
Department	Property Department
Description	This project proposes to develop an ongoing staff engagement program and green ladder network. Staff will be educated and encouraged to adopt sustainable working practises. Part of this will be the successful green action energy saving competition. Ongoing action assumes a 2% reduction in energy use through staff behaviours. Published data indicates that better staff behaviours can reduce organisational resource use by 2-5%.
Benefits	<p>Financial savings: £69,665/Year CO₂ Emissions reduction: 228 tonnes of CO₂/Yr. 3.2% of reduction target</p> <p>Note: No known cost at present, however there may need to be a small nominal budget created for the ongoing associated costs of managing the green ladder network and developing engagement tools and materials.</p>
Funding	<p>Project cost, Nil at present Source of funding: Resource-TBC</p>
Resources	Suite of engagement material and tools to be developed to support initiative.
Risks	Inadequate internal resources to deliver ongoing effective staff engagement
Ensuring Success	Ongoing consistent engagement is needed for successful culture change within staff working practises and awareness
Measuring Success	Energy saved from green action completion will be measured. Other initiatives will be assessed for measurement on a case by case basis
Timing	<p>Milestones / key dates e.g.</p> <p>Ongoing program and initiatives throughout CMP period</p>
Notes	Ongoing



Project 9	Loft Insulation Retained Stations
Owner(s)	Regional and Property Officers (Site Specific)
Department	Property Department
Description	This project proposes to retrofit 270mm of loft insulation to 240 retained stations. This project will help reduce heat related energy use and carbon emissions.
Benefits	<p>Financial savings: £366,432/Year CO₂ Emissions reduction: 745 tonnes of CO₂/Yr. 10.6% of reduction target</p> <p>Improved thermal comfort Increased energy efficiency of building</p>
Funding	<p>Project cost, £1,003,800 Source of funding: Capital-Grant Pending/ Energy Project Budget</p>
Resources	
Risks	Adequate funding not available
Ensuring Success	Priority will be given to most suitable sites first to ensure maximum impact.
Measuring Success	Energy consumption of the buildings will be closely monitored and a full report on the findings will be produced by the Carbon Energy Officer.
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period
Notes	Ongoing



Project 10	Retained Stations Smart Heating Controls
Owner(s)	Carbon Energy Officer, Regional and Property Officers (Site Specific)
Department	Property Department
Description	This project proposes to retrofit smart heating controls to the electric heating systems within 180 electrically heated retained fire stations. This will allow for remote management of these systems to ensure the building is being heated to appropriate levels while reducing energy waste. A trial at Denny FS was installed in February 2020 which has proven to be very successful.
Benefits	<p>Financial savings: £291,633/Year CO₂ Emissions reduction: 593 tonnes of CO₂/Yr. 8.48% of reduction target</p> <p>Increased working Lifecycle of heating systems Improved thermal comfort for building users Increased energy efficiency of building</p>
Funding	<p>Project cost, £1,173,600 Source of funding: Capital-Grant Funding / Energy Projects Budget</p>
Resources	Property Department and ICT
Risks	Support from ICT is required to facilitate the connection of these systems to SFRS internal network.
Dependencies	Support from ICT is required to facilitate the connection of these systems to SFRS internal network.
Measuring Success	Energy consumption of the buildings will be closely monitored and a full report on the findings will be produced by the Carbon Energy Officer.
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period
Notes	Ongoing



Project 11	Oil Heated sites
Owner(s)	Regional and Property Officers (Site Specific)
Department	Property Team
Description	This project involves the decommissioning of the last two large oil boilers located at Invergordon and Fort William fire stations to a low carbon alternative
Benefits	Financial savings: £15,297/Year CO ₂ Emissions reduction: 40 tonnes of CO ₂ /Yr. 0.6% of reduction target
Funding	Project cost, £241,000 (EST) Operational costs, nil Source of funding: Capital-Grant Pending/ Energy Project Budget
Resources	Delivered within Property Department resources
Risks	Adequate funding not available
Ensuring Success	Full implementation of this project will go ahead if funding is allocated.
Measuring Success	Energy consumption will be monitored and a full measurement and verification process will be undertaken to measure the impact of the project
Timing	Milestones / key dates e.g. <ul style="list-style-type: none"> Program will be split into work packages over CMP period
Notes	Ongoing



Project 12	ARC Energy HUB's
Owner(s)	Energy Officer, Regional and Property Officers (Site Specific)
Department	Property Department
Description	This project proposes to install large roof based Solar PV and battery storage at each of the regional Asset Resource Centres. This project will greatly reduce the need for grid electricity at these sites and power the new EV fleet with clean renewable electricity.
Benefits	<p>Financial savings: £41,799/Year after full implementation CO₂ Emissions reduction: 90 tonnes of CO₂/Yr. 3.3% of reduction target</p> <p>Insulation from rising and expensive grid energy Ability to power new EV's from onsite green energy Increased site resilience</p> <p>Note: Costs assume install cost of £1,096/Kwp, based on UK government figures for 2019. Assumes 90% of energy generated is consumed onsite</p>
Funding	<p>Project cost, £673,184 Est Source of funding: Capital-Grant Pending/ Energy Project Budget</p>
Resources	Further professional analysis and feasibilities of individual sites will be needed.
Risks	Adequate funding not available,
Ensuring Success	Priority will be given to most suitable sites first to ensure maximum impact.
Measuring Success	Energy generated and consumed onsite will be measured to quantify impact of projects
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period
Notes	Ongoing



Project 13	Solar PV and Batteries-Whole-time stations
Owner(s)	Energy Officer, Regional and Property Officers (Site Specific)
Department	Property Department
Description	This project proposes to install 15Kwp Photovoltaic systems and 10kw battery storage on 74 Wholetime stations
Benefits	<p>Financial savings: £123,188/Year after full implementation CO₂ Emissions reduction: 249 tonnes of CO₂/Yr. 3.6% of reduction target</p> <p>Insulation from rising and expensive grid energy Ability to power new EV's from onsite green energy Increased site resilience</p> <p>Note: Costs assume install cost of £1,096/Kwp, based on UK government figures for 2019. Assumes 90% of energy generated is consumed onsite</p>
Funding	<p>Project cost, £1,816,389 (Est) Source of funding: Capital-Grant Pending/ Energy Project Budget</p>
Resources	Further professional analysis and feasibilities of individual sites will be needed.
Risks	Adequate funding not available
Ensuring Success	Priority will be given to most suitable sites first to ensure maximum impact.
Measuring Success	Energy generated and consumed onsite will be measured to quantify impact of projects
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period
Notes	Ongoing



Project 14	Smart Lighting Controls
Owner(s)	Regional and Property Officers (Site Specific)
Department	Property Team
Description	This project involves developing and rolling out a standard lighting controls package to all wholetime stations and corporate sites. Currently there are varied levels of lighting control on stations with large amounts of lighting on in unused spaces.
Benefits	<p>Financial savings: £175,176/Year CO₂ Emissions reduction: 347 tonnes of CO₂/Yr. 5% of reduction target</p> <p>Improved energy efficiency of building Reduced costs in lighting replacement</p>
Funding	<p>Project cost: £1,130,380 (EST) Operational costs, Nil Source of funding: Capital: Grant Pending / Energy Capital Budget</p>
Dependencies	n/a
Resources	Delivered within property department resources
Risks	Adequate funding not available
Ensuring Success	Full implementation of this project will go ahead if funding is allocated.
Measuring Success	Electricity consumption will be monitored and a full measurement and verification process will be undertaken to measure the impact of the project.
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period, 20% of sites per annum
Notes	Ongoing



Project 15	W/T Replacement Windows and doors
Owner(s)	Regional and Property Officers (Site Specific)
Department	Property Department
Description	This project proposes to replace and upgrade all external doors and windows of the wholetime stations to the latest energy efficient standard, currently large amounts of station windows are old, leaky and single glazed leading to increased heat loss
Benefits	<p>Financial savings: £96,049/Year CO₂ Emissions reduction: 588 tonnes of CO₂/Yr. 10.6% of reduction target</p> <p>Improved thermal comfort Increased energy efficiency of building</p>
Funding	<p>Project cost, £13,100,000 Source of funding: Capital-Grant Pending/ Energy Project Budget</p>
Resources	
Risks	Adequate funding not available
Ensuring Success	Priority will be given to most suitable sites first to ensure maximum impact.
Measuring Success	Energy consumption of the buildings will be closely monitored and a full report on the findings will be produced by the Carbon Energy Officer.
Timing	<p>Milestones / key dates e.g.</p> <ul style="list-style-type: none"> Program will be split into work packages over CMP period
Notes	Ongoing

6.3 C - Carbon Financing Assumptions

The financing of the CMP is based on the following assumptions:

Costs: Actual costs have been used for projects that have already started or been completed and supplier quotes were obtained. Where supplier quotes were not available, estimated costs have been obtained from verbal communication with suppliers or based on previous projects.

Cost saving: Cost savings were calculated using 2020 utility tariff costs and assumed energy savings (from supplier quotes, published data sources and internally developed business cases).

Carbon saving: Calculated carbon savings were derived using assumed energy savings (as outlined above) and Defra's emission factors 2020.

The key assumptions made in calculating the benefits and savings are:

- Gas and electricity costs will rise by a constant 4% per annum over the next 5 years. Utility supply markets are very volatile which makes prediction of future prices very difficult.
- Default emission factors were used in converting energy kWh to tonnes CO_{2e} emissions.

Project cost savings are calculated using the Carbon Trust Project Register tool which is used by all public bodies to produce their Carbon Management Plans. Energy costs are indexed to projected Scottish Government price increases, however project costs are based on best known 2020 costs as this model doesn't allow for projected project cost increase over lifetime of plan. Projected cost and savings will be updated annually in line with best practise for a carbon reduction programme.