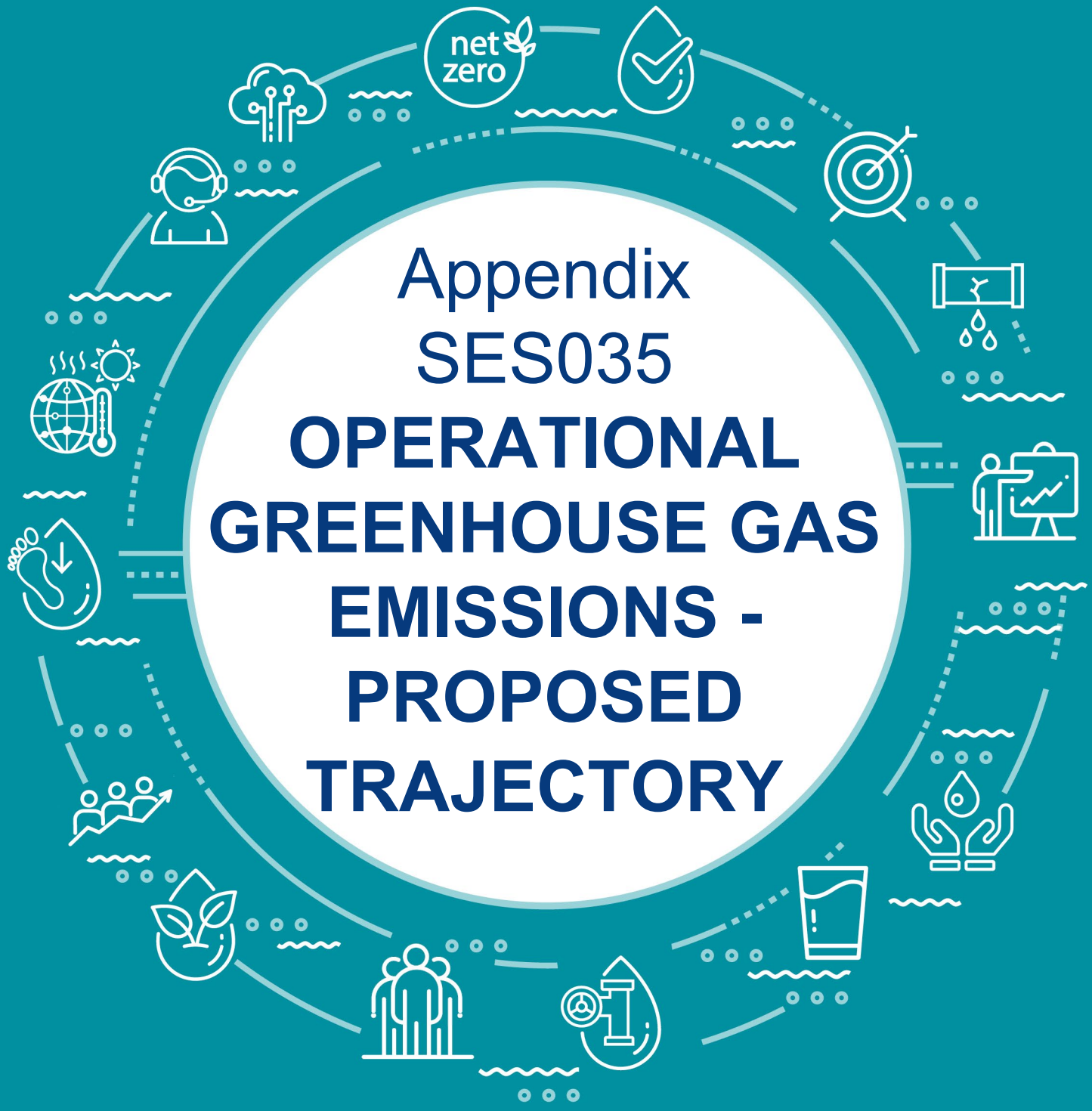
ses WATER



Appendix
SES035

OPERATIONAL GREENHOUSE GAS EMISSIONS - PROPOSED TRAJECTORY

7004 Carbon Emissions Trajectories

SES Water

Commercial in Confidence

Final report

19th September 2023

Report produced by Optopia Ltd | Registered in England and Wales | Company Number 13717880

Optopia
Optimising your net zero future

Contents

Acronyms

Acronym	Meaning
BAU	Business As Usual
CAW	Carbon Accounting Workbook
CPPA	Corporate Power Purchase Agreement
DI	Distribution Input
DYAA	Dry Year Annual Average
EV	Electric Vehicle
GAC	Granular Activated Carbon
LTDS	Long Term Delivery Strategy
PC	Performance Commitment
PIC	Public Interest Commitment
REGO	Renewable Energy Guarantee of Origin
WRMP	Water Resources Management Plan
WTT	Well to tank

Executive summary

This report evaluates SES Water's future emissions under a range of different assumptions: business as usual, a mid case and a best case. We highlight some key takeaways from the modelling below.

Public interest commitment (PIC)

- SES Water previously committed to net zero operational emissions by 2030.
- The carbon footprint for the PIC is on a relatively narrow boundary: Scope 1 and 2 emissions and Scope 3 where a core activity is outsourced.
- It is also reported on a market basis, so measures like the procurement of green energy tariffs/ and or purchase of carbon offset certificates can be used to reduce reported emissions.
- As a result, in a best case, SES Water can meet its 2030 commitment. The trajectories in this report would involve work beyond business as usual: to reduce energy use, reduce mileage, decarbonise vehicles, work with supply chain partners to reduce their footprint and develop onsite renewables. Achieving net zero would also involve offsetting SES Water's residual emissions.
- While some of these measures pay back for themselves relatively quickly (in five years or less for the mid case in this report); others would need to be justified on carbon reduction (rather than necessarily cost saving) grounds.

Projected net footprint under different assumptions	Metric	2021	2022	2030
Trajectory 1a: BAU with no interventions (PIC)	tCO2e	2,721	2,289	1,346
	% change on 2021		-16%	-51%
Trajectory 3: Mid case (PIC)	tCO2e	2,721	2,289	1,079
	% change on 2021		-16%	-60%
Trajectory 4a: Best Possible trajectory (PIC)	tCO2e	2,721	2,289	-
	% change on 2021		-16%	-100%

New Performance Commitment (PC)

- Ofwat has introduced a new operational greenhouse gas reporting commitment for PR24.
- It has a wider footprint boundary than the PIC e.g. it includes chemicals and well to tank emissions for energy.
- It is also calculated on a location basis, which means that key market measures possible under the PIC (e.g. low carbon energy tariffs and carbon offsets) would not be eligible.
- Lastly, emissions factors will not reduce over time and are fixed at 22/23 assumptions. This means that decarbonisation of the grid and other external activities that will impact on emissions factors will not affect emissions under the PC.
- These differences mean that SES Water's absolute footprint is higher under the PIC than the PC i.e. the two footprints cannot be compared like for like.

- In terms of the trajectories, even the best case rate of reduction for the PC is slower than for the PIC, due to the differences above. Even though the actions SES Water is assumed to take are very similar for both reporting boundaries, the best case under the PC is necessarily less impactful than under the PIC.

Projected net footprint under different assumptions	Metric	2021	2022	2030
Trajectory 1b: BAU with no interventions (PC new)	tCO2e	24,561	22,956	19,297
	% change on 2021		-7%	-21%
Trajectory 2: Mid case (PC)	tCO2e	24,561	22,956	17,812
	% change on 2021		-7%	-27%
Trajectory 4b: Best Possible trajectory (PC new)	tCO2e	24,561	22,956	14,697
	% change on 2021		-7%	-40%

Projected PC under different assumptions	Metric	2021	2022	2030
Trajectory 1b: BAU with no interventions (PC new)	kgCO2e/Ml	385	369	362
	% change on 2021		-4%	-6%
Trajectory 2: Mid case (PC)	kgCO2e/Ml	385	369	334
	% change on 2021		-4%	-13%
Trajectory 4b: Best Possible trajectory (PC new)	kgCO2e/Ml	385	369	276
	% change on 2021		-4%	-28%

SES Water PC proposal trajectory

Following feedback on the draft report, we modelled a fifth scenario. It is a mid case based on a PC boundary. This means that reported emissions are higher than under the PIC mid case. However, it is lower than the PC mid case because it allows market measures to count towards emissions reductions and emissions factors to change over time.

Projected net footprint under SES Water PC proposal	Metric	2021	2022	2030
Trajectory 5: mid case (SES Water PC proposal)	tCO2e	14,954	12,449	7,863
	% change on 2021		-17%	-47%

SES Water PC proposal	Metric	2021	2022	2030
Trajectory 5: mid case (SES Water PC proposal)	kgCO2e/Ml	234	200	147
	% change on 2021		-14%	-37%

Risks and uncertainties

We note that the results are contingent on a range of assumptions which given they look to the future are inherently uncertain. Key uncertainties include:

- Delivery of the WRMP – the scenarios are contingent on reducing electricity and chemical use in line with reduced supply
- Engaging suppliers – outsourced emissions (e.g. from third party vehicles) are included in both footprints and delivering the trajectories requires their emissions to be reduced too
- Fleet decarbonisation – all scenarios assume reduced mileage and EV switching for all vehicles except HGVs; if this takes longer than anticipated to achieve, the rate of footprint reduction will be slower
- Energy reduction measures – all scenarios assume a reduction in energy use through energy savings and these projects will need to deliver to the levels expected to achieve the trajectories
- Reporting guidance – reporting guidance is subject to update and change which can affect the footprint reported and the emissions abatement options available
- Costs of abatement – this report makes simple assumptions about the costs of market measures like REGOs and carbon offsets. Their price can fluctuate materially driven by international markets.
- Electricity emissions factors – particularly for the PIC, if the grid decarbonises more slowly than anticipated, the trajectories will reduce more slowly.

1. Introduction

In May 2023, Ofwat published the final definition PR24 operational greenhouse gas emissions performance commitment (PC) for water companies like SES Water. SES Water asked Optopia LTD (Optopia) to help assess the trajectory its emissions could follow, in line with the scope of the PC.

This follows SES Water's publication of its own Net Zero Routemap, which set out how it plans to deliver the sector-wide public interest commitment (PIC) for net-zero emissions by 2030. SES Water also asked Optopia to update its view of future emissions based on the PIC scope, to establish how it is progressing to date and the activities needed to meet the PIC.

To do this, Optopia modelled five different trajectories:

- Trajectory 1: Business as Usual (BAU) or baseline emissions, with no net-zero specific interventions (reported both on a PC and PIC basis). This includes expected reductions in emissions from the WRMP, growth in emissions from the LTDS and firm changes to emissions through energy management.
- Trajectory 2: Mid case based on Ofwat's new PC criteria for PR24. This includes assumptions regarding the most cost effective emissions reductions[1].
- Trajectory 3: Mid case based on the original WaterUK PIC criteria. This includes the same assumptions as Trajectory 2 where they are in the scope of the PIC.
- Trajectory 4: Best possible trajectory (reported both on a PC and PIC basis). This includes additional measures not included in the mid case.
- Trajectory 5: Mid case based on Ofwat's new PC boundary but reporting emissions on a market basis and allowing emissions factors to change with time.

This document is the final report; it presents our final results based on data provided by SES Water and incorporates feedback on the draft results.

It is structured as follows: Section 1.1 provides an overview of current reporting rules. Section 1.2 summarises our approach. Section 2 presents key assumptions that the results rely on. Section 3 presents historic emissions and compares the scope of the PIC to the scope of the PC. Section 4 presents the three pathways for the PIC and explains the differences. Section 5 does the same for the PC trajectories, including SES Water's proposal. Section 6 compares all of the trajectories. Section 7 sets out key risks, challenges and recommended areas for action.

We have also provided a spreadsheet alongside the report, which sets out annual projected emissions for each trajectory (tCO2e), % change on 21/22 emissions. For the PC trajectories, it also reports those emissions on a kgCO2e/Ml basis.

1.1. Carbon reporting boundaries

This section describes the different sources of emissions included in the trajectories.

[1] For the mid case, 'cost effective' means carbon reduction and efficiency measures where the estimated capex investment could result in a payback of less than 5 years in opex savings. The best case also includes measures where the payback period is more than 5 years.

The report uses the following terminology, in line with the Greenhouse Gas (GHG) Protocol[2]:

- Scope 1 direct emissions from company's own activities. For a water company these can include: refrigerants and fuels including gas oil, diesel and natural gas
- Scope 2 indirect emissions from fuels. For a water company these can include: emissions from imported electricity or heat
- Scope 3 other indirect emissions. For a water company these can include: transmission and distribution losses from grid imports, well-to-tank emissions of fuels, outsourced activities, chemical use, business travel

The project covers operational (rather than embedded) emissions only. The modelled emissions trajectories are based on one of two reporting boundaries:

- PIC: In 2019, the United Kingdom set a target of net zero emissions by 2050. The water sector agreed a more ambitious target, to achieve net zero by 2030 as set out in the net zero routemap[3]. SES Water has also committed to achieve net zero by 2030 and set out how it plans to do this in its own net zero routemap[4]. This footprint is based on a relatively narrow boundary: Scope 1 and 2 emissions and Scope 3 where a core activity is outsourced. It is also reported on a market basis, meaning that measures like the procurement of green energy tariffs/ and or purchase of carbon offset certificates can be used to reduce reported emissions.
- PC: In December 2022, Ofwat announced[5] that it will introduce a performance commitment for operational emissions at PR24. It confirmed its final guidance for this in May 2023[6]. Key differences to the PIC are:
    - Location based – market methods to reduce emissions e.g. green tariffs or offsetting do not count as a reduction (1% of gross location-based emissions may be offset from projects that SES Water invests in and are part of its value chain ('insets')).
    - Fixed emissions factors – emissions factors are fixed at V17 of the Carbon Accounting Workbook (CAW) i.e. 22/23 factors. This means that future reductions in emission from e.g. electricity grid decarbonisation does not count as a reduction
    - Chemicals – the PC includes the carbon impact of chemicals usage which has a material impact on SES Water's reported Scope 3 emissions compared to the PIC.
    - Well to tank (WTT) emissions – emissions from the extraction, production, transmission and distribution of electricity, heat and purchased fuels. Given the volume of electricity used, this has a material impact on SES Water's reported Scope 3 emissions compared to the PIC.
    - Emissions from land – Scope 1 emissions are included in the PC but for SES Water, water treatment waste to lagoon is zero-rated in the CAW.

[2] https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf
[3] https://www.water.org.uk/routemap2030/wp-content/uploads/2020/11/Water-UK-Net-Zero-2030-Routemap.pdf
[4] https://seswater.co.uk/your-environment/net-zero-carbon/our-net-zero-carbon-routemap
[5] https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_Appendix_7_Performance_commitments.pdf
[6] https://www.ofwat.gov.uk/publication/pr24-operational-greenhouse-gas-emissions-performance-commitment-water/

1.2. Approach

This section provides an overview of our approach to quantifying the projections.

- Calculate baseline emissions: we used 22/23 actual activity data assumed constant, then modified it for known changes, e.g. as a result of the Water Resources Management Plan (WRMP), to estimate what activity levels would be in the absence of a net zero programme
- Establish a long list of abatement options: together with SES Water, we then constructed a wide-ranging list of the way that carbon emissions at SES Water could be reduced.
- Scenario development: this list was then refined and the timing of each measure's implementation assigned to the baseline, a mid case or a best case:
    - Mid case: carbon reduction and efficiency measures where capex investment results in a payback of less than 5 years in opex savings
    - Best case: carbon reduction and efficiency measures where the payback period is more than 5 years are also included (in addition to the mid case measures above)
- Emissions projection: we then used these assumptions regarding activity data, combined with future emissions factors to calculate future emissions
- Results review: we then summarised the findings of our analysis for presentation in this report and the templates that accompany this document.

2. Key data and assumptions

2.1. Abatement options for SES Water

We took the 22/23 activity data as a starting point and projected it forward assuming:

- the WRMP is delivered (reducing water demand, volume supplied and so reducing electricity and chemicals consumption).
- LTDS activities that may increase emissions go ahead.
- Some energy management measures already underway are assumed to be complete

In order to determine trajectories for future emissions, we then quantified a range of different ways that SES Water could reduce its carbon footprint:

- Impact of energy management measures on emissions, from energy efficiency to fuel switching
- Impact of fleet management on emissions, specifically mileage reduction and switching to electric vehicles
- Impact of planned onsite solar developments (assuming that SES Water retains the REGOs)

For PIC (i.e. market-based) trajectories only, we also quantified:

- Impact of green electricity procurement (assuming that this is of a quality aligned to carbon reporting guidance at the time)
- Impact of in/setting or offsetting on the footprint (assuming that this is the final step undertaken and uses good quality offsets, to be in line with net zero reporting guidance)

2.2. Key assumptions

This section sets out key data and assumptions on which the results rely (Figure 2.1). The assumptions reflect that this was a short, high-level project, designed to produce top-level outputs to inform the PC process. We are happy to provide further detailed information or answer questions as necessary.

Figure 2.1 Overview of key assumptions

Ref	Area	Data/ assumption	Source
1	Historic emissions	Historic data for all emissions sources taken from the input sheet to the Carbon Accounting Workbook	SES Water (22/23 activity data, checked against the APR)
2	Historic emissions factors	Historic emissions factors for most emissions sources taken from DESNZ emissions factors for company reporting (for the relevant year for the PIC or fixed at 22/23 for the PC)	DESNZ https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting
		Emissions factors for purchased Chemicals and Granular Activated Carbon (GAC) are taken from the CAW v17	CAW v17
		Well to tank (WTT) emissions factors are taken from DESNZ for: electricity, electricity losses, fuels (including fuels used in buildings and vehicles)	DESNZ

Ref	Area	Data/ assumption	Source
3	WRMP	Impact of WRMP on electricity and chemicals use is based on Table 3c: DYAA - Final plan.	SES Water (WRMP - DYAA - DI Forecasting.xlsx)
4	Projected grid emissions factor	Projected carbon emissions factor from Cornwall Insight (central for all trajectories except 4 which uses the high case).	Cornwall Insight (20230831 Q42022 BOC Grid Carbon Intensity.xlsx)
5	Projected emissions factors for other activities	Assumed constant. Given the expected increase in biofuels e.g. for transport fuels, this should be conservative i.e. avoid underestimating the scale of the challenge.	Assumption
6	Abatement measures: energy efficiency and fuel switching	These assumptions have been taken from data held by SES Water (e.g. ESOS reports, the LTDS) supplemented with SES Water's knowledge and Optopia's experience to fill gaps and produce estimates A generic asset lifetime of 30 years is assumed, so that all measures installed in a scenario last until at least 2050.	SES Water & Optopia (20230906 Energy related measures.xlsx)
7	Abatement measures: fleet management	These high level assumptions have been constructed in conversation with SES Water, to produce top-down assumptions EV switching assumed that approximately 19 vehicles that do 10,000 miles per year each (i.e. 190,000 residual miles) do not have an obvious EV option and remain diesel fuelled.	SES Water Net zero routemap Optopia
8	Abatement measures: renewable generation (onsite solar)	Existing renewable assets are assumed to continue at 22/23 levels for the remainder of the period. Assumptions for new build assets have been taken from information on existing projects and projects already evaluated by SES Water, supplemented with the commitments in the net zero routemap and Optopia's experience	SES Water Net zero routemap Optopia
	Capacity factor	10%	Optopia assumption based on similar projects
	Export factor	0%	Simplifying assumption
	Onsite generation factor	100%	100% of reported generation from planned installations can be used onsite. Simplifying assumption
	Capex	£900,000/MW	From SES Water
	Opex	£20,000/MW/year	Optopia assumption for maintenance based on similar projects

Ref	Area	Data/ assumption	Source
9	Abatement measures: green electricity procurement	These assumptions have been taken from the net zero routemap and conversations with SES Water, supplemented with Optopia's own experience, data analysis and estimates. A REGO prices of £8/MWh is based on information from SES Water[7].	SES Water Net zero routemap Optopia
10	Abatement measures: offsets	£15/5CO2e assumption have been taken from the net zero routemap supplemented with Optopia's own experience, data analysis and estimates An indicative carbon removal offset price of £10-20 per tonne is based on publicly available information[8].	Net zero routemap Optopia Renewable Exchange Woodland Carbon Code
11	Supply volumes to calculate the PIC	Absolute emissions are divided by supply volumes to give kgCO2e/ Ml as well as tCO2e for PC reporting. The supply data is taken from Table 3c: DYAA - Final plan.	SES Water (WRMP - DYAA - DI Forecasting.xlsx)

[7] No attempt has been made to project REGO prices as part of this project. We have used in an assumption provided by SES Water of £8/MWh, but outturn prices could be higher or lower.

[8] As in the case of REGOs, we have not undertaken any modelling of future carbon credit (offset) prices. A report by the Committee on Climate Change (see here figure 1.5) found a wide range in current costs hence there is even more uncertainty looking ahead. For the purposes of illustration, we have used an indicative cost of £15/tCO2e based on the midpoint of a statement by the Woodland Carbon Code that current prices for pending credits are between £10-20/tCO2 (see here).

2.3. Comparison of trajectory assumptions

An overview of each trajectory is provided in Figure 2.2 below.

Figure 2.2 Overview of trajectory assumptions

	PIC			PC			
	Trajectory 1a BAU with no interventions (PIC)	Trajectory 3 Mid case (PIC)	Trajectory 4a Best case (PIC)	Trajectory 1b BAU with no interventions (PC)	Trajectory 2 Mid case (PC)	Trajectory 4a Best case (PC)	Trajectory 5 Mid case (SES Water PC proposal)
Location or market based	Market			Location			Market
Reporting boundary	PIC			PC			PC
Emissions factors	In year			Fixed at 2022			In year
Electricity factors	Cornwall: Central scenario		Cornwall: High scenario	Cornwall: Central scenario		Cornwall: High scenario	Cornwall: Central scenario
Impact of WRMP	Table 3c: DYAA - Final plan						
Impact of LTDS	Baseline	Mid case	Best case	Baseline	Mid case	Best case	Mid case
Measures scenario	Baseline	Mid case	Best case	Baseline	Mid case	Best case	Mid case
Onsite renewables (known)	Baseline	Mid case	Best case	Baseline	Mid case	Best case	Mid case
Onsite renewables (additional)	n/a	n/a	Best case (climbing to 20% by 2040)	n/a	n/a	Best case (climbing to 20% by 2040)	n/a
Fleet mileage reductions (own and outsourced)	No change	Mid case (20% reduction by 2030 then constant)	Best case (50% reduction by 2040 then constant)	No change	Mid case (20% reduction by 2030 then constant)	Best case (50% reduction by 2040 then constant)	Mid case (20% reduction by 2030 then constant)
EV switching (own and outsourced)	No change	Mid case (50% EV switching by 2030 and 100% by 2050)	Best case (100% EV switching by 2030)	No change	Mid case (50% EV switching by 2030 and 100% by 2050)	Best case (100% EV switching by 2030)	Mid case (50% EV switching by 2030 and 100% by 2050)
Low carbon energy procurement	No change (i.e. 100% electricity from recognised green tariff)			n/a (location based)			No change
Offsetting	No change (i.e. no offsets)		Best case (net zero by 2030)	n/a (location based)			No change

2.4. Costs

Figure 2.3 summarises the treatment of Opex and Capex under all trajectories. Capex costs are assumed to be incurred once in the start year for the measure. Opex costs are assumed to be incurred annually (including in the first year), for the lifetime of the measure.

Figure 2.3 Overview of cost assumptions

Emissions driver	Treatment of Opex/ Capex
WRMP	Funded elsewhere so we have not accounted for any Capex or Opex resulting from these changes
LTDS	As for WRMP
Energy management	Both Capex and Opex included where assumptions were populated by SES Water and Optopia
Fleet mileage	Not accounted for here because part of the fleet strategy
Vehicle switching	As for fleet mileage
Onsite renewables (planned)	Indicative values for capex included based on typical £/kW from SES Water for two new installations at Bough Beech and Fetcham. Opex only reflect indicative annual maintenance cost only. Aggregate costs of small scale solar are not included on basis funded elsewhere.
Onsite renewables (additional)	Only applicable in best case. Includes Capex and Opex values based on typical £/kW from SES Water.
Energy procurement	Assume no Capex and Opex indicative cost of REGOs only (£8/MWh). Using a different mechanism e.g. a CPPA would incur additional set up costs e.g. legal fees.
In/offsets	Assume no Capex; assumed indicative cost of certificates. Prices could be higher or lower than this. If chose to use insets, they would incur additional internal/ supply chain costs to implement projects.

All costs are assumed flat real, in 2023 money i.e. no adjustment is made for inflation and future costs are not discounted.

Note, in the spreadsheet accompanying this report, we have provided emissions data to two decimal places as required by Ofwat. This is not intended to give the impression of more accuracy than the high level assumptions for this project allow (ideally we would be reporting in ktCO2e).

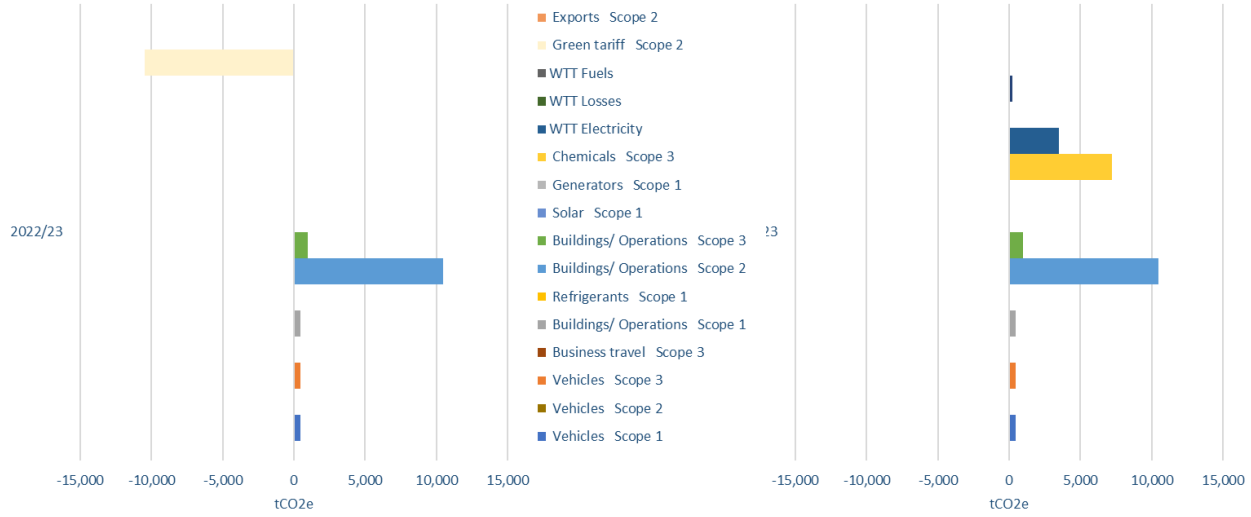
3. Historic emissions

We used the most recent year's data (2022/23) as the starting point from which to project the level of each activity that generates carbon emissions to 2050.

The breakdown of historic carbon emissions under each reporting boundary is shown in the chart below (Figure 3.1).

The table summarises the gross footprint (i.e. before any green tariff) under both reporting boundaries for 22/23. It shows that the scope of the PC is much broader than the PIC, so the reported footprint is also materially higher (due primarily to the inclusion of chemicals and WTT emissions from electricity in the PC).

Figure 3.1 Historic emissions by activity (2022/23) (PIC on left, PC on right)



tCO2e	PIC	PC
Gross footprint 22/23	12,796	22,956
Net footprint 22/23	2,289	22,956 The PC is location based and does not allow low carbon energy procurement or offsets to be netted off.

Source: SES Water, Optopia analysis

The charts in the chapters that follow illustrate the emissions pathway under each set of assumptions. To help make trajectories easier to compare, we have separated emissions projections into two chapters, the first focussed on the PIC, the second on the PC. This means that Trajectory 3 appears before Trajectory 2.

4. Public Interest Commitment (PIC)

4.1. Trajectory 1a: BAU using the PIC methodology

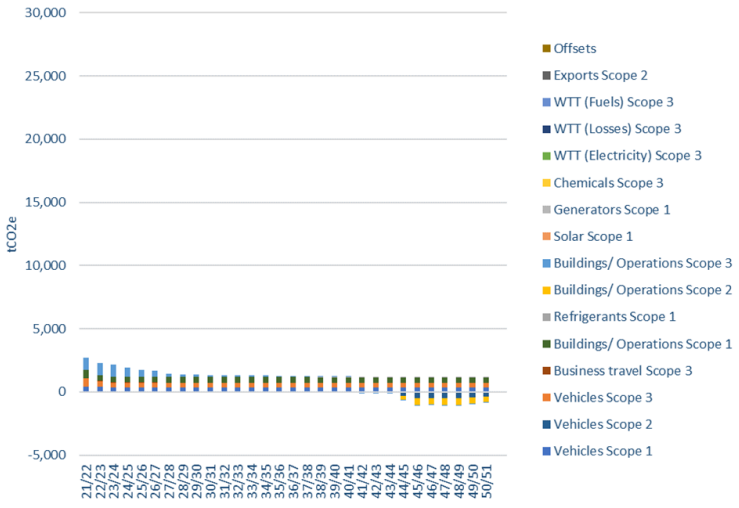
Trajectory 1a is the business as usual (BAU) trajectory using the public interest commitment (PIC) methodology. Other assumptions are summarised in Figure 4.1.

Figure 4.1 Trajectory 1a: assumptions

Assumptions:	Trajectory 1a
Location or market based	Market
Reporting boundary	PIC
Emissions factors	In year
Electricity factors	Cornwall: Central scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Baseline
Measures scenario	Baseline
Onsite renewables (known)	Baseline
Onsite renewables (additional)	n/a
Fleet mileage reductions (own and outsourced)	No change
EV switching (own and outsourced)	No change
Low carbon energy procurement	No change (i.e. 100% electricity from recognised green tariff)
Offsetting	No change (i.e. no offsets)

The BAU trajectory in emissions is illustrated in Figure 4.2 using a PIC reporting boundary and related assumptions (i.e. market based, in-year emissions factors).

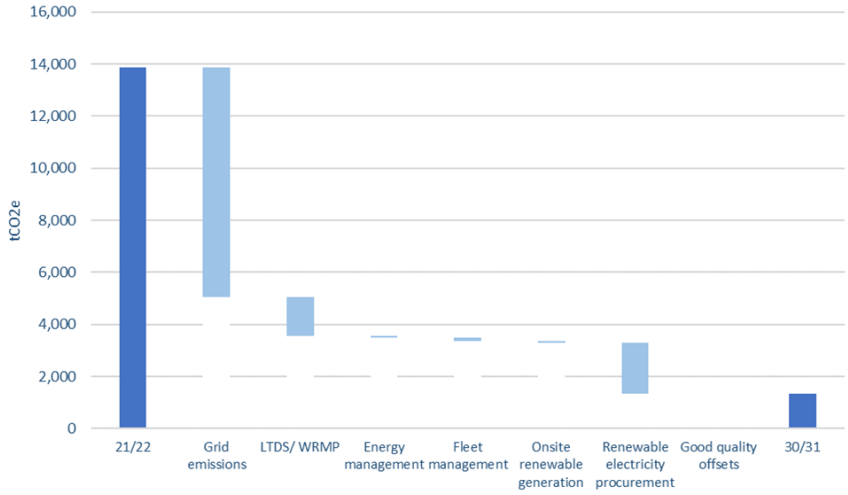
Figure 4.2 Trajectory 1a: BAU emissions to 2050 (PIC)



Source: SES Water, Optopia analysis.

Trajectory 1a (tCO2e)	21/22	22/23	30/31	40/41	50/51
Net footprint	2,721	2,289	1,346	1,190	340

Figure 4.3 Trajectory 1a: Contribution of different activities (PIC)



Source: SES Water, Optopia analysis Grid emissions reflect reductions in emissions factor. Renewable electricity procurement reflects impact of REGOs.

Based on the assumptions above and the current reporting methodology, the emissions that SES Water reports under the PIC could reduce materially, without further action. This is for two key reasons:

- the PIC allows net emissions reporting i.e. SES Water can report its green electricity tariff as zero emissions
- the PIC allows the use of in-year emissions factors, which are projected to fall over the period, in line with Cornwall Insight's projections

Low carbon energy procurement

We note that the guidance on reporting electricity tariffs is expected to tighten in future:

- In particular, a green tariff of the kind currently used by SES Water is not expected to be judged sufficiently additional[9]. However, no firm decisions have been made yet.
- In parallel, newer market-based mechanisms to source renewable electricity (corporate power purchase agreements, or CPPAs, for instance) are being used by a larger number of companies.

All PIC trajectories assume that SES Water continues to procure 100% of its electricity from a route it is allowed to report as zero emissions on a market-based reporting methodology[10]. SES Water is aware that it needs to strengthen its approach to low carbon energy procurement to achieve this; it does not expect that a REGO-backed tariff will be enough to report zero emissions going forward. The cost estimates in this report include an illustrative cost of REGOs only; alternative procurement routes would usually result in additional costs.

[9] Green tariffs have come under criticism (in the UK and internationally) for failing to meet test of additionality and being insufficient to zero rate emissions. The UK opened a call for evidence on recognising the carbon content of energy products but has not yet produced proposals for updating its corporate GHG reporting guidance. If it does change, the rules for reporting the PIC may be updated in line with best practise or stay the same. Given this uncertainty, we have taken a simple approach for this report.

[10] Noting that because the Cornwall Emissions grid emissions factors are negative towards the end of the period, a zero-rated tariff would increase reported emissions. We therefore assume that if the emissions factor is less than zero, SES Water would take advantage of that, rather than continue to procure a green tariff.

Grid decarbonisation

The extent and rate of grid decarbonisation also materially affects SES Water's reported emissions under the PIC. This is particularly true as the vehicle fleet electrifies, since it affects the emissions saving from the switch to EVs. The assumptions (Cornwall Insight central scenario) result in negative emissions from electricity consumption towards the end of the period modelled.

Carbon offsets

The PIC also allows the use of good quality carbon offsets. In line with good practice, offsets are the last option in an emissions reduction hierarchy and should only be used once a company is already taking steps to reduce its own emissions. By definition, that is not the case with a BAU trajectory and so we have not included offsets here. In addition, SES Water is not currently buying offsets, so it is not a BAU assumption. Offsets are included in Trajectory 4a (see below).

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 4.4 Estimated Capex and Opex: Trajectory 1a (PIC) (£m)

Capex £m	2022-50		2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3		0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**2.3**		**0.0**	**0.0**	**0.1**	**2.2**	**0.0**	**0.0**	**0.0**
Opex £m	**2022-50**		**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5		0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy procurement	6.8		0.4	0.4	1.9	1.7	1.6	0.3	0.0
Offsetting	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-0.7**		**0.4**	**0.4**	**1.3**	**0.3**	**-0.1**	**-1.4**	**-1.7**

Source: SES Water and Optopia analysis. Totals may not sum due to rounding .

4.2. Trajectory 3: Mid case using the PIC methodology

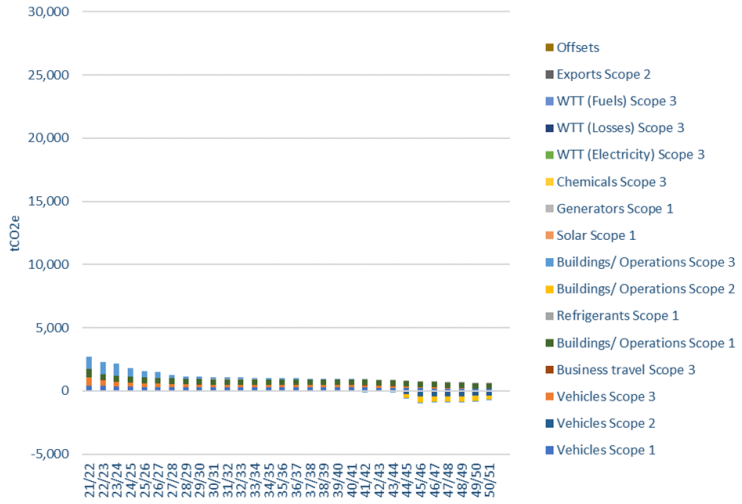
Trajectory 3 is the mid case based on the PIC methodology. It takes the BAU scenario as a starting point and then adds in additional reductions, for energy management, fleet and onsite generation. The assumptions are summarised in Figure 4.5.

Figure 4.5 Trajectory 3: assumptions

Assumptions:	Trajectory 3
Location or market based	Market
Reporting boundary	PIC
Emissions factors	In year
Electricity factors	Cornwall: Central scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Mid case
Measures scenario	Mid case
Onsite renewables (known)	Mid case
Onsite renewables (additional)	n/a
Fleet mileage reductions (own and outsourced)	Mid case (20% reduction by 2030 then constant)
EV switching (own and outsourced)	Mid case (50% EV switching by 2030 and 100% by 2050)
Low carbon energy procurement	No change (i.e. 100% electricity from recognised green tariff)
Offsetting	No change (i.e. no offsets)

The mid case trajectory in emissions is illustrated in Figure 4.6 using a PIC reporting boundary and related assumptions (i.e. market based, in-year emissions factors).

Figure 4.6 Trajectory 3: Mid case to 2050 (PIC)



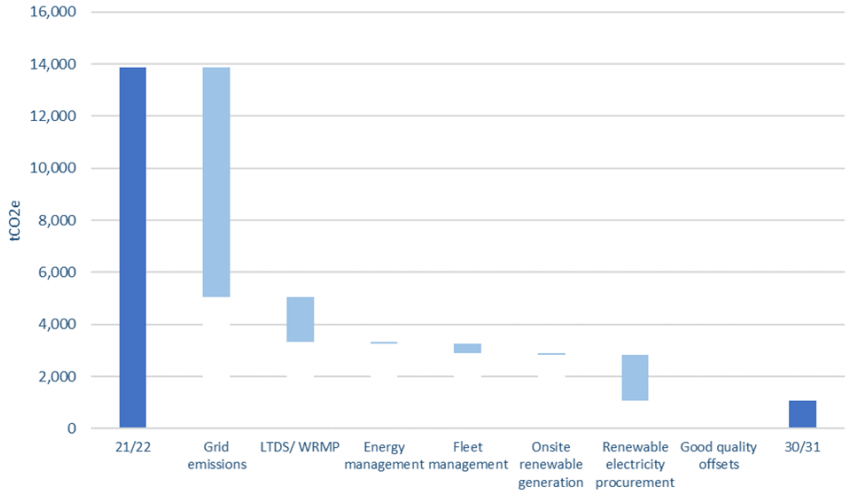
Source: SES Water, Optopia analysis.

Trajectory 3 (tCO2e)	21/22	22/23	30/31	40/41	50/51
Net footprint	2,721	2,289	1,079	936	-155

We note the negative emissions towards the end of the period modelled. This is a direct result of the electricity emissions factor projection being negative in the later years. It remains to be seen whether, even if generation delivering carbon removal is implemented, a negative factor would be allowed for carbon reporting. For instance, it means that other options e.g. onsite renewables or low carbon energy

procurement result in a higher footprint, which arguably goes against the emissions hierarchy used for this project.

Figure 4.7 Trajectory 3: Contribution of different activities (PIC)



Source: SES Water, Optopia analysis

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 4.8 Estimated Capex and Opex: Trajectory 3 (PIC) (£m)

Capex £m	2022-50		2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3		0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	0.9		0.0	0.0	0.9	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**3.2**		**0.0**	**0.0**	**1.0**	**2.2**	**0.0**	**0.0**	**0.0**
Opex £m	**2022-50**		**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5		0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	-24.3		0.0	0.0	-4.7	-4.7	-4.7	-4.7	-4.7
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy procurement	6.2		0.4	0.4	1.7	1.5	1.4	0.3	0.0
Offsetting	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-25.6**		**0.4**	**0.4**	**-3.5**	**-4.6**	**-5.0**	**-6.1**	**-6.4**

Source: SES Water and Optopia analysis. Totals may not sum due to rounding .

4.3. Trajectory 4a: Best case using the PIC methodology

Trajectory 4a is the best case based on the PIC methodology. It takes the mid case using a PIC methodology (Trajectory 3) as a starting point. It then includes additional reductions, for energy management, fleet and onsite generation. The assumptions are summarised in Figure 4.9.

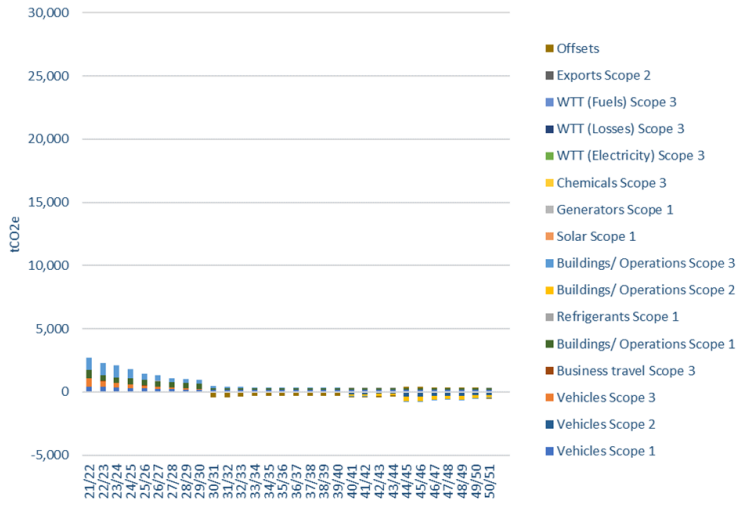
Figure 4.9 Trajectory 4a: assumptions

Assumptions:	Trajectory 4a
Location or market based	Market
Reporting boundary	PIC
Emissions factors	In year
Electricity factors	Cornwall: High scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Best case
Measures scenario	Best case
Onsite renewables (known)	Best case
Onsite renewables (additional)	Best case (climbing to 20% by 2040)
Fleet mileage reductions (own and outsourced)	Best case (50% reduction by 2040 then constant)
EV switching (own and outsourced)	Best case (100% EV switching by 2030)
Low carbon energy procurement	No change (i.e. 100% electricity from recognised green tariff)
Offsetting	Best case (net zero by 2030)

The best case trajectory in emissions is illustrated in Figure 4.10 using a PIC reporting boundary and related assumptions (i.e. market based, in-year emissions factors).

Given this is the best case, it includes carbon offsets so that SES Water achieves net zero by 2030.

Figure 4.10 Trajectory 4a: Best case to 2050 (PIC)

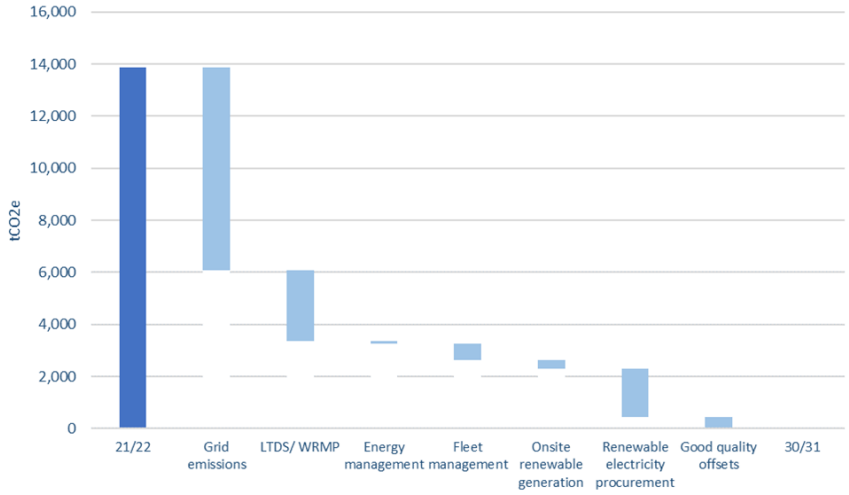


Source: SES Water, Optopia analysis.

Trajectory 4a (tCO2e)	21/22	22/23	30/31	40/41	50/51
Net footprint	2,721	2,289	-	-167	-220

As noted above, the negative emissions towards the end of the period modelled result from the electricity emissions factor projection being negative in the later years.

Figure 4.11 Trajectory 4a: Contribution of different activities (PIC)



Source: SES Water, Optopia analysis

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 4.12 Estimated Capex and Opex: Trajectory 4a (PIC) (£m)

Capex £m	2022-50		2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3		0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	5.5		0.0	0.0	1.2	4.3	0.0	0.0	0.0
Onsite generation	4.7		0.0	0.0	0.0	4.3	0.3	0.1	0.0
All	**12.5**		**0.0**	**0.0**	**1.3**	**10.8**	**0.3**	**0.1**	**0.0**
Opex £m	**2022-50**		**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5		0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	-50.5		0.0	0.0	-4.7	-10.9	-10.9	-10.9	-10.9
Onsite generation	2.1		0.0	0.0	0.0	0.5	0.5	0.5	0.5
Energy procurement	5.1		0.4	0.4	1.7	1.1	1.0	0.0	0.0
Offsetting	0.1		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-50.7**		**0.4**	**0.4**	**-3.6**	**-10.7**	**-11.1**	**-12.1**	**-12.1**

Source: SES Water and Optopia analysis Note cost of offsetting are not zero, just very small, due to the low (15/tCO2e) price assumed for carbon certificates and the assumption that residual emissions are low, because of low carbon electricity procurement.

5. New Ofwat Performance Commitment (PC)

5.1. Trajectory 1b: BAU using the PC methodology

Trajectory 1b is the business as usual (BAU) trajectory based on the performance commitment (PC) methodology. Although it uses the same assumptions as the BAU for the PIC, the results are materially different because:

- the scope of the footprint is much broader, as discussed in Section 3
- the reporting rules are stricter, meaning market-based emissions reductions cannot be used
- emissions factors are fixed and do not allow for grid decarbonisation

The assumptions are summarised in Figure 5.1.

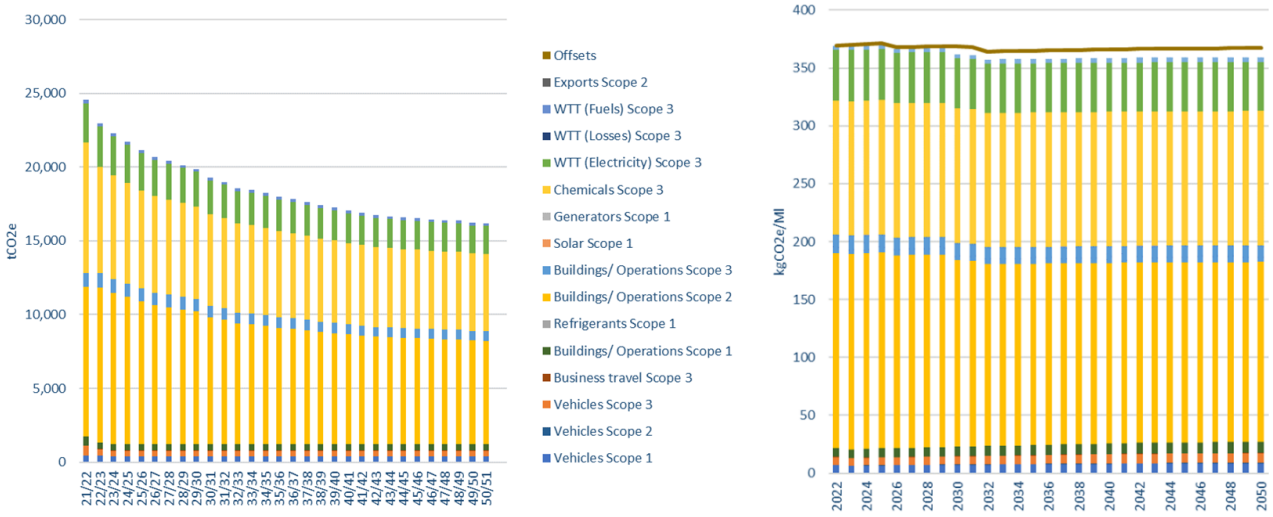
Figure 5.1 Trajectory 1b: assumptions

Assumptions:	Trajectory 1b
Location or market based	Location
Reporting boundary	PC
Emissions factors	Fixed at 2022
Electricity factors	Cornwall: Central scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Baseline
Measures scenario	Baseline
Onsite renewables (known)	Baseline
Onsite renewables (additional)	n/a
Fleet mileage reductions (own and outsourced)	No change
EV switching (own and outsourced)	No change
Low carbon energy procurement	n/a (location based)
Offsetting	n/a (location based)

The BAU trajectory in emissions is illustrated in Figure 5.2 using a PC reporting boundary and related assumptions (i.e. location based, fixed emissions factors).

It shows that the footprint under the PC is much larger than under the PIC. In addition, because most of the change in absolute emissions in the baseline (left hand chart) is driven by the rate of reduction in water supply, the footprint remains relatively constant in relative terms (right hand chart).

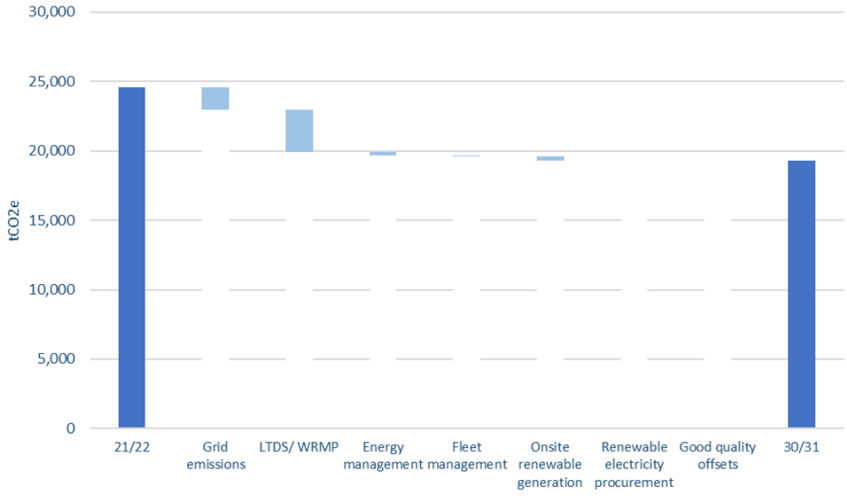
Figure 5.2 Trajectory 1b: BAU to 2050 (PC) (tCO2e on the left, kgCO2e/Ml on the right)



Source: SES Water, Optopia analysis.

Trajectory 1b	21/22	22/23	30/31	40/41	50/51
Net footprint (tCO2e)	24,561	22,956	19,297	17,060	16,211
Net footprint (kgCO2e/Ml)	385	369	362	358	359

Figure 5.3 Trajectory 1b: Contribution of different activities (PC)



Source: SES Water, Optopia analysis Note the reduction in grid emissions relates to the fact that Ofwat has fixed factors based on CAW17 i.e. 22/23 rather than 21/22.

Key determinants of the footprint under all three PC trajectories are:

- Electricity use (because the grid factors stays constant and green tariffs cannot be used). Although the WRMP is expected to reduce electricity use, switching to EVs is expected to increase it.
- Well to tank emissions. These make a material contribution to the footprint. On the plus side, the inclusion of these factors means that where electricity and fuel use can be reduced it, it makes a bigger difference to the footprint.

- Chemicals. These are also assumed to reduce at the rate of the WRMP, however they are carbon intensive and remain a large proportion of the footprint in 2050 in the absence of other abatement options.

It is these areas that SES Water will need to target for energy reduction if it is to affect its emissions as reported under the PC.

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 5.4 Estimated Capex and Opex: Trajectory 1b (PC) (£m)

Capex £m	2022-50		2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3		0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**2.3**		**0.0**	**0.0**	**0.1**	**2.2**	**0.0**	**0.0**	**0.0**
Opex £m	**2022-50**		**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5		0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy procurement	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offsetting	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-7.5**		**0.0**	**0.0**	**-0.6**	**-1.4**	**-1.7**	**-1.7**	**-1.7**

Source: SES Water and Optopia analysis.

5.2. Trajectory 2: Mid case using the PC methodology

Trajectory 2 builds on the business as usual (BAU) trajectory based on the performance commitment (PC) methodology. It uses the same abatement assumptions as Trajectory 3 (mid case based on the PIC methodology). However, it follows the performance commitment reporting requirements.

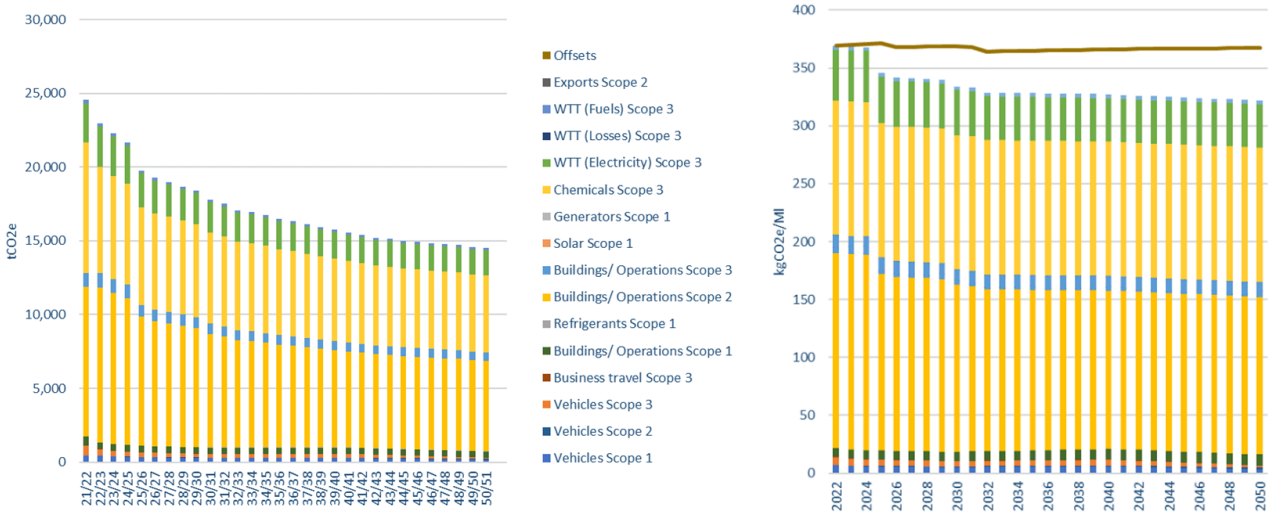
The assumptions are summarised in Figure 5.5.

Figure 5.5 Trajectory 2: assumptions

Assumptions:	Trajectory 2
Location or market based	Location
Reporting boundary	PC
Emissions factors	Fixed at 2022
Electricity factors	Cornwall: Central scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Mid case
Measures scenario	Mid case
Onsite renewables (known)	Mid case
Onsite renewables (additional)	n/a
Fleet mileage reductions (own and outsourced)	Mid case (20% reduction by 2030 then constant)
EV switching (own and outsourced)	Mid case (50% EV switching by 2030 and 100% by 2050)
Low carbon energy procurement	n/a (location based)
Offsetting	n/a (location based)

The mid case trajectory in emissions is illustrated in Figure 5.6 using a PC reporting boundary and related assumptions (i.e. location based, fixed emissions factors).

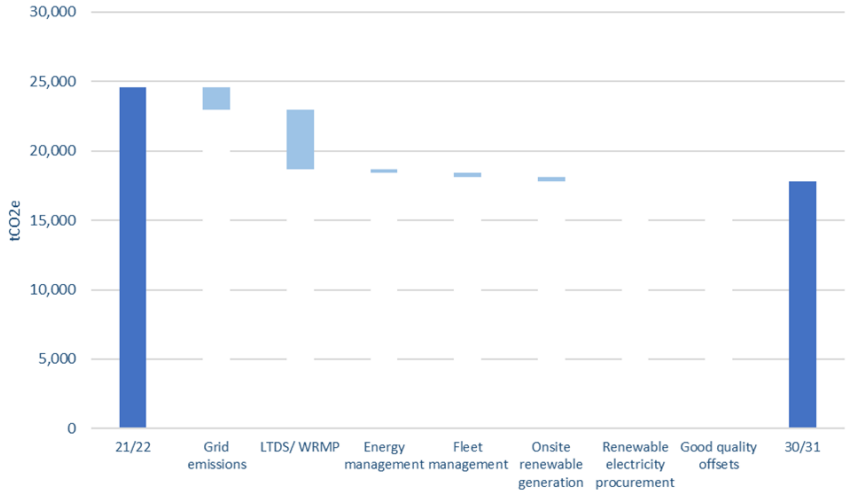
Figure 5.6 Trajectory 2: BAU to 2050 (PC) (tCO2e on the left, kgCO2e/Ml on the right)



Source: SES Water, Optopia analysis.

Trajectory 2	21/22	22/23	30/31	40/41	50/51
Net footprint (tCO2e)	24,561	22,956	17,812	15,575	14,515
Net footprint (kgCO2e/Ml)	385	369	334	327	322

Figure 5.7 Trajectory 2: Contribution of different activities (PC)



Source: SES Water, Optopia analysis

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 5.8 Estimated Capex and Opex: Trajectory 2 (PC) (£m)

Capex £m	2022-50		2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3		0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	0.9		0.0	0.0	0.9	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**3.2**		**0.0**	**0.0**	**1.0**	**2.2**	**0.0**	**0.0**	**0.0**
Opex £m	**2022-50**		**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5		0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	-24.3		0.0	0.0	-4.7	-4.7	-4.7	-4.7	-4.7
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy procurement	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offsetting	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-31.8**		**0.0**	**0.0**	**-5.3**	**-6.1**	**-6.4**	**-6.4**	**-6.4**

Source: SES Water and Optopia analysis.

5.3. Trajectory 4b: Best case using the PC methodology

Trajectory 4b is the best case based on the performance commitment (PC) methodology. It takes the mid case using the PC methodology (Trajectory 2) as a starting point. It then includes additional reductions, for energy management, fleet and onsite generation.

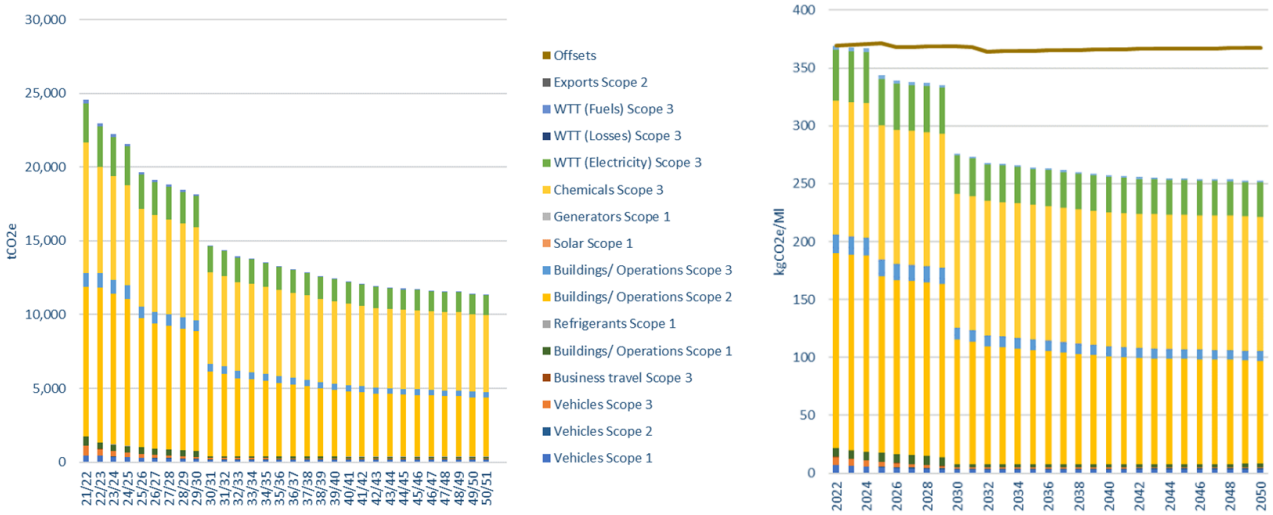
The assumptions are summarised in Figure 5.9.

Figure 5.9 Trajectory 4b: assumptions

Assumptions:	Trajectory 4b
Location or market based	Location
Reporting boundary	PC
Emissions factors	Fixed at 2022
Electricity factors	Cornwall: High scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Best case
Measures scenario	Best case
Onsite renewables (known)	Best case
Onsite renewables (additional)	Best case (climbing to 20% by 2040)
Fleet mileage reductions (own and outsourced)	Best case (50% reduction by 2040 then constant)
EV switching (own and outsourced)	Best case (100% EV switching by 2030)
Low carbon energy procurement	n/a (location based)
Offsetting	n/a (location based)

The best case trajectory in emissions is illustrated in Figure 5.10 using a PC reporting boundary and related assumptions (i.e. location based, fixed emissions factors).

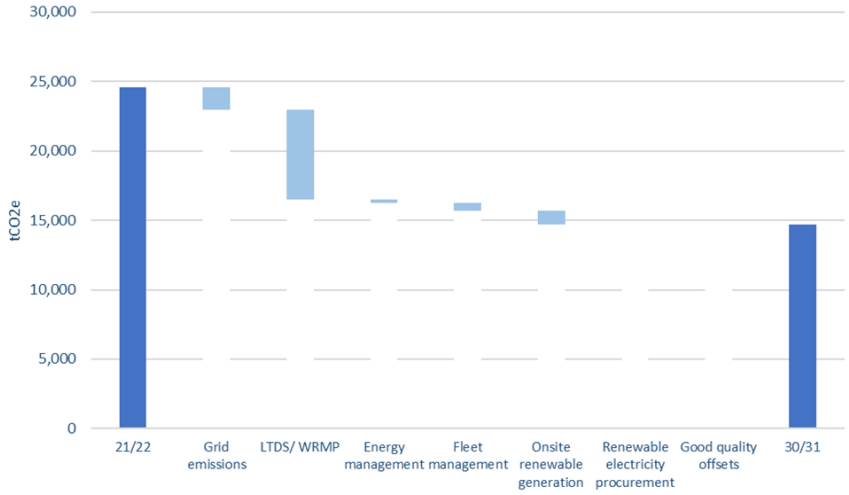
Figure 5.10 Trajectory 4b: BAU to 2050 (PC) (tCO2e on the left, kgCO2e/Ml on the right)



Source: SES Water, Optopia analysis.

Trajectory 4b	21/22	22/23	30/31	40/41	50/51
Net footprint (tCO2e)	24,561	22,956	13,863	11,552	10,703
Net footprint (kgCO2e/Ml)	385	369	260	243	237

Figure 5.11 Trajectory 4b: Contribution of different activities (PC)



Source: SES Water, Optopia analysis

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 5.12 Estimated Capex and Opex: Trajectory 4b (PC) (£m)

Capex £m	2022-50	2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3	0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	5.5	0.0	0.0	1.2	4.3	0.0	0.0	0.0
Onsite generation	4.7	0.0	0.0	0.0	4.3	0.3	0.1	0.0
All	**12.5**	**0.0**	**0.0**	**1.3**	**10.8**	**0.3**	**0.1**	**0.0**
Opex £m	**2022-50**	**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5	0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	-50.5	0.0	0.0	-4.7	-10.9	-10.9	-10.9	-10.9
Onsite generation	2.1	0.0	0.0	0.0	0.5	0.5	0.5	0.5
Energy procurement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Offsetting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-55.9**	**0.0**	**0.0**	**-5.3**	**-11.8**	**-12.1**	**-12.1**	**-12.1**

Source: SES Water and Optopia analysis.

5.4. Trajectory 5: Mid case using SES Water PC proposal

Following feedback on the draft report, we have added a fifth trajectory. Trajectory 5 uses the same assumptions as the mid case based on the performance commitment (PC) methodology (Trajectory 2). However, it assumes that SES Water is allowed to report on a market basis and that emissions factors vary with time. As a result, emissions under this scenario are higher than under the PIC methodologies but lower than under Trajectory 2.

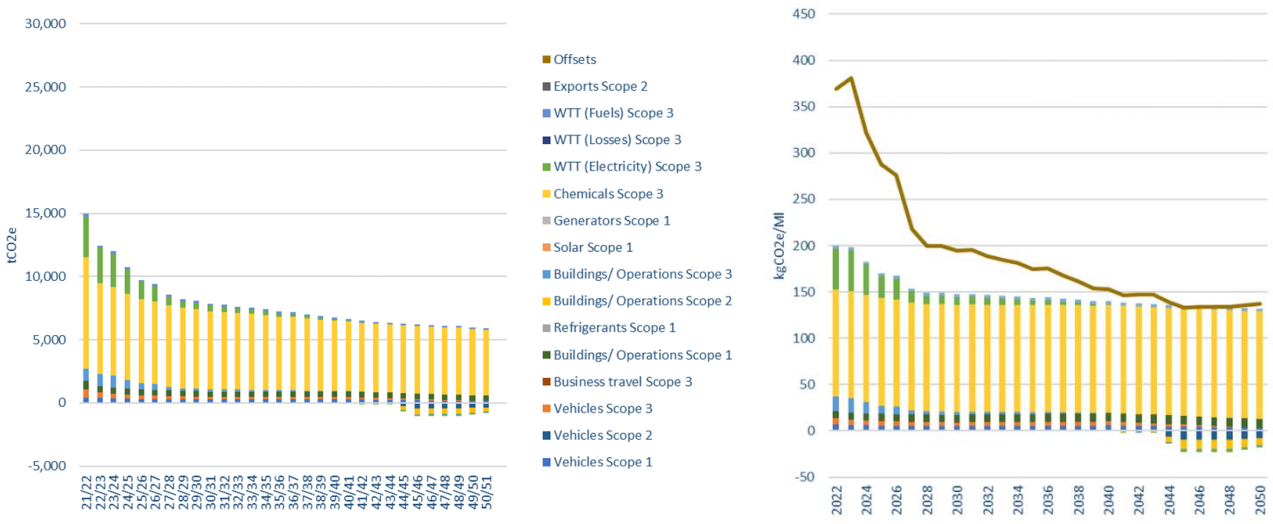
The assumptions are summarised in Figure 5.13.

Figure 5.13 Trajectory 5: assumptions

Assumptions:	Trajectory 2
Location or market based	Market
Reporting boundary	PC
Emissions factors	In year
Electricity factors	Cornwall: Central scenario
Impact of WRMP	Table 3c: DYAA - Final plan
Impact of LTDS	Mid case
Measures scenario	Mid case
Onsite renewables (known)	Mid case
Onsite renewables (additional)	n/a
Fleet mileage reductions (own and outsourced)	Mid case (20% reduction by 2030 then constant)
EV switching (own and outsourced)	Mid case (50% EV switching by 2030 and 100% by 2050)
Low carbon energy procurement	Market
Offsetting	PC

The new mid case trajectory in emissions is illustrated in Figure 5.6 using a PC reporting boundary but market reporting and allowing emissions factors to vary over time.

Figure 5.14 Trajectory 5: BAU to 2050 (SES Water PC proposal) (tCO2e on the left, kgCO2e/Ml on the right)

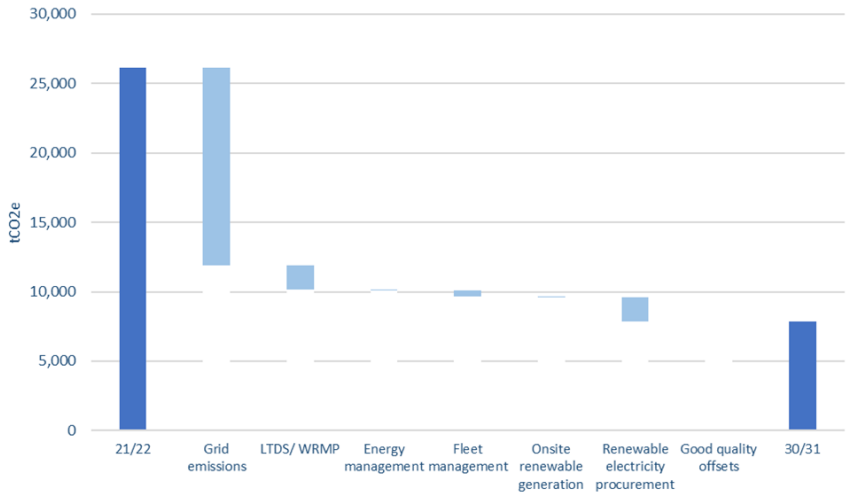


Source: SES Water, Optopia analysis.

Trajectory 2	21/22	22/23	30/31	40/41	50/51
Net footprint (tCO2e)	24,561	22,956	17,109	14,323	13,263

Net footprint (kgCO2e/Ml)	385	369	321	301	294

Figure 5.15 Trajectory 5: Contribution of different activities (SES Water PC proposal)



Source: SES Water, Optopia analysis

Consistent with other market scenarios, Trajectory 5 assumes that only emissions from electricity generation (i.e. Scope 2 emissions) are zero-rated as a result of the low carbon electricity procurement. In the PIC trajectories, given the narrow reporting boundary, in terms of electricity, this just leaves emissions from losses (in Scope 3). Trajectory 5 is based on the PC reporting boundary however, so for electricity, WTT emissions for both generation and losses are also left in Scope 3.

Costs

The table below sets out an estimate of the capital and operational costs under this trajectory. Please refer to Figure 2.3 for an explanation of which categories of costs were included for this project.

Figure 5.16 Estimated Capex and Opex: Trajectory 5 (SES Water PC proposal) (£m)

Capex £m	2022-50		2023-24	2024-25	2025-30	2030-35	2035-40	2040-45	2045-50
Baseline energy management	2.3		0.0	0.0	0.1	2.2	0.0	0.0	0.0
Scenario energy management	0.9		0.0	0.0	0.9	0.0	0.0	0.0	0.0
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**3.2**		**0.0**	**0.0**	**1.0**	**2.2**	**0.0**	**0.0**	**0.0**
Opex £m	**2022-50**		**2023-24**	**2024-25**	**2025-30**	**2030-35**	**2035-40**	**2040-45**	**2045-50**
Baseline energy management	-7.5		0.0	0.0	-0.6	-1.4	-1.7	-1.7	-1.7
Scenario energy management	-24.3		0.0	0.0	-4.7	-4.7	-4.7	-4.7	-4.7
Onsite generation	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy procurement	6.2		0.4	0.4	1.7	1.5	1.4	0.3	0.0
Offsetting	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
All	**-25.6**		**0.4**	**0.4**	**-3.5**	**-4.6**	**-5.0**	**-6.1**	**-6.4**

Source: SES Water and Optopia analysis.

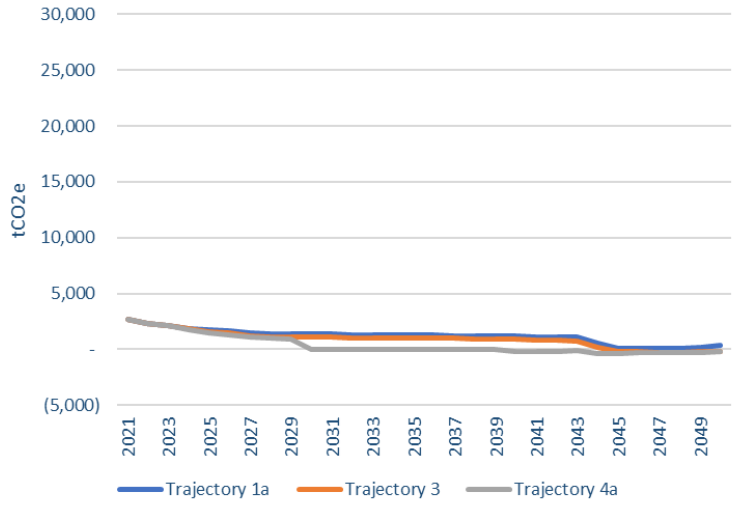
6. Review of trajectories

The scenarios in this report demonstrate how the reporting boundary directly affects both the scale of the footprint reported and the range of abatement options available.

6.1. Comparison of trajectories

The PIC carbon footprint is much smaller than the PC footprint. There are also a wide range of options to reduce it. As a result, it starts smaller and, if grid emissions reduce at the rate expected, SES Water can achieve its net zero commitment in a best case.

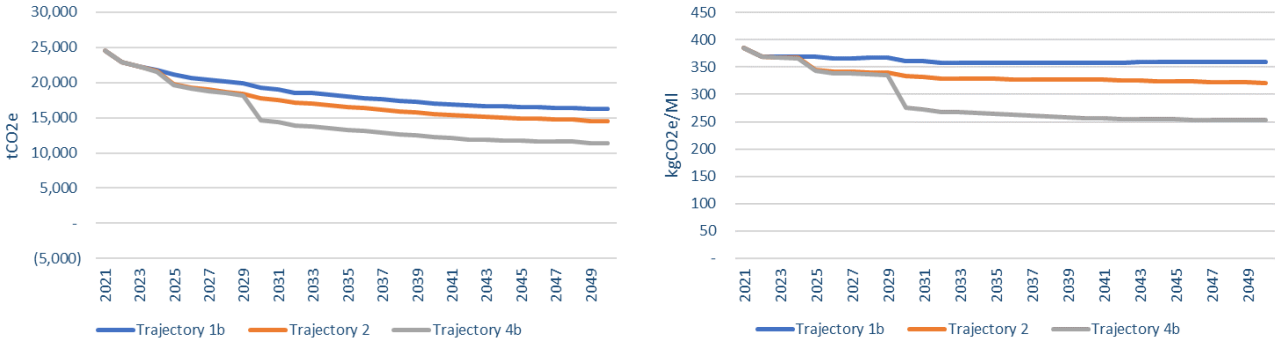
Figure 6.1 Public interest commitment trajectories (tCO2e)



Source: SES Water and Optopia analysis.

In absolute terms, the PC trajectories rely on emissions reductions through reduced energy and chemicals use, as DI reduces. However, in relative terms, energy management, fleet management and onsite (behind the meter) renewables can all help reduce relative emissions as reported under the PC. Although the resulting footprint reductions are considerably higher under the PIC, a best case could deliver a material difference.

Figure 6.2 Performance commitment trajectories (tCO2e and kgCOe/Ml)

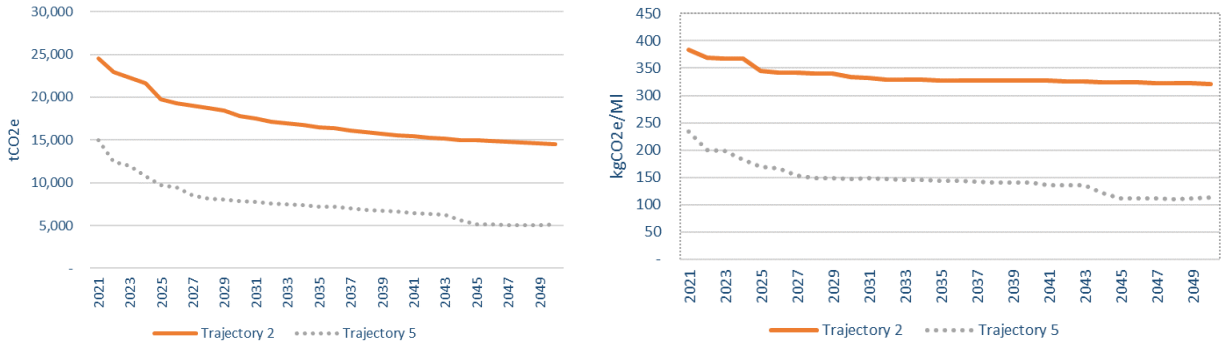


Source: SES Water and Optopia analysis

For the final report, we have added a new trajectory, the SES Water PC proposal. This reflects the mid case using a PC boundary but uses market-based reporting and allows emissions factors to change over time. All other assumptions in the new Trajectory 5 (mid case based on SES Water PC proposal) are the same as in Trajectory 2 (mid case based on the PC).

Trajectory 5 is compared against Trajectory 2 in Figure 6.3 below.

Figure 6.3 SES Water PC proposal trajectory (tCO2e and kgCOe/Ml)



6.2. Impact of softening

SES Water is the only company with a statutory obligation to soften water. It has a material impact on its carbon footprint (under a PIC boundary but particularly a PC boundary) due to the use of electricity and chemicals (lime and hydrochloric acid). All of the trajectories assume that SES Water continues to soften water and so to undertake these activities to a similar extent per Ml of water supplied as in 2022/23. Were SES Water to cease softening, this would have a material impact on its carbon footprint. In order to demonstrate that impact, the footprint of the relevant activities is shown below.

Figure 6.4 Illustrative impact of stopping softening (tCO2e)

Scope	Emissions source	2030
Scope 3	Lime	-1,947
Scope 3	Hydrochloric acid	-2,777
Scope 3	Ferric sulphate	-22
Scope 2	Electricity*	-1,988
	Total	**-6,734**

Source: SES Water, Optopia analysis *Includes generation, losses, generation WTT and losses WTT impacts based on CAW v17 emissions factors.

Figure 6.5 Impact of stopping softening on BAU Trajectory 1b (PC) (tCO2e)

Scope	Emissions source	2030
	Softening impact as % of total footprint	35%
	Net footprint including softening	19,297
	Net footprint excluding softening	12,563

7. Risks and challenges

This report contains projections, which by definition are uncertain. They set out one view of the future based on a series of assumptions; actual outturn may be different than expected. This section sets out some key reasons why actual outturn may differ from the projections in this report.

New reporting guidance

We have followed the written guidance but are aware that this is the first time SES Water has calculated its emissions on this reporting boundary. As a result, it is possible that the final PC agreed with Ofwat may reflect some differences in emissions included/ excluded and/or that its reporting guidance may develop over time (so affecting how easy it is to demonstrate a reduction in relative emissions).

SES Water's delivery of the WRMP

If demand for water is not reduced as planned, it could increase the absolute carbon footprint. The absolute projections in this report assume the delivery of the WRMP. Both electricity use and chemicals use are assumed to reduce materially over the period modelled, as a direct result of the delivery of the WRMP. Since this would also increase DI, its impact on SES Water's PC may be muted. It would make the 2030 net zero target more costly to deliver.

Outsourced activities

In this report we assume that outsourced activities, specifically vehicle mileage and EV switching, achieve the same ambitious profiles as for SES Water's own fleet. Achieving this will require a clear fleet strategy that is embedded in SES Water's procurement requirements of third parties.

Home vehicle charging

It is still early to judge the impact of the electric vehicle roll out on SES Water's footprint, which introduces uncertainty. For instance, the assumptions rely on diesel and petrol consumption reducing due to the uptake of EVs (not that EVs become additional mileage). In addition, colleagues charging vehicles away from work may result in apparent reduction in emissions, if this isn't correctly recorded, which may increase again as reporting improves. The source of charging away from site is also currently outside SES Water's control to ensure is low carbon (i.e. it is not on its corporate green tariff).

SES Water's delivery of the WRMP

If demand for water is not reduced as planned, it could increase the absolute carbon footprint. The absolute projections in this report assume the delivery of the WRMP. Since this would also increase DI, it may not impact directly on SES Water's PC but it would make the 2030 net zero target more costly to deliver.

Grid emissions

If the grid decarbonises to a lesser extent (or more slowly) than assumed, it would increase the absolute carbon footprint. The decarbonisation of the national electricity grid is outside SES Water's control. As this market-based approach does not count towards the PIC, a slower rate of decarbonisation will most affect the cost of delivering the PIC.

Treatment of energy procurement

We assume in the baseline, mid and best cases that SES Water is allowed to demonstrate a material reduction in its market based footprint by procuring green electricity. The GHG Protocol recently consulted on updates to its guidance to corporate carbon footprints (changes which could feed into UK reporting). This could mean that SES Water would need to pursue other avenues to procure electricity

that meets a zero emissions reporting requirement and these may be more expensive than the cost of REGOs assumed.

SES Water's delivery of the net zero programme

If SES Water does not implement the energy savings measures assumed (or if they do not deliver the savings expected), the trajectories will not be achieved. While for the purposes of illustration the results in this report are grouped into a small series of categories, in reality, each chunk of emissions reductions breaks down into a large number of smaller actions. These must be proactively managed if they are to deliver effectively, to the cost expected and on time.

Market movements

The cost of abatement could move materially in the timescales covered by this study. While in some cases this may make the costs of abatement less expensive than assumed, it could push the costs up too. For instance, in recent years we have seen material changes in the cost of carbon offsets and renewable energy certificates (REGOs) as well as in the cost of materials (e.g. PV panels).

Reporting/ regulation

Changes to the reporting rules may affect the options available to SES Water. For instance, the carbon insetting and offsetting markets are relatively immature and the accepted view of a 'quality' certificate is developing rapidly.

Disclaimer

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