

# Natural Resources Wales' Net Zero Plan 2024-2030

Report No: 856

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## About Natural Resources Wales

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We will realise this vision by:

- maintaining and developing the technical specialist skills of our staff
- securing our data and information
- having a well-resourced proactive programme of evidence work
- continuing to review and add to our evidence to ensure it is fit for the challenges facing us
- communicating our evidence in an open and transparent way

This Evidence Report series serves as a record of work carried out or commissioned by Natural Resources Wales. It also helps us to share and promote use of our evidence by others and develop future collaborations. However, the views and recommendations presented in this report are not necessarily those of NRW and should, therefore, not be attributed to NRW.

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## Crynodeb gweithredol

Mae'r Cynllun Sero Net hwn yn disodli Cynllun Galluogi Carbon Bositif CNC a gyhoeddwyd yn 2019 yn dilyn datgan argyfwng hinsawdd gan Lywodraeth Cymru. Mewn gwirionedd, hwn oedd ein Cynllun Sero Net cyntaf a hwn osododd y cyfeiriad strategol a'r blaenoriaethau ar gyfer datgarboneiddio yn CNC rhwng 2019 a 2023.

Mae ein cynllun corfforaethol newydd a'n cynlluniau busnes a gwasanaeth yn cydnabod yr heriau amgylcheddol a achosir gan y newid yn yr hinsawdd, ac wedi ymrwymo i leihau allyriadau a diogelu a gwella storffeydd carbon hirdymor o fewn ein gweithrediadau ein hunain a thrwy ein dylanwad ehangach.

Rydym, cyn belled ag y bo modd, wedi alinio ein ffin sefydliadol ar gyfer adeiladau, asedau a thir â dull gwasanaeth y sector cyhoeddus a nodir yng Nghanllaw Adrodd Sero Net Llywodraeth Cymru a ddatblygodd o waith Prosiect Carbon Bositif CNC. Y ffynonellau allyriadau a nodir gan CNC yn y cynllun hwn yw adeiladau, trafndiaeth a pheiriannau, allyriadau ac atafaelu tir (gan gynnwys amaethyddiaeth), gwastraff a gynhyrchir mewn gweithrediadau, nwyddau a gwasanaethau a brynwyd, teithio at ddibenion busnes, a gweithwyr yn cymudo ac yn gweithio gartref. Mae holl ffynonellau allyriadau Cwmpas 1, a Chwmpas 2 a 3 i fyny'r gadwyn gyflenwi, wedi'u cynnwys ond nid ein hallyriadau Cwmpas 3 i lawr y gadwyn gyflenwi, sydd ddim yn cael eu cyfrif ar hyn o bryd yn adroddiadau sero net sector cyhoeddus Cymru.

Wrth ddatblygu cynllun CNC, rydym wedi ceisio bod yn gyson lle y bo'n briodol â Chynllun Strategol Sero Net Llywodraeth Cymru (Llywodraeth Cymru, 2022), sy'n nodi'r uchelgeisiau ar gyfer eu datgarboneiddio sefydliadol eu hunain. Fel yng nghynllun Llywodraeth Cymru, rydym wedi defnyddio egwyddorion y Fenter Targedau'n Seiliedig ar Wyddoniaeth (SBTi) i osod targedau ar gyfer llawer o allyriadau gweithredol. Rydym hefyd wedi datblygu sawl llwybr allyriadau a sawl senario ar gyfer 'gwneud dim', 'ennill momentwm' a 'newid cyflymach' ar gyfer y rhan fwyaf o allyriadau gweithredol mewn modd tebyg.

Ym mlwyddyn ariannol 2022-23, cyfrifwyd mai allyriadau nwyon tŷ gwydr CNC, h.y. ein hól troed carbon sefydliadol, oedd 22,962 tCO<sub>2</sub>e. Nid yw hyn yn cynnwys allyriadau ac atafaelu tir. Nid yw'r cyfanswm hwn hefyd yn cynnwys allyriadau y tu allan i'r cwmpas, a oedd yn gyfystyr â 552.3 tCO<sub>2</sub>e ychwanegol. Amcangyfrifwyd mai cyfanswm net y carbon a atafaelwyd mewn cynefinoedd ar ystad CNC oedd -390,000 tCO<sub>2</sub>e (yn seiliedig ar ddata 2015-16).

Cyfrifwyd yr ôl troed carbon yn y cynllun hwn ar gyfer gweithgarwch gweithredol ar gyfer cyflwyno ein hadroddiad sero net sector cyhoeddus Cymru, sy'n cael ei ddiweddarau'n flynyddol. Cyfanswm allyriadau gweithredol CNC (ac eithrio'r gadwyn gyflenwi a defnydd tir) oedd 6,955 tCO<sub>2</sub>e yn 2019-20, 3,093 tCO<sub>2</sub>e yn 2020-21, 3,556 tCO<sub>2</sub>e yn 2021-22, a 3,655 tCO<sub>2</sub>e yn 2022-23. Allyriadau sy'n gysylltiedig â thanwydd y fflyd ac offer (8%), gweithio gartref (6%), a'r defnydd o wres a thrydan mewn adeiladau (4%) yw'r categorïau mwyaf o'n hallyriadau gweithredol.

Mae tueddiadau yn allyriadau gweithredol CNC yn cael eu gwerthuso ar sail blwyddyn sylfaen 2019-20 ar gyfer adrodd sero net. Mae effeithiau Covid ar allyriadau gweithredol yn glir gyda gostyngiadau sylweddol mewn allyriadau o'r rhan fwyaf o gategoriâu yn 2020-21 o'u cymharu â llinell sylfaen 2019-20, yn fwyaf nodedig yw y gostyngiad mawr mewn allyriadau cymudo. Cynyddodd allyriadau o wastraff a gweithio gartref yn 2020-21 a chynyddodd allyriadau offer a theithiau busnes yn 2022-23, gan adlewyrchu newidiadau ar ôl y pandemig. Cynyddodd ein hallyriadau cadwyn gyflenwi sefydliadol dros 12% yn 2022-23 o'u cymharu â'r flwyddyn ariannol flaenorol a 22% o'u cymharu â'r flwyddyn sylfaen (2019-20), gan adlewyrchu cynnydd mewn gwariant a gwelliannau ac awtomeiddio dulliau coladu ar gyfer data gwariant.

Mae'r tueddiadau yn ein data yn adlewyrchu'r ffaith ein bod wedi gwneud gostyngiadau goddefol mewn allyriadau drwy ddatgarboneiddio'r grid ynghyd â gostyngiadau rhagweithiol drwy leihau ein portffolio adeiladau a'r ffaith fod Covid-19 wedi ysgogi mwy o weithio gartref. Er gwaethaf ystod o gamau datgarboneiddio, nid yw CNC wedi cyflawni cynnydd sylweddol yn bwrpasol eto tuag at ei nodau lleihau carbon ei hun. Nod y cynllun hwn yw sicrhau bod gennym gynllun i leihau ein hallyriadau hyd at 2030 ac i gyfrannu at uchelgais datgarboneiddio ehangach y sector cyhoeddus ar gyfer 2030.

Mewn perthynas â'n gosod targedau, mae CNC wedi dewis dull hybrid, gan ddatblygu targedau pwrpasol lle mae data mewnol o ansawdd uchel ar gael i gefnogi eu datblygiad, ond, lle nad oes data mewnol da ar gael, rydym wedi defnyddio targedau SBTi generig. Mae'r cynllun hwn yn cynnwys y mentrau strategol a fydd yn ein symud tuag at ein huchelgeisiau i leihau allyriadau a bydd yn cael ei adolygu yn gyson.

Mae'r senarios datgarboneiddio a nodir yn y cynllun hwn yn amlygu'r gostyngiadau posibl mewn allyriadau nwyon tŷ gwydr y gellid eu cyflawni drwy amrywiaeth o gamau gweithredu, yn seiliedig ar wybodaeth a thystiolaeth gyfredol.

Mae'r senarios yn cwmpasu allyriadau nwyon tŷ gwydr gweithredol a'r gadwyn gyflenwi o'r meysydd canlynol:

- yr ystad adeiledig
- fflyd a pheiriannau/offer
- staff yn cymudo
- gweithio gartref
- y gadwyn gyflenwi
- asedau gweithredol, megis gorsafoedd pwmpio
- teithio at ddibenion busnes

Y senarios hyn yw:

- 'gwneud dim byd' (busnes fel arfer)
- 'ennill momentwm'
- 'newid cyflymach'

Mae'r senarios yn dangos lefelau gwahanol o gamau datgarboneiddio. Maent yn dangos graddfa a chyflymder y newid sydd ei angen. Er mwyn cynyddu'r cyfraniad hwn ymhellach, byddai angen rhagor o arloesi a gwelliannau technolegol ac uwchraddio camau gweithredu. O ystyried y cyfyngiadau ar adnoddau, rydym hefyd wedi cynnal ymarfer blaenoriaethu ym mhob un o'r meysydd datgarboneiddio thematig i helpu i flaenoriaethu'r gwaith o gyflawni camau gweithredu yn ystod cyfnod y cynllun. Fodd bynnag, amlygodd hyn y realiti ar gyfer llawer o feysydd, er enghraifft adeiladau a'r fflyd, bod gweithredoedd yn rhyngberthynol a bod angen eu gweithredu mewn modd integredig naill ai o fewn adeilad neu ar draws y fflyd yn hytrach nag ar wahân. O ganlyniad, graddfa a chyflymder y gweithredu fel y nodir yn y llwybrau yn hytrach na nifer y camau a gymerir ar unrhyw un adeg fydd yn pennu anghenion adnoddau a chynnydd.

Mae CNC yn cydnabod y rôl bwysig sydd gan newid ymddygiad wrth leihau ein hól troed carbon sefydliadol ein hunain hefyd. Fel rhan o'n gwaith i ymgorffori ystyriaeth o ddatgarboneiddio a newid yn yr hinsawdd yng ngwaith pawb, mae CNC wedi gweithio gyda Phrifysgol Fetropolitan Manceinion (MMU) a Cynnal Cymru – Sustain Wales i ddatblygu pecyn hyfforddi pwrpasol ar newid hinsawdd sy'n bodloni safon yr Ymddiriedolaeth Llythrennedd Carbon.

Bydd mireinio ymhellach y broses effeithiol o gasglu a defnyddio data yn broses ailadroddol a fydd yn gofyn am rolau a chyfrifoldebau clir ar draws y sefydliad o ran pwy sy'n gyfrifol am gasglu, coladu a gwerthuso data. Hyrwyddir ymagwedd ystwyth i sicrhau bod systemau a ffyrdd o weithio sy'n gymesur yn cael eu mabwysiadu.

Dros y dudalen, mae tabl cryno o'r camau gweithredu allweddol a gynigir yn y cynllun hwn i gyflawni ein llwybrau lleihau allyriadau arfaethedig. Bydd y tabl hwn yn cael ei adolygu'n gyfnodol ond yn rhoi rhestr glir o'r camau nesaf.

**Crynodeb o'r camau allweddol y mae angen i CNC eu cymryd i gyflawni canlyniadau'r Cynllun Sero Net**

Categori allyriadau	Cam datgarboneiddio arfaethedig	Prif swyddogaeth cyflawni CNC
Yr ystad adeiledig	<ul style="list-style-type: none"> <li>• Rhesymoli asedau.</li> <li>• Rheoli ynni'n effeithiol (caffael ynni, dadansoddi data ynni, adolygu gosodiadau gwresogi).</li> <li>• Mesurau effeithlonrwydd ynni, e.e. inswleiddio, rheolyddion gwresogi.</li> <li>• Systemau ynni adnewyddadwy wedi'u gosod ar adeiladau.</li> <li>• Gwresogi carbon isel (pymptiau gwres).</li> <li>• Newid ymddygiad.</li> </ul>	Adnewyddu/R heoli Cyfleusterau a Fflyd

Categori allyriadau	Cam datgarboneiddio arfaethedig	Prif swyddogaeth cyflawni CNC
Fflyd a pheiriannau	<p>Fflyd</p> <ul style="list-style-type: none"> <li>Ni ddylai unrhyw gerbydau peiriant tanio mewnol newydd gael eu prydlesu o 2024 ymlaen oni bai fod hynny'n gwbl angenrheidiol. Dylai unrhyw gerbydau newydd o'r fath, a'r holl gerbydau presennol, gael eu gweithredu gan ddefnyddio olew llysiâu hydrogenedig, er y bydd hyn yn cynyddu'r gost weithredol oherwydd pris tanwydd uwch.</li> <li>Dylid disodli pob cerbyd peiriant tanio mewnol wedi'i frandio (ac eithrio cerbydau 4x4 a cherbydau nwyddau trwm) â cherbydau trydan batri erbyn 2029-30.</li> <li>Dylid gweithredu cerbydau peiriant tanio mewnol 4x4 a cherbydau nwyddau trwm gan ddefnyddio olew llysiâu hydrogenedig a rhoi cerbydau trydan batri yn eu lle pan fo hynny'n ymarferol.</li> <li>Dylid cynnal adolygiad o'r defnydd o gerbydau peiriant tanio mewnol 4x4 presennol i ganfod a oes angen gweithgareddau cyfredol ac a ellir eu cynnal o bell neu drwy ddulliau eraill ag ôl troed carbon is.</li> <li>Dylid cynnal ymchwiliad i ganfod achosion defnydd isel (&lt;6,000 milltir y flwyddyn) o rai cerbydau wedi'u brandio.</li> <li>Nodi camau i wella'r defnydd o gerbydau trydan batri presennol wedi'u brandio gan staff.</li> <li>Integreiddio system dal data i fonitro milltired a defnydd ynni gan gerbydau trydan batri cyn gynted ag y bo'n dechnegol ymarferol.</li> <li>Gwella data olrhain i bennu'r milltired uchaf a phatrymau defnydd nodweddiadol ar gyfer cerbydau unigol.</li> </ul> <p>Peiriannau</p> <ul style="list-style-type: none"> <li>Dylai CNC gynnal asesiad o'r defnydd o beiriannau a chreu blaengynllun sy'n asesu dichonoldeb disodli peiriannau sy'n defnyddio tanwydd ffosil yn gynyddol â thechnoleg trydan a hydrogen.</li> </ul>	Fflyd

Categori allyriadau	Cam datgarboneiddio arfaethedig	Prif swyddogaeth cyflawni CNC
Teithio at ddibenion busnes	<p>Y fflyd lwyd</p> <ul style="list-style-type: none"> <li>Dylid cynnal adolygiad cyfnodol i sicrhau bod coeden penderfynu teithio CNC yn addas i'r diben ac yn cael ei defnyddio wrth deithio at ddibenion busnes.</li> <li>Dylid annog staff i ddefnyddio cerbydau cronfa wedi'u brandio ar gyfer teithiau busnes lle bo modd os nad yw'r cerbyd preifat yn gerbyd allyriadau isel iawn (&lt;75g/CO<sub>2</sub>/km).</li> <li>Dylai CNC gyflwyno cynllun aberthu cyflog i staff brydlesu cerbydau trydan batris, a fydd yn cael effaith gadarnhaol o ran lleihau allyriadau o'r fflyd lwyd a theithiau cymudo staff.</li> </ul> <p>Fflyd ceir llogi</p> <ul style="list-style-type: none"> <li>Ar y cyd ag adolygiad cyfnodol o goeden penderfynu teithio CNC, dylid cynnal asesiad i sicrhau bod y mathau mwyaf effeithlon o gerbydau'n cael eu llogi (yn addas ar gyfer y defnydd a fwriedir) er mwyn asesu'r nifer sy'n defnyddio cerbydau trydan batri.</li> </ul>	Fflyd
Gweithio ystwyth, Gweithio gartref a chymudo	<ul style="list-style-type: none"> <li>Gwneud y gorau o wasanaethau TG carbon isel presennol a pharhau i fuddsoddi mewn seilwaith digidol sy'n galluogi gweithio cynhyrchiol o bell a chysylltedd ar draws y sefydliad.</li> <li>Parhau i gynnal arol Welsh Government 'teithio staff' blynyddol i leihau ein dibyniaeth ar feincnodau generig a nodi mentrau datgarboneiddio wedi'u teilwra sy'n ymwneud â gweithio ystwyth.</li> <li>Parhau i alinio ein proses o gynllunio/gwneud penderfyniadau â'r hierarchiaeth teithio cynaliadwy a chefnogi'r nifer sy'n ei defnyddio ymhlith staff i symud arferion cymudo i ddulliau teithio carbon isel.</li> <li>Ymgysylltu â staff i ddeall y rhwystrau presennol i ddefnyddio teithio llesol a thrafnidiaeth gyhoeddus.</li> <li>Darparu amgylchedd galluogi ar gyfer teithio carbon isel, gan gynnwys gwelliannau i'r ddarpariaeth o gyfleusterau storio beiciau, cawodydd a gwefrwyr cerbydau trydan, a chynnal polisïau galluogi megis ein cynllun beicio i'r gwaith.</li> <li>Datblygu cyfrifiannell staff i archwilio effaith tanwydd gwresogi deiliaid tai a phellter cymudo ar allyriadau i lywio penderfyniadau staff ar y materion dyddiol hyn.</li> </ul>	TGCh/Newid Hinsawdd a Datgarboneiddio/ Adnoddau Dynol/ Adnewyddu/ Cyfleusterau

Categori allyriadau	Cam datgarboneiddio arfaethedig	Prif swyddogaeth cyflawni CNC
Y gadwyn gyflenwi	<ul style="list-style-type: none"> <li>• Cyflwyno system haenog o ofynion adrodd a lleihau carbon ar gyfer pob cyflenwr erbyn 2025.</li> <li>• Datblygu pecyn adnoddau i staff i gefnogi rheolwyr contract i gynnwys y gofynion lleihau carbon ac adrodd sy'n berthnasol i haen eu contract.</li> <li>• Datblygu holiadur allyriadau i gyflenwyr ar allyriadau sefydliadol.</li> <li>• Integreiddio cwestiynau carbon sylfaenol yn ein holl dempledi tendro a dyfynbrisau ar gyfer cyflenwyr.</li> <li>• Archwilio'r defnydd o gyfrifianellau carbon ar gyfer contractau a fframweithiau gwerth uchel ac allyriadau uchel i'w gwneud yn ofynnol i gyflenwyr osod llinell sylfaen a dangos arbedion ar lefel contract neu brosiect.</li> <li>• Datblygu system i gofnodi data allyriadau ar lefel contract yn ganolog a chyfuno hyn â data allyriadau sefydliadol a ddyrannwyd, a data a seilir ar wariant, ar gyfer contractau gwerth is i gynhyrchu amcangyfrifon allyriadau cadwyn gyflenwi gyfan ar gyfer CNC.</li> </ul>	Caffael/Grŵp Cynllunio ac Adnoddau/Gw asanaeth Cymorth Rheoli Contractau/ Swyddfa Rheoli Portffolios

Categori allyriadau	Cam datgarboneiddio arfaethedig	Prif swyddogaeth cyflawni CNC
Asedau gweithredol	<ul style="list-style-type: none"> <li>Sicrhau bod gan gyflenwadau trydan ddarllenwyr mesuryddion awtomatig (AMR) fel bod data ac anfonebau trydan yn gywir, a sicrhau bod yr holl asedau ar ein prif gontract ynni adnewyddadwy 100%.</li> <li>Adolygu'r cynnydd presennol o ran ôl-osod technolegau ynni adnewyddadwy i asedau ac ailedrych ar astudiaethau dichonoldeb blaenorol a'u diweddarau lle bo angen.</li> <li>Gosod ynni adnewyddadwy ar y ddaear i hunangyflenwi ynni i asedau CNC, lle bo hynny'n briodol ac yn ymarferol.</li> <li>Ymchwilio ymhellach i gynhyrchu ynni adnewyddadwy ar yr ystad a reolir gan CNC ar gyfer hunangyflenwi lle mae lleoliad asedau yn caniatáu hynny.</li> <li>Ôl-osod holl orsafoedd pwmpio a reolir gan CNC gyda phympiau ynni-effeithlon a chynhyrchu ynni adnewyddadwy, lle bo hynny'n ymarferol.</li> <li>Ôl-osod holl asedau llai a reolir gan CNC (e.e. gorsafoddd mesur) ag ynni adnewyddadwy microgynhyrchu, lle bo hynny'n ymarferol.</li> <li>Sicrhau bod paneli ffotofoltäig solar yn cael eu hystyried wrth ddylunio a datblygu pob ased newydd.</li> <li>Adolygu cynnydd gyda staff hydrometreg a thelemetreg a datblygu rhaglen o ôl-osod ynni adnewyddadwy pellach ar draws asedau gweithredol.</li> </ul>	Gweithrediadau/MEICA/Hydr ometreg a Thelemetreg
Defnydd tir	<ul style="list-style-type: none"> <li>Adolygu'r asesiad modelu statws carbon net o'r cynefinoedd ar yr ystad dros y flwyddyn nesaf, gan ystyried yr amcangyfrifon diweddaraf sydd ar gael o lif carbon ar gyfer pob cynefin, yn ogystal ag adfer mawndiroedd ar yr ystad.</li> </ul>	Newid Hinsawdd a Datgarboneiddio
Newid ymddygiad	<ul style="list-style-type: none"> <li>Parhau i gyflwyno ein hyfforddiant pwrpasol ar y newid yn yr hinsawdd i staff a monitro ei effaith ar ymddygiad a phenderfyniadau yn dilyn y cwrs.</li> </ul>	Newid Hinsawdd a Datgarboneiddio/Dysgu a Datblygu
Gwastraff	<ul style="list-style-type: none"> <li>Cwblhau a gweithredu polisi economi gylchol a lleihau gwastraff.</li> </ul>	Gwastraff

## Executive summary

This Net Zero Plan supersedes Natural Resources Wales' (NRW) Carbon Positive Enabling Plan that was published in 2019 following the declaration of a Climate Emergency by the Welsh Government. It was in effect our first Net Zero Plan and set the strategic direction and priorities for decarbonisation in NRW between 2019 and 2023.

Our new Corporate Plan and our Business and Service Plans recognise the environmental challenges posed by climate change, and commit to reducing emissions, protecting and enhancing long-term stores of carbon both within our own operations and through our wider influence.

We have, as far as possible, aligned our organisational boundary for buildings, assets and land to the public sector service-approach set out in the Welsh Government Net Zero Reporting Guide that evolved out of NRW's Carbon Positive Project work. The emissions sources reported by NRW in this Plan are buildings, transport and plant, land-based emissions and sequestration (including agriculture), waste generated in operations, purchased goods and services, business travel, employee commuting and homeworking. All scope 1, and upstream scope 2 and 3 emissions sources are included but not our downstream scope 3 emissions, which are currently not accounted for in Welsh public sector Net Zero Reporting.

In developing NRW's Plan, we have sought to be consistent where appropriate with Welsh Government's Net Zero Strategic Plan (Welsh Government 2022), which sets out the ambitions for their own organisational decarbonisation. Similarly, to the Welsh Government Plan, we have used the principles of the Science Based Targets Initiative (SBTi) for target setting for many operational emissions. We have also developed several emission pathways and scenarios for 'do nothing', 'gaining momentum' and 'accelerated change' for most operational emissions in a similar manner.

In the financial year 2022-23, NRW's greenhouse gas (GHG) emissions, meaning our organisational carbon footprint, was calculated to be 22,962 tonnes of carbon dioxide equivalent (tCO<sub>2e</sub>). This excludes land-based emissions and sequestration. This total also excludes outside of scope emissions that amounted to an additional 552.3 tCO<sub>2e</sub>. The total net quantity of carbon sequestered in habitats on the NRW estate was estimated to be approximately -390,000 tCO<sub>2e</sub> (based on 2015-16 data).

The carbon footprint in this plan for operational activity was calculated for our Welsh public sector Net Zero reporting submission for 2022-23, which is updated annually. NRW's total operational emissions (excluding both supply chain and land use) were 6,955 tCO<sub>2e</sub> in 2019-20; 3,093 tCO<sub>2e</sub> in 2020-21; 3,556 tCO<sub>2e</sub> in 2021-22 and 3,655 tCO<sub>2e</sub> in 2022-23. Emissions associated with fleet and equipment fuel (8%), homeworking (6%) and building-related emissions from heating and electricity use (4%) are the largest categories of our operational emissions.



Trends in NRW's operational emissions are evaluated based on the baseline year 2019-20 for Net Zero reporting. The impacts of Covid-19 on operational emissions is clear with significant decreases in emissions from most categories in 2020-21 compared to the 2019-20 baseline, most notably the large reduction in commute emissions. Emissions from both waste and homeworking increased in 2020-21 and equipment and business travel emissions increased in 2022-23 reflecting post pandemic changes. Our organisational supply chain emissions increased by over 12% in 2022-23 compared to the previous financial year and by 22% compared to the baseline year (2019-20), reflecting both an increase in spend and improvements and automation of collation methods for spend data.

The trends in our data reflect the fact that we have made passive reductions in emissions through grid decarbonisation along with proactive reductions through reducing our buildings portfolio along with Covid-19 driving increased homeworking. Despite a range of decarbonisation actions, NRW has not yet purposefully achieved significant progress towards its' own carbon reduction goals. The aim of this plan is to ensure we have a plan to minimise our emissions through to 2030 and to contribute to the wider Welsh public sector decarbonisation ambition for 2030.

In relation to our target setting, NRW has chosen a hybrid approach, developing bespoke targets, where high quality internal data is available to support their development. Where good internal data is not available, we have used generic SBTi targets. This plan contains the strategic initiatives that will move us towards our emissions reduction ambitions and will be reviewed periodically.

The decarbonisation scenarios detailed in this plan highlight the possible greenhouse gas emission reductions that could be achieved through a range of actions, based on current knowledge and evidence.

The scenarios cover both operational and supply chain greenhouse gas emissions from the following areas:

- the built estate
- fleet and plant/equipment
- staff commute
- homeworking
- supply chain
- operational assets, such as pumping stations
- business travel

These scenarios are:

- 'do nothing' (business as usual)
- 'gaining momentum'
- 'accelerated change'

The scenarios demonstrate different levels of decarbonisation action. They demonstrate the scale and pace of change that is required. To increase this contribution further would

require further innovation, technological improvements and upscaling of action. Given resource limitations, we have also undertaken a prioritisation exercise within each of the thematic decarbonisation areas to help prioritise the delivery of actions during the period of the plan. However, this revealed the reality that for many areas, for example buildings and fleet, actions are interrelated and need to be implemented in an integrated manner either within a building or across the fleet rather than in isolation. Consequently, it is the scale and pace of action as set out in the pathways rather than the number of actions taken at any one time that will determine resource needs and progress.

NRW recognises the important role behavioural change has to play in reducing our own organisational carbon footprint too. As part of our work to embed consideration of decarbonisation and climate change in everyone’s work, NRW has worked with Manchester Metropolitan University (MMU) and Cynnal Cymru-Sustain Wales to develop a bespoke climate change training package that meets the Carbon Literacy Trust standard. Further refining the effective collection and use of data will be an iterative process that will require clear roles and responsibilities across the organisation as to who is responsible for collection, collation and evaluation of data. An agile approach will be promoted to ensure that systems and ways-of-working are proportionate.

Below, a summary table of key actions proposed in this plan to meet our planned emission reduction trajectories, provides a clear list of next steps.

**Summary of key actions required by NRW to achieve the outcomes of the Net Zero Plan**

<b>Emissions category</b>	<b>Proposed decarbonisation action</b>	<b>Lead NRW delivery function</b>
Built estate	<ul style="list-style-type: none"> <li>• Asset rationalisation.</li> <li>• Effective energy management (e.g. energy procurement, energy data analysis, reviewing heating settings).</li> <li>• Energy efficiency measures such as insulation, heating controls.</li> <li>• Building mounted renewable energy systems.</li> <li>• Low carbon heating (e.g. heat pumps).</li> <li>• Behaviour change.</li> </ul>	Renewal/Fleet and Facilities Management

Emissions category	Proposed decarbonisation action	Lead NRW delivery function
Fleet & plant	<p><b>Fleet</b></p> <ul style="list-style-type: none"> <li>• No new internal combustion engine (ICE) vehicles should be leased from 2024 onwards unless absolutely necessary, including any new and all existing ICE vehicles should be operated using Hydrogenated Vegetable Oil (HVO) (although this will increase the operational cost due to a higher fuel price).</li> <li>• All badged ICE vehicles (except 4x4s and HGVs) should be replaced with battery electric vehicles (BEVs) by 2029-30.</li> <li>• ICE 4x4s and heavy goods vehicles (HGVs) should be operated using HVO and replaced with BEVs when feasible.</li> <li>• A review should be carried out on the use of existing ICE 4x4s to establish if current activities are necessary, can be carried out remotely or by other means with lower carbon footprint.</li> <li>• An investigation should be undertaken to identify the causes of low utilisation (&lt;6k annual miles) of some badged vehicles.</li> <li>• Identify steps to improve utilisation of existing badged BEVs by staff.</li> <li>• Integrate data capture system to monitor mileage and energy use by BEVs as soon as technically feasible.</li> <li>• Improve tracking data to determine peak mileage and typical patterns of use for individual vehicles.</li> </ul> <p><b>Plant</b></p> <ul style="list-style-type: none"> <li>• NRW should carry out an assessment of plant use and create a forward plan that assesses the feasibility of progressively transitioning fossil fuel-based plant with both electric and hydrogen technology.</li> </ul>	Fleet

Emissions category	Proposed decarbonisation action	Lead NRW delivery function
Business travel	<p>Grey Fleet</p> <ul style="list-style-type: none"> <li>• A periodic review should be carried out to ensure NRW's Travel Decision Tree is fit for purpose and applied when travelling for business purposes.</li> <li>• Staff should be encouraged to use badged pool vehicles for business travels where possible if the private vehicle is not an Ultra Low Emission Vehicle (ULEV) (&lt;75g/CO<sub>2</sub>/km).</li> <li>• NRW should introduce a salary sacrifice scheme for staff to lease BEV's, which will have a positive impact in terms of emissions reduction from grey fleet and staff commute.</li> </ul> <p>Hire car fleet</p> <ul style="list-style-type: none"> <li>• In association with a periodic review of NRW's Travel Decision Tree an assessment to ensure that the most efficient vehicle types are being hired (suitable for the intended use) should be undertaken to assess BEV uptake.</li> </ul>	Fleet
Agile working, homeworking & commuting	<ul style="list-style-type: none"> <li>• Optimise existing low carbon IT services and continue investing in digital infrastructure that enables productive remote working and connectivity across the organisation.</li> <li>• Continue to conduct a 'staff travel' survey to reduce our reliance on generic benchmarks and identify tailored decarbonisation initiatives related to agile working.</li> <li>• Continue to align our planning/decision making to the sustainable travel hierarchy and support its' uptake among staff to shift commuting habits to low carbon forms of travel.</li> <li>• Engage with staff to understand existing barriers to the use of active travel and public transport.</li> <li>• Provide an enabling environment for low carbon travel, including improvements to provision of bicycle storage, showers, electric vehicle chargers, and maintain enabling policies such as our cycle-to-work scheme.</li> <li>• Develop a staff calculator to explore the impact of householder heating fuel and commuting distance on emissions to inform staff decisions on these daily matters.</li> </ul>	ICT/Climate Change and Decarbonisation/ HR/Renewal/ Facilities

Emissions category	Proposed decarbonisation action	Lead NRW delivery function
Supply chain	<ul style="list-style-type: none"> <li>• Introducing a tiered system of carbon reporting &amp; reduction requirements for all suppliers by 2025.</li> <li>• Developing a toolkit for staff to support contract managers to include the carbon reduction and reporting requirements relevant to their contract tier.</li> <li>• Developing a supplier emissions questionnaire on organisational emissions.</li> <li>• Integrating basic carbon questions into all our tender and quotation templates for suppliers.</li> <li>• Exploring the use of carbon calculators for high value, high emission contracts and frameworks to require suppliers to baseline and demonstrate contract or project level savings.</li> <li>• Developing a system to centrally record contract level emissions data and combine this with allocated organisational emissions and spend based emissions data for lower value contracts to produce whole supply chain emissions estimates for NRW.</li> </ul>	Procurement/ Planning and Resources Group/Contract Management Support Service/ Programme Management Office
Operational assets	<ul style="list-style-type: none"> <li>• Ensure electricity supplies have Automatic Meter Readers (AMR) so that electricity data and invoices are accurate, and ensure all assets are on our main 100% renewable energy contract.</li> <li>• Review current progress in retrofitting renewable energy technologies to assets and revisit previous feasibility studies and update where necessary.</li> <li>• Install ground mounted renewable energy to self-supply energy to NRW assets, where suitable and feasible.</li> <li>• Further explore renewable energy generation on the NRW managed estate for self-supply where the location of assets allows.</li> <li>• Retrofit all NRW managed pumping stations with energy efficient pumps and renewable energy generation, where feasible.</li> <li>• Retrofit all smaller NRW managed assets (e.g. gauging stations) with microgeneration renewable energy, where feasible.</li> <li>• Ensure solar PV is considered when designing and developing all new assets.</li> <li>• Review progress with hydrometry and telemetry and develop a programme of further renewable energy retrofit across operational assets.</li> </ul>	Operations/ Mechanical, Electrical, Instrumentational Control and Automation/Hydro metry and Telemetry

Emissions category	Proposed decarbonisation action	Lead NRW delivery function
Land Use	<ul style="list-style-type: none"> <li>Revise the net carbon status modelling assessment of the habitats on the estate, taking account of the latest available estimates of carbon fluxes for each habitat, as well as the restoration of peatlands on the estate.</li> </ul>	Climate Change and Decarbonisation
Behaviour Change	<ul style="list-style-type: none"> <li>Continue the roll out of our bespoke climate literacy training to staff and to monitor through post course surveying its impact on behaviour and decision-making.</li> </ul>	Climate Change and Decarbonisation/ Learning and Development
Waste	<ul style="list-style-type: none"> <li>Complete and implement a circular economy and waste minimisation policy.</li> </ul>	Waste

## Policy context and background

Addressing climate change is a key priority of both the UK and Welsh Governments, as part of the international response to climate change driven by the UN Framework Convention on Climate Change. The Paris Accord objective to limit global warming to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C remains the principal international policy driver. In the UK, the Climate Change Act (2008) sets out a framework to reduce greenhouse gas emissions and adapt to the impacts of climate change. The Act commits the UK to be net zero by 2050 across all four nations.

Two key Welsh Acts provide direction for decarbonisation and the climate emergency response in Wales. The Wellbeing of Future Generations (Wales) Act (2015) requires public bodies to ensure that sustainable development is the central organising principle and that the social, environment and economic impacts of short- and long-term decisions are accounted for. The Act sets out five ways of working to integrate wellbeing and sustainable development and seven Wellbeing Goals. The goals for ‘a prosperous Wales’ and ‘a globally responsible Wales’ help drive climate change action, including reference to transition to a ‘low carbon society’ and ‘make a positive contribution to global well-being’ respectively. The Environment (Wales) Act (2016) sets out the key principles of sustainable management of natural resources as well as placing a duty on Welsh Ministers to set decadal greenhouse gas emission reduction targets and 5-yearly carbon budgets. Wales has a legally binding target to achieve net zero greenhouse gas emissions by 2050 with the carbon budgets and decadal targets setting the trajectory to reach it. Net Zero Wales (Welsh Government, 2021a) sets out the policies and proposals for meeting carbon budget 2 (2021-2025), which requires a 37% average reduction in emissions. Carbon budget 3 (2026-2030) will require a 58% average reduction based on a 1990 baseline. The public sector chapter of Net Zero Wales identifies several policies for public sector organisations to contribute towards meeting carbon budget 2. This Net Zero Plan has been published to address the policy that states ‘all public sector organisations should develop and publish plans by March 2023 to achieve a collective net zero public sector by 2030’. Another example is for all public sector organisations work towards Wales’ target to have ‘all new cars and light good vehicles in the public sector fleet as ultra-low emission vehicles by 2025 and where practicably possible, all heavy goods vehicles are ultra-low emission by 2030’ (Welsh Government 2021a). Net Zero Wales also reinforces the ambition for the Welsh public sector to be collectively net zero by 2030, for which NRW has an important role to play.

To steer the Welsh public sector in delivering this ambition, the Net Zero Carbon Status Route Map sets out the strategic overview of the key priority areas for action and milestones needed for the public sector to reach net zero greenhouse gas emissions by 2030 (Welsh Government 2021b). These key priority areas are buildings, mobility and transport, procurement, and land use, with decarbonisation milestones between 2021 and 2030. This route map, based on NRW’s earlier work through the Carbon Positive project (Jones A, 2018), has been used to frame NRW’s Net Zero Plan and its approach to decarbonising the organisation.

Welsh Government's Net Zero Strategic Plan sets out its own net zero ambition for the organisation and outlines their priority decarbonisation initiatives (Welsh Government 2022). For operational emissions (buildings, fleet, business travel, commuting and homeworking) several emission pathways and scenarios are detailed which include do nothing, gaining momentum, accelerated change and an annual reduction to meet a 90% reduction by 2030 based on the principles of the Science Based Targets Initiative (SBTi). This SBTi target for operational emissions has been adopted by Welsh Government in its strategic plan. In developing NRW's Plan we have sought to be consistent with the Welsh Government Plan where appropriate.

This Net Zero Plan supersedes NRW's Carbon Positive Enabling Plan that was published in 2019 following the declaration of a Climate Emergency by the Welsh Government. It was effectively our first Net Zero Plan and set the strategic direction and priorities for decarbonisation in NRW between 2019 and 2022. This new plan builds upon this work in providing greater detail in terms of the priorities we need to address and the targets that we are able to set.

Alongside decarbonisation, reducing climate risks and impacts through adaptation action is the other half of our Climate Emergency response. Whilst this Net Zero Plan does not include actions related to climate risk and adaptation, NRW has produced a climate risk baseline assessment to consider how the risks in the UK's 3<sup>rd</sup> Climate Change Risk Assessment relate to NRW. We have now in parallel with the production of this report, produced an organisational adaptation plan setting our priorities to manage how climate risks impact on our own delivery of our work.



# Natural Resources Wales – what we do

## Our roles

NRW has a wide range of roles and responsibilities which we deliver in an integrated way to achieve our overall purpose of the sustainable management of natural resources in Wales. In summary, our main roles are:

- adviser to Welsh Government, industry, farming, landowners, land managers, the wider public and voluntary sectors
- regulator including for industry and waste sites, energy, marine, forest and designated sites. Our statutory obligations are to permit, ensure compliance and take enforcement action to reduce the risk of environmental harm, protect people and the natural environment, support legitimate business and facilitate renewable energy generation. We issue about 4,500 permits and species licences in total each year
- designator for sites of special scientific interest, areas of outstanding natural beauty, national parks and for national nature reserves
- responder to environmental incidents - we receive over 8,500 reports of environmental incidents a year and target our response to those categorised as 'high'
- statutory consultee for about 7,000 planning applications a year
- manager of 7% of Wales' land area, including the Welsh Government Woodland Estate, national nature reserves and our flood defences and assets. We have 500km of flood defences and about 4,000 assets. We also run recreation facilities (such as visitor centres and mountain biking trails) and a laboratory
- partner, educator, enabler supporting and facilitating other organisations' work and helping people enjoy, learn in, learn for and learn about the natural environment
- evidence gatherer monitoring the environment, influencing, commissioning and undertaking research, developing and sharing knowledge and holding public records
- employer of our own staff as well as contractors, and working with volunteers

## Our organisation

Our organisational structure is designed to deliver locally, whilst maintaining high standards in the services we provide across the whole of Wales. At a local level, we follow a place-based approach with seven place-based teams (including a marine team). These are led by our seven Heads of Place. This is underpinned by a central directorate for evidence, policy, and permitting led by our heads of business. Delivery is supported by our central finance & corporate services, corporate strategy & development, communications, customer and commercial directorates.

Each of the seven places has an Area Statement which highlights the opportunities and challenges in a particular geographical area to both enhance the local natural environment, provide opportunities for business and improve people’s health and well-being. Working in partnership is key to making the most of these opportunities.



Figure 1. A summary of NRW's role as Wales' environment agency.

## Our approach to decarbonisation

NRW is committed to taking action to address the climate emergency, declared by Welsh Government in 2019, and to help through collaboration the Welsh public sector to collectively reach net zero by 2030. Limiting further emissions must now be key in the delivery of all our operations, in all the advice we provide and for every pound we spend.

This is a challenge for all NRW staff to face, both individually and as teams in our day-to-day decisions, and collectively as an organisation through our long-term business planning and risk management processes.

Our new corporate plan and our business plans recognise the environmental challenges posed by climate change, and commit to reducing emissions, protecting and enhancing long-term stores of carbon both within our own operations and through our wider influence.

## Progress to date

2013-2023

NRW has had an Environmental Management System (EMS), which has been accredited to the ISO14001 standard since 2014. The EMS provides a framework for managing the organisation's environmental impacts, including our direct carbon emissions, energy use, travel and waste.

2015-2019

Building on the work of the EMS, NRW's Carbon Positive Project was started in 2015 to progress our understanding and management of organisational greenhouse gas emissions. The project:

- calculated NRW's first detailed organisational carbon footprint including direct, upstream and downstream emissions for 2016-2017 providing a crucial baseline (Jones A, 2018)
- identified the purchase of goods and services and the processing and transport of sold timber as our main sources of emissions
- estimated land-based emissions, sequestration and carbon stocks on the NRW managed estate (Williams *et al.*, 2016 and Matthews *et al.*, 2017)
- showed that more carbon is sequestered annually on the NRW managed estate than is emitted through our operations
- delivered decarbonisation projects including installation of solar panels and biomass boilers; integration of the first BEVs into the NRW fleet and associated charging infrastructure at offices and visitor centres; peatland restoration
- developed an evidence base to inform delivery and prioritisation of decarbonisation projects including a strategic fleet review and building energy surveys (Hodgson *et al.*, 2021, Carroll *et al.*, 2017)
- developed our Carbon Positive Enabling Plan, which set the strategic direction for decarbonisation in NRW between 2019 and 2023

2020 – 2023

Our detailed emissions and sequestration calculations informed the development of Welsh Government's Net Zero Reporting Guide, which provides a methodology for annual public sector emissions accounting across Wales. Alongside other public sector bodies, we submitted our first organisational footprint using the Net Zero Reporting Guide and template to Welsh Government in 2021. Our annual submissions will enable monitoring of future progress within NRW and form part of Welsh Government's public sector monitoring of progress towards the 2030 ambition.

In 2021 a dedicated climate change team was formed within NRW for the first time, with a remit including provision of decarbonisation strategy, evidence, advice and support to the rest of the organisation. Key pieces of recent work delivered by the team include:

- the development and adoption of a set of principles for managing NRW's built estate in response to the climate emergency
- deliver and develop our annual carbon reporting process, including a plan of continuous improvement
- trialling approaches for asking suppliers to report and reduce emissions in contracts
- developing a tailored climate change training course that has been delivered to hundreds of our staff to date
- initiating a review to assess opportunities to integrate consideration of carbon in our governance and processes, to link the climate emergency as a corporate priority with key internal decision-making processes

During 2022 and 2023 the team developed three decarbonisation forward plans to 2030 for our fleet, built estate and supply chain. These provide more detail on delivery of this new overarching Net Zero Plan.

Some of NRW's decarbonisation achievements to date include:

- 179,034 kWh of renewable electricity generated for self-supply, equating to 6.3% of our total usage in 2021-22
- 100% of electricity purchased on a renewable tariff
- 29 electric cars and 8 electric vans integrated into our fleet of vehicles by 2022, equating to 6.8% of our fleet
- requirement for contractors to use a carbon calculator and carbon optioneering modelling included in our framework agreement for flood defence and civil engineering projects (covering approximately 6% of our supply chain emissions)
- restoration action undertaken on 1,650 hectares of peatland nationally between 2020 and 2022 as part of the National Peatland Action Programme, including 640ha of peatland on the NRW managed estate

## Our operational and organisational boundaries for emissions reporting

NRW's emissions impact, both from our own operations and from activities occurring upstream and downstream of our organisation as a result of our operations are illustrated in Figure 2.

The operational boundary for Welsh public sector net zero emissions reporting in 2022 and therefore the emissions sources reported by NRW are: buildings, fleet and other mobile equipment, land-based emissions and sequestration (including agriculture), waste generated in operations, purchased goods and services, business travel, employee commuting and homeworking. These cover all scope 1, and upstream scope 2 and 3 emissions sources identified in Figure 2. Our downstream scope 3 emissions (in red) are currently not accounted for in our Net Zero Reporting. The guide states that NRW may optionally report downstream emissions associated with transportation and distribution,

processing of sold products and end-of-life of sold products given that they were significant in our original Carbon Positive Project calculations (pre-dating the Net Zero Reporting Guide). The inclusion of additional downstream emissions sources may be reconsidered in future.

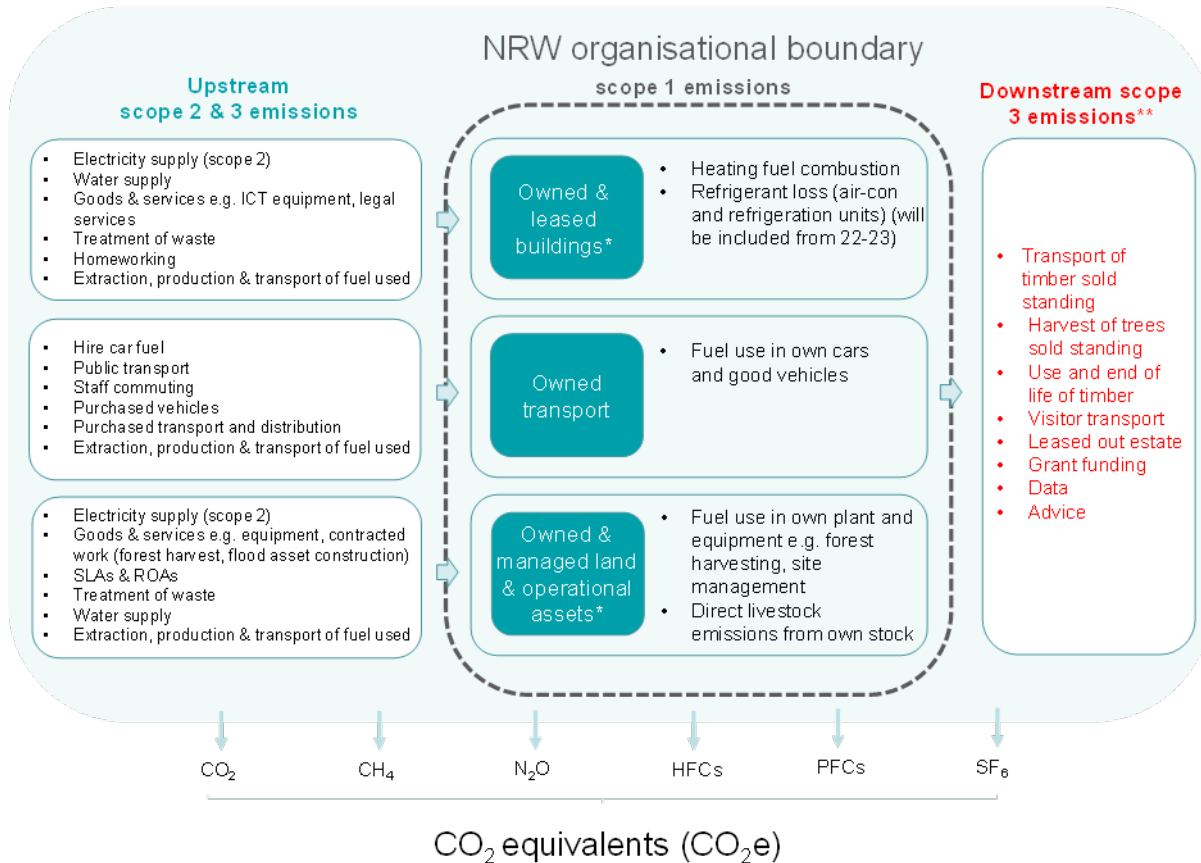


Figure 2. Schematic of NRW's emissions impact, showing our upstream and downstream emissions and illustrating the breadth of emissions covered within our organisational boundary and emissions reporting. Crucially, our downstream emissions (in red) are not included within our net zero reporting in line with the Welsh Government guidelines.

## Organisational boundary

We have, as far as possible, aligned our organisational boundary for buildings, assets and land to the public sector service-approach set out in the Net Zero Reporting Guide. Figure 3 sets out which buildings land and assets are included within our organisational boundary.

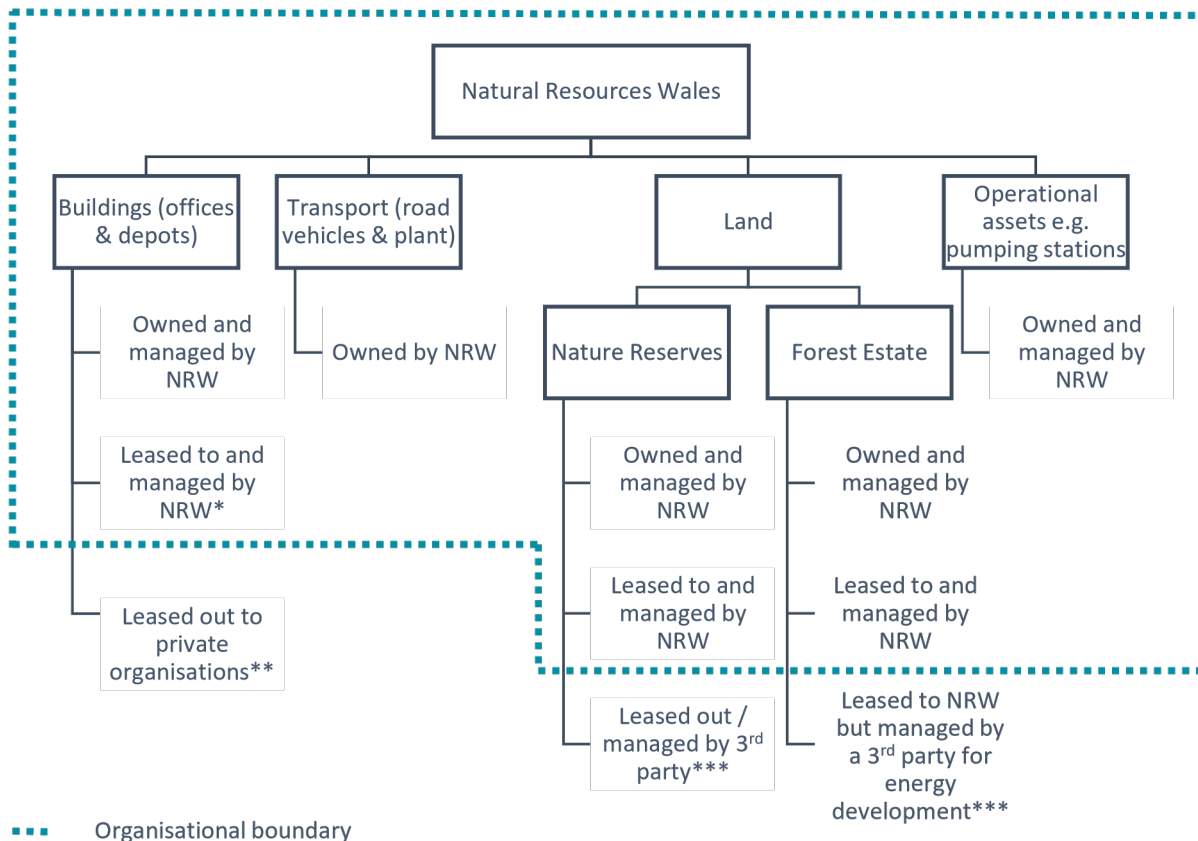


Figure 3. NRW’s organisational boundary for emissions reporting.

\* Excludes building space leased to NRW where the lessor pays the bills. Swansea Laboratory and space in the Aberystwyth Office are leased to us but are excluded from our organisational boundary because the bills are paid by Swansea University and Welsh Government respectively (as per page 29 of reporting guide). These emissions will be included within the organisational boundary of the organisation acting as the lessor.

\*\* Buildings owned by NRW but leased to private organisations are excluded from our organisational boundary (as page 29 of the reporting guide). At the time of writing farm tenancies, Garwnant Visitor Centre and Hafod Office are all excluded for this reason.

\*\*\* The organisational boundary for land currently matches that defined for our original net carbon status calculation predating the Net Zero Reporting Guide. Parcels of land leased out by NRW and parcels managed by a 3<sup>rd</sup> party for NRW still need to be assessed against the public sector service approach outlined in the Net Zero Reporting Guide. This will be done as part of planned updates to our land-based emission and sequestration calculations. Any boundary changes are likely to be small proportion of the overall total land owned and managed by NRW.

# Our carbon footprint

## Operational and supply chain emissions

In the financial year 2022-23 NRW's greenhouse gas emissions, meaning our organisational carbon footprint, was calculated to be 22,962 tCO<sub>2</sub>e. This excludes land-based emissions and sequestration which are reported separately. This also excludes outside of scopes emissions which amounted to an additional 552.3 tCO<sub>2</sub>e emitted in the financial year.

This carbon footprint was calculated for our net zero reporting submission to Welsh Government and is updated annually.

Figure 4 gives a breakdown of our 2022-23 carbon footprint by emissions category, highlighting emissions arising in our supply chain from the goods and services we purchase as the dominant emissions category (77%). Emissions associated with fleet and equipment fuel (8%), homeworking (6%) and building related emissions from heating and electricity use (4%) are the largest categories of our operational emissions.

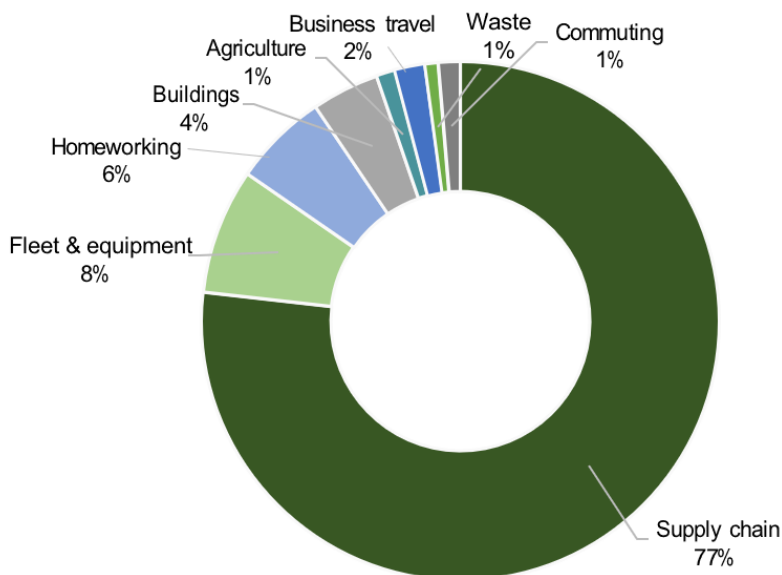


Figure 4. NRW's carbon footprint by emissions category in 2022-23.

The supply chain emissions category total given in Figure 4 comprises emissions across a wide range of purchase types. Figure 5 shows the contribution of individual NRW account codes to total supply chain emissions. These account codes are categories of purchase types used internally to group and record all spend.

In 2022-23, 66.16% of NRW's supply emissions arose from our top 10 account codes.

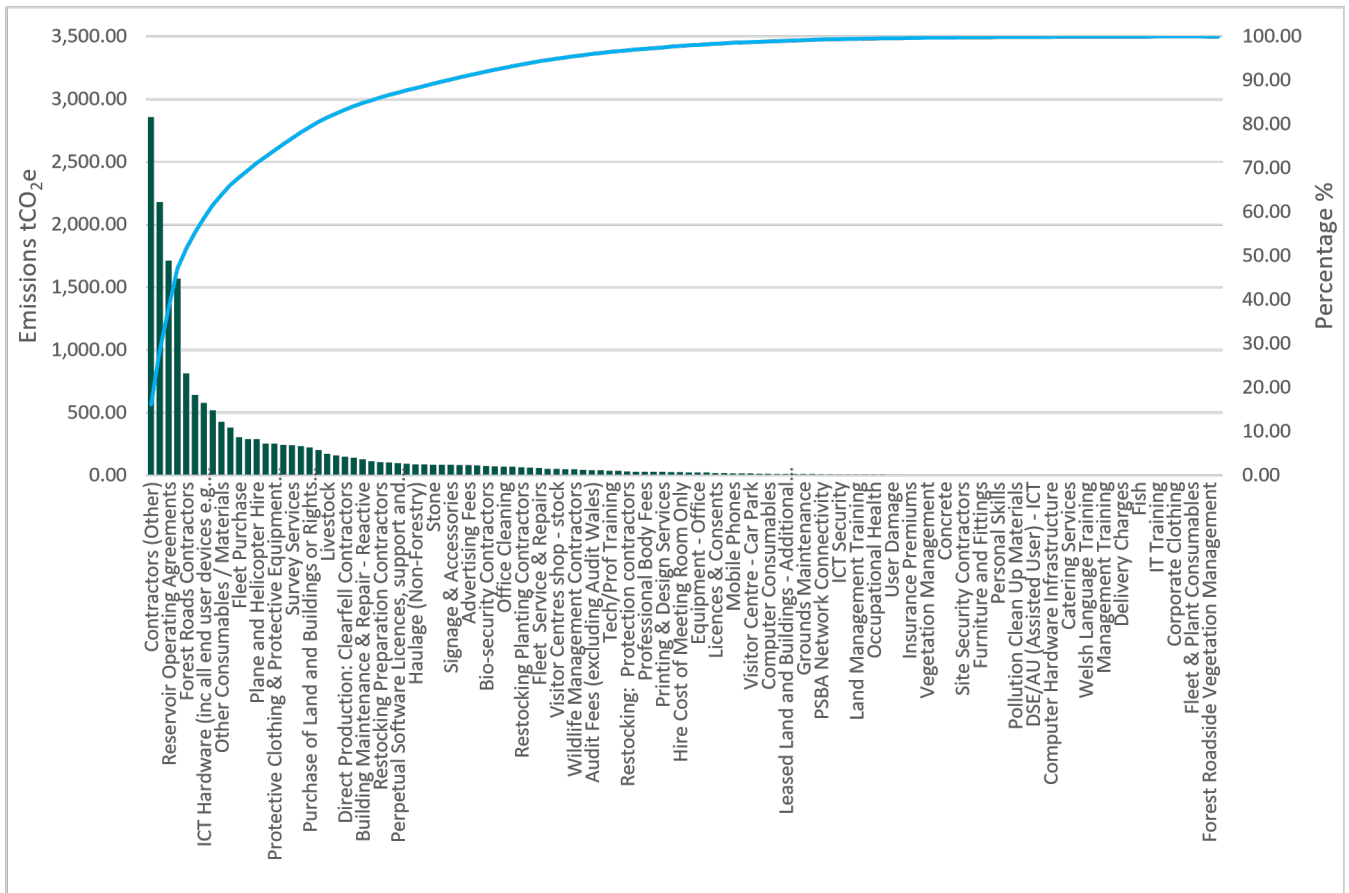


Figure 5. Breakdown of NRW's operational emissions by source. Bars show emissions in tCO<sub>2</sub>e by source, in descending order. The line shows the cumulative total percentage of operation emissions.

The broad operational emissions categories in Figure 4 are comprised of emissions from multiple sources. Figure 6 shows the contribution of each of our operational emissions sources. NRW's top five sources of operational emissions are:

- 1) fleet vehicle diesel (1,577.1 tCO<sub>2</sub>e)
- 2) homeworking (1,353.9 tCO<sub>2</sub>e)
- 3) office and depot grid electricity use (405.7 tCO<sub>2</sub>e)
- 4) asset electricity use including pumping stations (250.9 tCO<sub>2</sub>e)
- 5) grazing ponies (246.0 tCO<sub>2</sub>e)\*

\* This is likely to be an overestimate due to the use of an emission factor for horses in the net zero reporting spreadsheet which needs revision.



In 2022-23, 89.4% of NRW's operational emissions arose from our top 10 emissions sources.

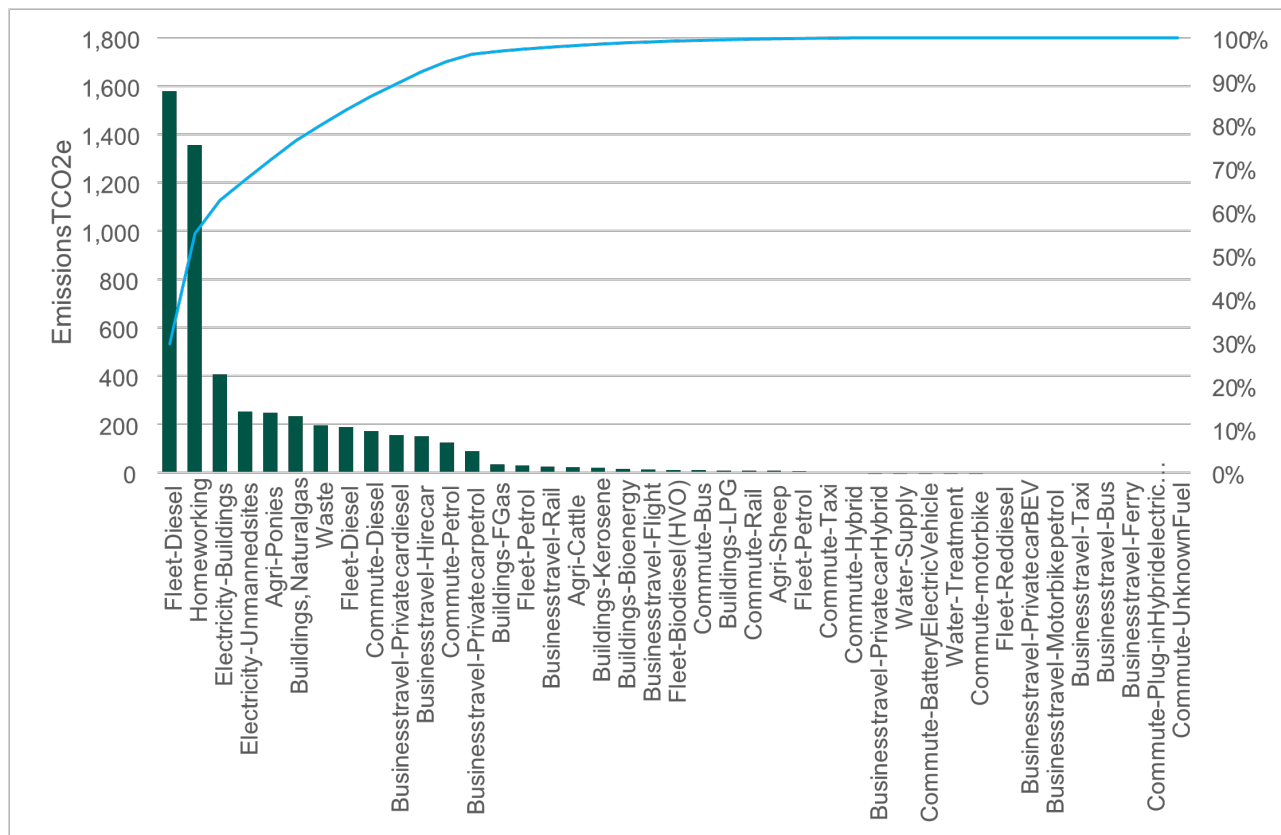


Figure 6. Breakdown of NRW's operational emissions by source. Bars show emissions in tCO<sub>2</sub>e by source, in descending order. The line shows the cumulative total percentage of operational emissions.

## Land based emissions and sequestration

NRW's land-based emission and sequestration have not been re-calculated since we undertook a detailed baseline assessment for 2015-16 as part of the Carbon Positive project. This baseline has been submitted for net zero reporting, but we are currently developing a process to update these figures on a periodic basis, although we do not intend to revise this data on an annual basis due to the limited changes from year to year.

In the financial year 2015-16, the total estimated net quantity of carbon sequestered in habitats on the NRW managed estate was -390,924 tCO<sub>2</sub>e. This is a greenhouse gas balance figure, where habitat emissions were subtracted from gross sequestration to give a net carbon sequestration figure for the estate. Emissions to the atmosphere are reported as a positive numbers and removals as negative.

Table 1. shows the balance between our organisational carbon footprint (operational and supply chain emissions) and our land-based emissions and sequestration over time. In 2022-23 we sequestered approximately -367,961 tCO<sub>2</sub>e more than we emitted.

Table 1. NRW's organisational carbon footprint (operational and supply chain emissions) and our land-based emissions and sequestration over time.

	2015-16	2019-20	2020-21	2021-22	2022-23
<b>Operational emissions</b>	18,637*	6,955**	3,093 **	5,125	5,336
<b>Supply chain emissions</b>	22,667 *	17,465	18,898	21,084***	17,627****
<b>Land based emissions and sequestration (net)</b>	-390,924****	-390,924	-390,924	-390,924	-390,924
<b>Net total</b>	-349,621	-366,504	-368,933	-364,715	-367,961

\*2015-16 operational and supply chain emissions are not directly comparable with 2019-20 onwards because of operational boundary changes to emissions sources accounted for and changes in calculation methods. Our 2015-16 results were calculated as part of our Carbon Positive Project and our 2019-20 and subsequent results following the Welsh Government net zero reporting guide.

\*\* Figures do not include homeworking and agricultural emissions which were not part of the net zero reporting requirements in 2019-20 and 2020-21.

\*\*\* 2021-22 supply chain figures are not directly comparable with 2019-20 and 2020-21 because of an improvement in spend data collection methods internally.

\*\*\*\* Our 2015-16 results were also submitted for net zero reporting between 2019 and 2022 and will be updated periodically.

\*\*\*\* Supply chain figures for 2022-23 not directly comparable with previous years data due Welsh Government updating emissions factors (EF's) from 2011 to 2019 values. If using 2011 EF's then 2022-23 emissions would be 23,295 tCO<sub>2</sub>e.

## Recent trends in our footprint

### Operational emissions

Figure 7 below shows NRW's total emissions (submitted as part of our net zero reporting and excluding supply chain and land use) were 6,955 tCO<sub>2</sub>e in 2019-20; 3,093 tCO<sub>2</sub>e in 2020-21; 3,556 tCO<sub>2</sub>e in 2021-22 and 3,655 tCO<sub>2</sub>e in 2022-23. The graph demonstrates a decrease in emissions (excluding supply chain emissions) due to the impacts of Covid in 2020-21, a return to more typical working practices post Covid-19 in 2021-22 and finally exceeding baseline emissions figures in 2022-23 period. These totals do not include

homeworking emissions for 2019-20 and 2020-21 years as the Welsh Government guidelines did not require their inclusion at that time.

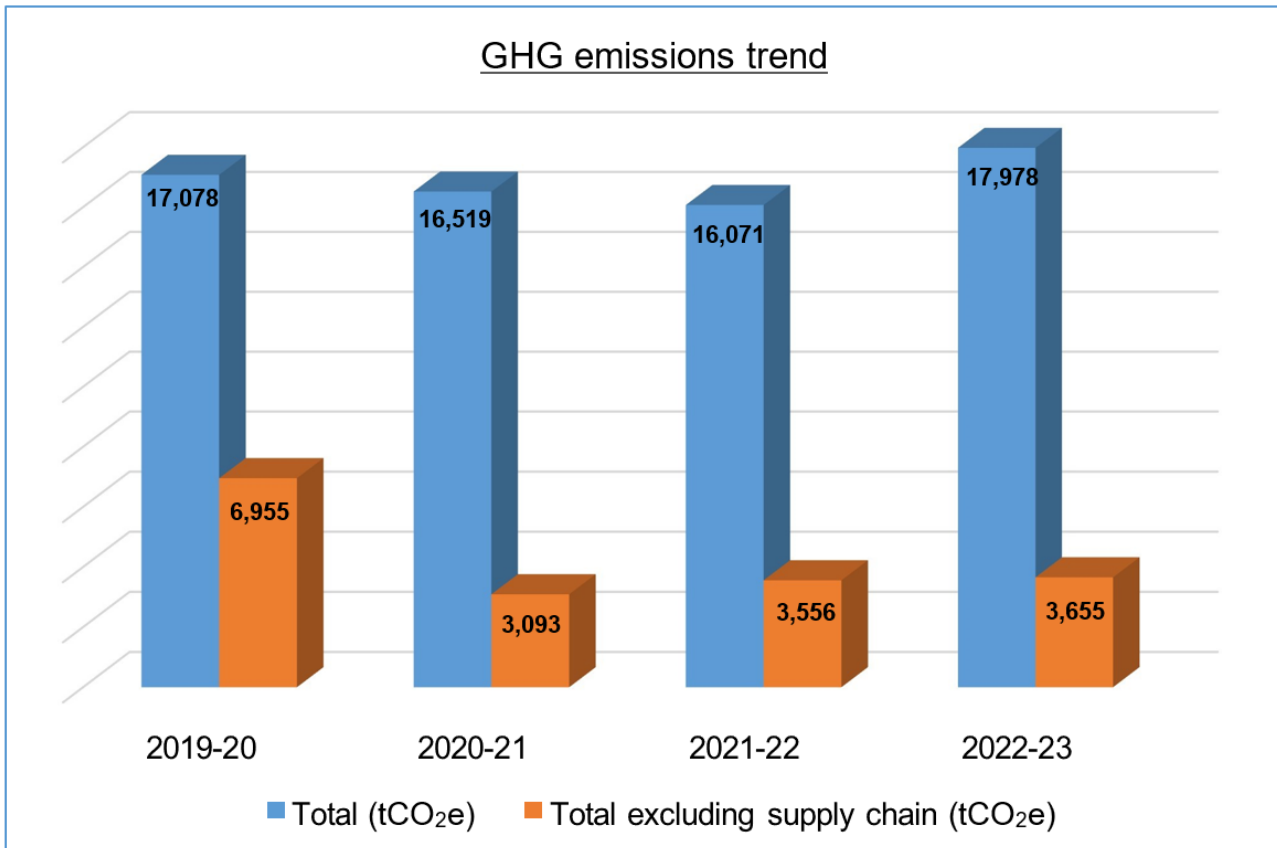


Figure 7: Graph showing NRW's GHG emissions based on Net Zero reporting to Welsh Government (using 2019 emission factors to calculate all supply chain emissions).

Figure 8 below shows NRW's operational emissions over time by emissions category, starting with our net zero reporting baseline year 2019-20. The impacts of Covid-19 on operational emissions categories is clear with significant decreases in emissions from most categories in 2020-21 compared to the 2019-20 baseline, most notably the drop in commute emissions. Emissions from both waste and homeworking increased in 2020-21. It is not clear why there was an increase in emissions from waste but NRW's waste data collection and recording system is both outdated and unreliable and is being reviewed. Emissions from homeworking increased significantly due to the shift towards remote working during Covid-19 lockdowns. Commute, fleet & equipment and business travel emissions all increased in 2022-23 from the previous financial year.

Homeworking emissions were previously calculated for 2019-20 and 2020-21 using our own methodology prior to inclusion in the net zero reporting approach in 2021-22. These data points have been included for information but were not part of the net zero reporting submission in these years and are not directly comparable to the 2021-22 data because of the methodology change. The homeworking emissions are not included in the NRW emissions totals given above for 2019-20 and 2020-21. The impact of Covid-19 on working practices saw a significant increase in emissions arising from homeworking in 2020-21

from the pre-pandemic baseline, which continued to increase year on year. However, homeworking has led to a decrease in emissions from both commute and buildings, with the combined effect being a net reduction in emissions. The slight increase in homeworking emissions in 2022-23 is thought to be due to an increase in staff numbers.

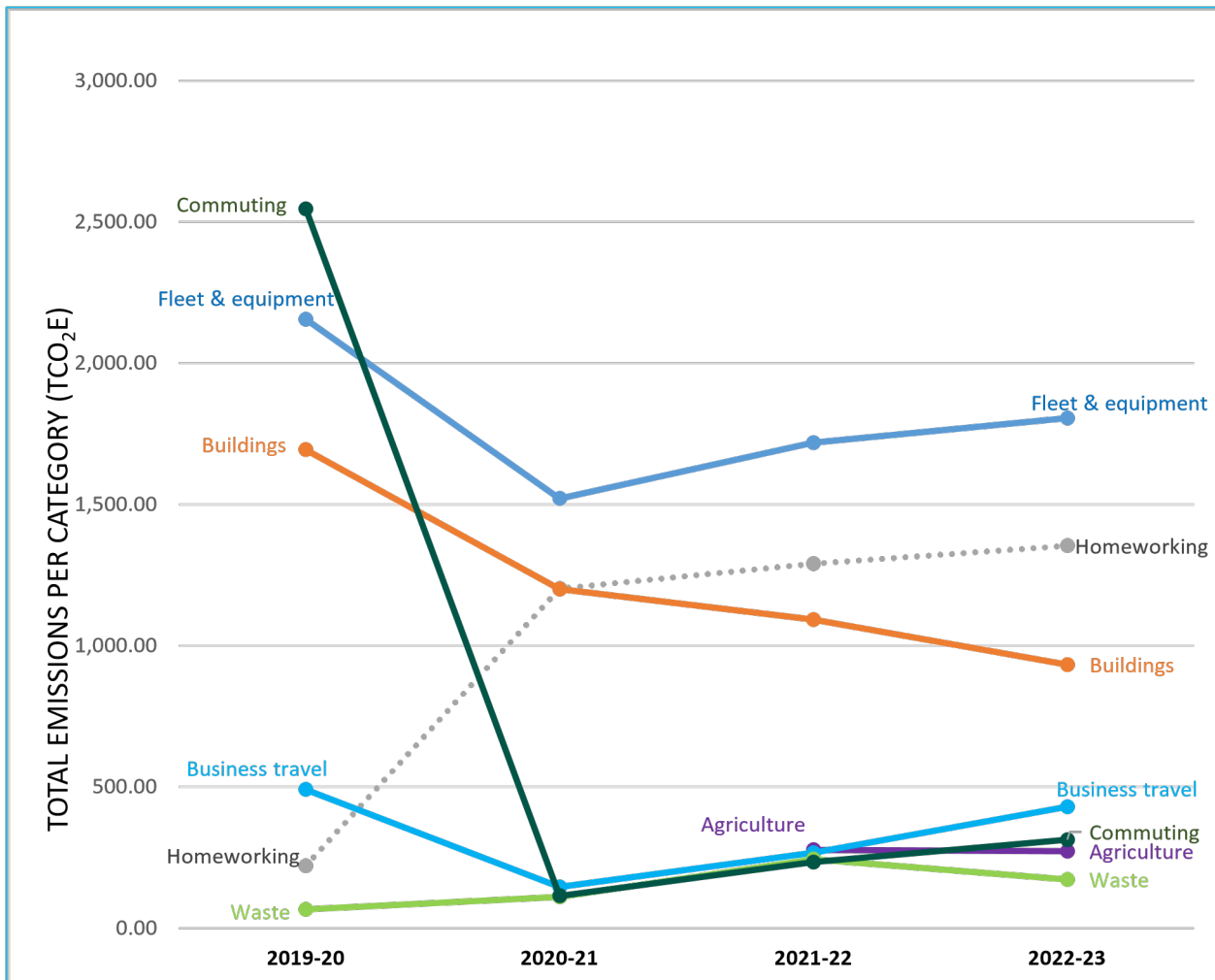


Figure 8: NRW's operations emissions over time by emissions category between our baseline year 2019-20 and 2022-23.

## Supply chain emissions

Figure 9 below shows NRW's supply chain emissions over time starting with our net zero reporting baseline year 2019-20. Our organisational supply chain emissions increased by over 12% in 2022-23 compared to the previous financial year and by 22% compared to the baseline year, reflecting both an increase in spend and internal improvements and automation of spend data collation methods. Because our supply chain emissions estimates are currently based on spend-based emissions factors rather than product and service specific data or supplier provided data, results are determined by spend and will not reflect any improvements made over time. However, as set out in our Supply Chain

Forward Plan, we are planning to increasingly collect non-spend emissions data from our supply chain.

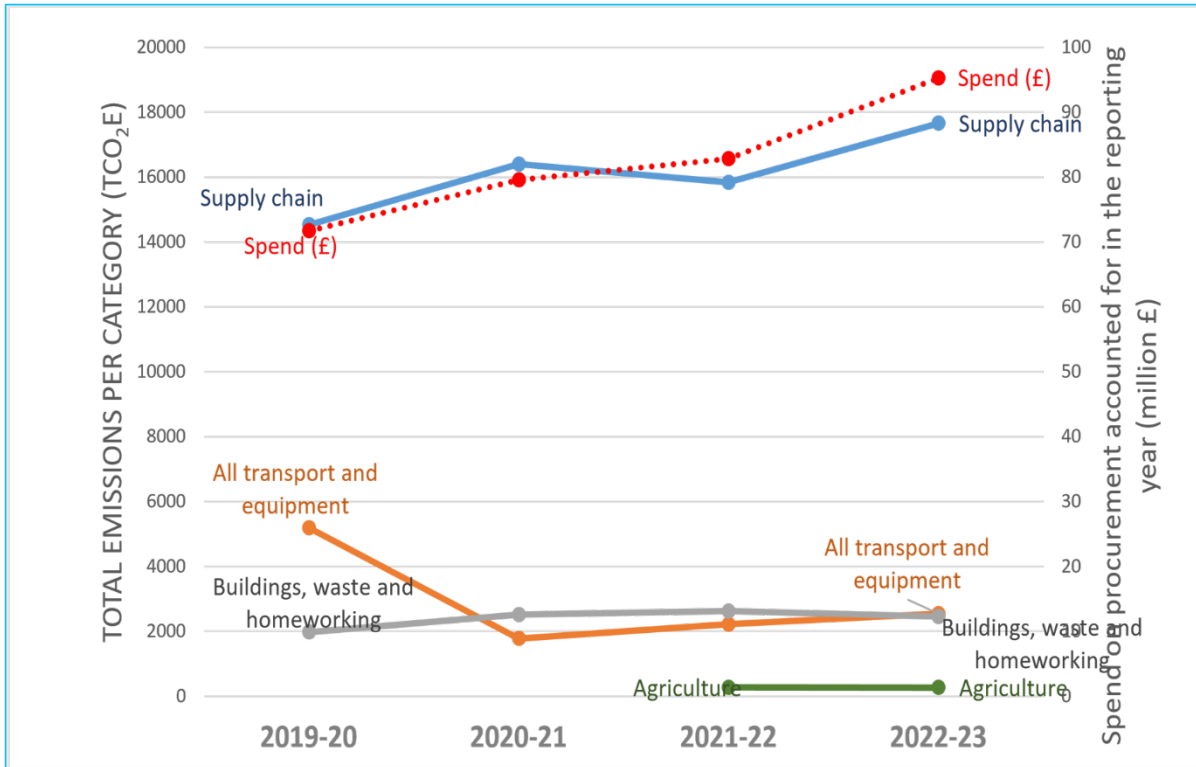


Figure 9. NRW’s supply chain and grouped operational emissions over time between our net zero reporting baseline year 2019-20 and 2022-23. Total procurement spend accounted for in the reporting year is also provided on a secondary axis (see red dotted line). Supply chain emissions calculated using 2019 emission factors.

## Our targets, commitments and ambitions

NRW is committed to minimising our greenhouse gas emissions as an organisation, thereby supporting the collective 2030 net zero ambition for the Welsh public sector. Net zero emissions are where the emissions are equal to removals within the target boundary and emissions are reduced in line with the 1.5°C global ambition and removals are used to neutralise residual emissions (World Resources Institute, 2023). NRW’s net carbon status is the balance of our emissions and sequestration, as an organisation we emit substantially less carbon from our operations than is captured annually (our sequestration) by habitats on our estate. Our carbon status is calculated annually and acts as an important tool to view our decarbonisation progress.

In relation to our target setting, NRW has chosen a hybrid approach, developing bespoke targets, where high quality internal data is available to support their development. Where good internal data is not available, we have used generic Science Based Targets Initiative (SBTi) targets. The SBTi provides a comprehensive definition of organisational net zero

and has been designed for private sector companies, however, we are aligning ourselves to the SBTi definition firstly due to the absence of a specific international public sector organisational net zero standard and to accord with the Welsh Government approach. To continue to drive down our emissions as an organisation in alignment with the SBTi, we will have to ultimately seek to reduce our emissions by at least 90% relative to the baseline year.

This Plan contains the strategic initiatives that will move us towards our emissions reduction ambitions and will be reviewed periodically. Further action planning and development work is required to deliver each initiative and turn strategic ambition into action. We have a series of absolute commitments which we will be accountable for and report progress against, along with a number of longer-term ambitions which will require organisational transformation to achieve.

Given resource limitations, we have also undertaken a prioritisation exercise within each of the thematic decarbonisation areas to help prioritise the delivery of actions during the period of the plan. However, this revealed the reality that for many areas, for example buildings and fleet, actions are interrelated and need to be implemented in an integrated manner either within a building or across the fleet rather than in isolation. Consequently, it is the scale and pace of action as set out in the pathways rather than the number of actions taken at any one time that will determine resource needs and progress.

Our targets for decarbonisation as an organisation have been split into four types:

- 1) an overarching carbon reduction target which sets out how as an organisation we will continue to reduce our emissions
- 2) measurable carbon reduction targets for some of our operational emissions, for example fleet and buildings
- 3) SBTi targets for supply chain, travel and homeworking
- 4) habitat restoration figures for land use

This approach has been taken to utilise all of our developing emissions data whilst ensuring that progress continues for those emissions sources where our carbon accounting approach is evolving to be quantifiable in the future. Our long-term ambition will be to reduce emissions by 90% by 2050, which aligns with the SBTi requirements for net zero. This will be based on the financial year 2019-20 net zero reporting baseline, aligning with SBTi requirements for a recent representative year. We have modelled the impact of measures across our operational emissions out to 2030. The modelling is not exhaustive, and it is not to the detail of specific defined measures for specific assets, but it does provide likely pathways for decarbonisation at three levels: do nothing, gaining momentum, and accelerated change – these categories are consistent with those used by Welsh Government.

Our overarching carbon reduction target will reduce our operational emissions by a minimum of 35% by 2030 across all significant emission categories, compared to a baseline year (2019-20). Built estate and fleet emission reductions of 56% and 66%

respectively can be achieved with an appropriate scale of investment and delivery of the planned actions. Other qualitative and quantitative targets are set out below.

## Quantitative targets

Based on data in Forward Plans:

- A. Fleet - 66% reduction in emissions by 2030, subject to continued electric vehicle roll out and running four-wheel drive fleet on HVO
- B. Built Estate - 56% reduction in emissions by 2030, subject to continued, planned estate rationalisation

Based on SBTi Linear Reduction:

- i. Procurement - 2.5% year on year emissions reduction for a 2°C pathway, however our ambition for accelerated change, subject to improved data accuracy is a 7% year on year reduction, which will result in a 51% reduction in emissions by 2030. These targets will be reviewed in 2026
- ii. Business Travel - 4.2% year on year reduction, resulting in a 35% reduction in emissions by 2030, with review of the target in 2026
- iii. Homeworking - 4.2% year on year reduction, resulting in a 35% reduction in emissions by 2030, with annual review of this target
- iv. Operational assets - We will work with the Operational Assets teams to gather necessary data to set a realistic target by 2025 due to a paucity of data to provide an appropriate baseline at present and therefore, a target will not be set yet

Based on Operational Data:

- On average of 640 hectare per year of peatland will be restored on the NRW Estate.

## Qualitative targets

1. In 2023 we set out in our Supply Chain Forward Plan a process for carbon emissions assessment in tenders and contracts including the use of a carbon assessment calculator in all our construction contracts by 2025.
2. By 2026 we will have a clearer understanding of our scope 3 supply chain emissions and be able to set a measurable target in our revised Plan.
3. We will aim to replace our tier 1 proxy data with tier 3 supplier data by 2026.
4. Develop a sustainable procurement policy by 2025.
5. Aligning with Welsh Governments' Beyond Recycling strategy to aim to achieve zero waste to landfill by 2025.
6. Develop a circular waste policy by 2025.

## Decarbonisation scenarios and pathways

The impact of actions to reduce greenhouse gas emissions between now and 2030 have been modelled to provide scenarios for decarbonisation (Figure 11). These scenarios are do nothing (business as usual), gaining momentum and accelerated change and they demonstrate different levels of decarbonisation action as well as underlying external assumptions such as electricity grid decarbonisation, shifts to active and sustainable travel, purchase of ULEVs by staff etc.

The scenarios cover both operational and supply chain greenhouse gas emissions from the following areas:

- the built estate
- fleet and plant/equipment
- staff commute
- homeworking
- supply chain
- operational assets, such as pumping stations
- business travel

Actual data from NRW's Net Zero Reporting submission to Welsh Government has been used for 2019-2022 and demonstrates the impact of Covid-19 on total greenhouse gas emissions (Figure 10).

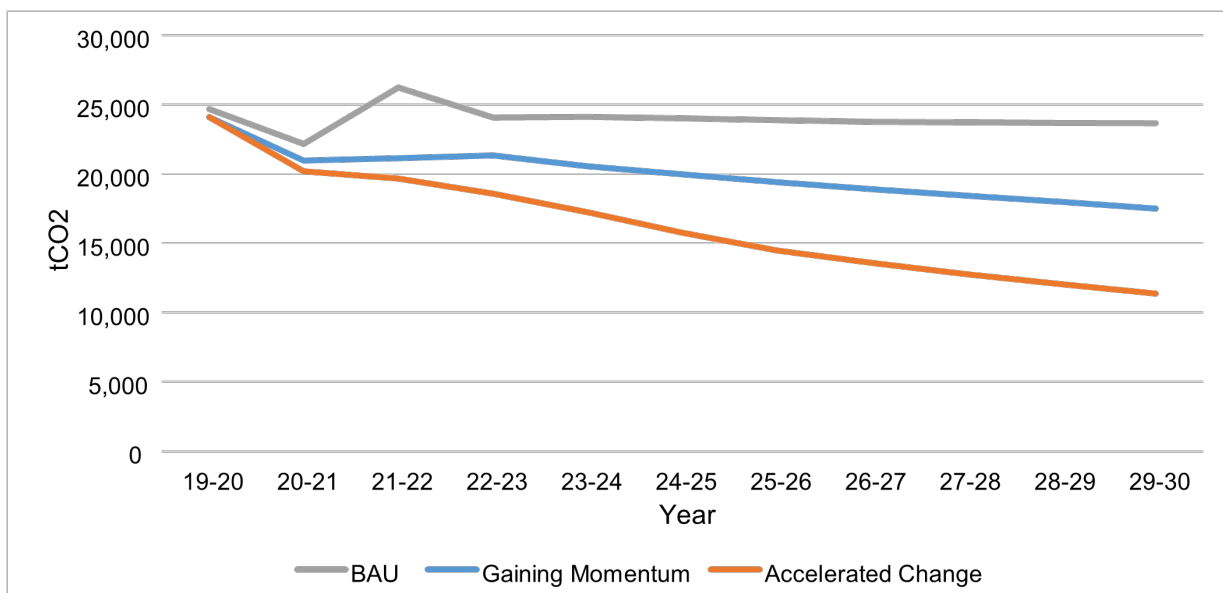


Figure 10: Decarbonisation scenarios to 2030.

Under the 'do nothing' scenario NRW's total greenhouse gas emissions in 2030 are estimated to be 23,642 tCO<sub>2</sub>e, a reduction of 4.1% compared to the 2019-2020 baseline. This assumes that there is little or no emission reduction effort or actions and that savings come from predicted electricity grid decarbonisation alone (as set out in the Green Book



supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (BEIS 2023)).

Greenhouse gas emissions in 2030 in the Gaining Momentum scenario are 17,510 tCO<sub>2e</sub>, a 27% reduction compared to the baseline. This is based on the assumptions and actions detailed in Table 2 below.

Table 2: Overview of the assumptions used in the Gaining Momentum decarbonisation scenario.

<b>Assumptions</b>	
<b>Built estate</b>	Emissions are reduced by 4.2% p.a. through energy efficiency and renewable energy retrofit. This is the Science Based Targets Initiative (SBTi) minimum reduction (near term) for scopes 1 and 2 based on absolute contraction to meet the goal of limiting temperature rises to 1.5°C (SBTi 2021).
<b>Fleet</b>	NRW has a mixed fleet of BEV's and diesel vehicles (mainly badged 4x4's, HGVs and large vans) operated on HVO by 2025.
<b>Staff commute</b>	Commuting distance is reduced in line with staff working from home 30% of the week.
<b>Homeworking</b>	Emissions associated with staff working from home 30% of the week.
<b>Supply chain</b>	An evidence-based reduction equivalent to the previous SBTi 2.5% linear annual reduction rate as outlined in the supply chain decarbonisation Forward Plan.
<b>Plant and equipment</b>	100% conversion from diesel to HVO.
<b>Operational assets</b>	Electricity related emissions decrease based on grid decarbonisation as set out in the Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (BEIS 2023).

Assumptions	
<b>Business travel</b>	25% reduction in private car related business mileage with 50% of the remaining private car mileage by BEV's.

The Accelerated Change Scenario is the most ambitious scenario which suggests that a 53% reduction in NRW's greenhouse gas emissions could be achievable by 2030 compared to a 2019-2020 baseline. Emissions in 2030 are estimated to be 11,371 tCO<sub>2e</sub>. Table 3 details how this could be achieved and the assumptions made.

Table 3: Overview of the assumptions used in the Accelerated Change decarbonisation scenario.

Assumptions	
<b>Built Estate</b>	An 80% reduction in building related greenhouse gas emissions is achieved by 2030 through a programme of asset rationalisation, energy efficiency and renewable energy retrofits and grid decarbonisation (as set out in the Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (BEIS 2023)). Fossil fuel heating is replaced by heat pumps.
<b>Fleet</b>	NRW has a 100% BEV fleet by 2026.
<b>Staff commute</b>	Commuting distance is reduced in line with staff working from home 60% of the week.
<b>Homeworking</b>	Emissions associated with staff working from home 60% of the week.
<b>Supply chain</b>	An updated SBTi scenario assuming a 7% year on year reduction to 2030 (calculated for absolute emissions rather than physical intensity emissions as recommended by the SBTi, because no single physical intensity metric would be applicable to the whole NRW supply chain).
<b>Plant and equipment</b>	100% conversion from red diesel to hydrogenated vegetable oil.

<b>Assumptions</b>	
<b>Operational assets</b>	<p>Electricity related emissions decrease 4.2% p.a. and grid decarbonisation as set out in the Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (BEIS 2023).</p> <p>4.2% p.a. is the Science Based Targets Initiative (SBTi) minimum reduction (near term) for scopes 1 and 2 based on absolute contraction to meet the goal of limiting temperature rises to 1.5°C (SBTi 2021).</p>
<b>Business travel</b>	<p>Greater uptake of active and sustainable travel through incentives, encouragement from NRW and improved facilities in our offices and depots; increase in BEV mileage from grey fleet due to an increased uptake of BEVs by staff through the introduction of a salary sacrifice scheme.</p>

The decarbonisation scenarios detailed above highlight the possible greenhouse gas emission reductions that could be achieved through a range of actions based on current knowledge and evidence. They demonstrate the scale and pace of change that is required. To increase this contribution further would require further innovation, technological improvements and upscaling of action.

# Actions

## Built estate

### Overview of greenhouse gas emissions

In 2022-23 GHG emissions from NRW's buildings were 933 tCO<sub>2</sub>e, 4.07% of NRW's overall GHG emissions. Seventy percent of building related GHG emissions can be attributed to electricity use. Several buildings use electricity to provide heating and hot water. Other contributors to high electricity use include ICT and servers, building specific processes such as refrigeration for laboratory use and air conditioning. Between 2015-16 and 2019-20 there was a 39% reduction in GHG emissions from buildings. However, total energy use had not decreased in this time and the majority of GHG emission savings can be attributed to the reduction in the GHG emission intensity of the electricity grid (44% reduction over the same period). Offices (at the time of 2022-23 data collection) were the biggest contributor to NRW's building GHG emissions (69%), particularly Maes y Ffynnon, Tŷ Cambria\*, Rivers House, Maes Newydd/Llandarcy, Buckley and Llys Afon followed by visitor centres (12%).

The biggest contributors to a building's energy usage (Carbon Trust 2018) are:

- heating and hot water - 38%
- ICT equipment and small power - 33%
- lighting - 9%
- cooling and humidification - 8%

Building energy benchmarking was carried out by Welsh Government Energy Service (Welsh Government) in 2020 (Figure 10), which sought to assess the energy use and GHG emissions in buildings across the NRW portfolio and compare building energy and efficiency to relevant benchmarks and standards. The twenty buildings in Figure 11 represented 89% of NRW's building related GHG emissions in 2019-20. Table 4 shows the top 10 buildings with the greatest tCO<sub>2</sub>e per m<sup>2</sup> emissions intensity in 2019-20 due to poor energy management, electric, oil and LPG heating, which has a greater emissions intensity, on-site processes/building use and catering. A number of these buildings are also shown in Figure 11, which indicates their importance in terms of their contribution and impact on GHG emissions from buildings.

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\* \* Note that the Ty Cambria office has since closed and been replaced by offices within the Welsh Government Cathays Park office

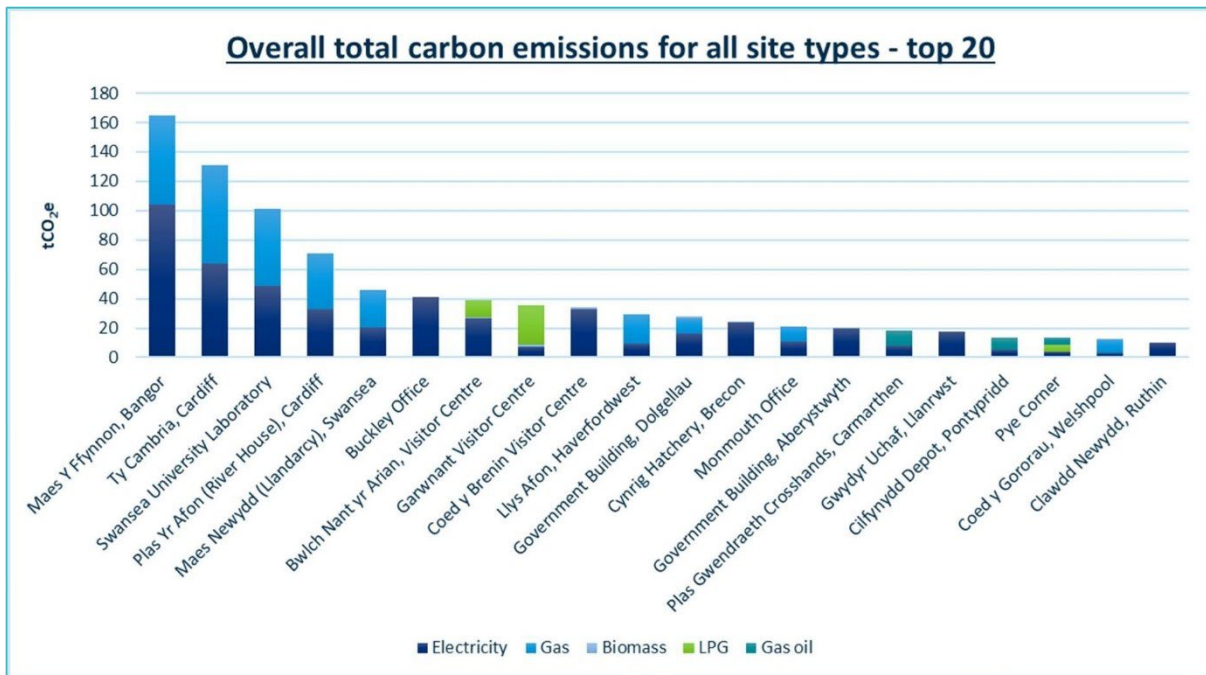


Figure 11: Buildings with the highest GHG emissions in 2019-20. Note: the Ty Cambria office has since closed and been replaced by offices within the Welsh Government Cathays Park office

Table 4: Top 10 buildings ranked by GHG emissions per m<sup>2</sup>.

Site	tCO <sub>2</sub> e/m <sup>2</sup>
Bwlch Nant yr Arian, Visitor Centre	0.150
Cynrig Hatchery, Brecon	0.080
Pye Corner	0.067
Hafod, Ystrad Meurig	0.064
Coed y Brenin Visitor Centre	0.056
Rhuddlan Depot	0.054
Garwnant Visitor Centre	0.051
Swansea University Laboratory	0.050
Skomer, Martins Haven	0.049
Maes Y Ffynnon, Bangor	0.049

## Actions to reduce greenhouse gas emissions

To support our Net Zero Plan targets, there must be a radical shift in how energy is managed in buildings, a centralisation of energy management and energy contracts and

an acceleration of improving building energy efficiency, deploying building renewable energy technologies and low carbon heating.

Reducing greenhouse gas emissions from NRW’s buildings will require:

- asset rationalisation
- effective energy management (energy procurement, energy data analysis, reviewing heating settings)
- energy efficiency measures (e.g. insulation, heating controls)
- building mounted renewable energy systems
- low carbon heating (heat pumps)
- behaviour change

New buildings (constructed or leased) must align to net zero design standards and principles such as LETI’s climate emergency design guide, PassivHaus and the recently published UK Net Zero Carbon Building Standard.

The Built Estate Decarbonisation Forward Plan sets out how NRW can meet its ambitions by reducing building related GHG emissions. The plan demonstrates the potential emission and energy cost savings that could be realised for a range of decarbonisation pathways and scenarios. The most ambitious of these indicates that through a strategic programme of asset rationalisation and energy efficiency; renewable energy; low carbon heating retrofit and electricity grid decarbonisation, a 71% reduction in building related GHG emissions compared to business as usual could be achieved by 2030 (Table 5). There are also potentially significant cumulative GHG emission and energy cost savings (based on conservative energy price estimates).

Table 5: Costs, GHG emission and energy cost savings for a programme of asset rationalisation and energy retrofit for the built estate compared to business as usual (BAU).

Scenario	Capital cost	Cumulative GHG emissions savings compared to BAU (tCO <sub>2</sub> e)	Cumulative energy cost saving	GHG emission in 2030 (tCO <sub>2</sub> e) compared to BAU	GHG emissions in 2030 (tCO <sub>2</sub> e/m <sup>2</sup> )*
<b>BAU</b>	N/A	N/A	N/A	629	0.023
<b>Rationalisation and retrofit</b>	£4.3m	2224	£886k	183	0.010

\*total floor area for BAU: 27,394 m<sup>2</sup>. Total floor area for Rationalisation and Retrofit: 17,885 m<sup>2</sup>

The Adfywio/Renewal Programme seeks to support NRW to create a flexible workplace for the future to enable it to be an effective organisation to tackle the climate and nature

emergencies. The programme has the following three drivers: reduced carbon; improved wellbeing of staff and financial savings. Decarbonising the built estate through asset rationalisation and energy efficiency/renewable energy retrofit is a crucial part of the delivery of Adfywio. NRW's Accommodation Strategy developed as part of the Adfywio Programme includes the following commitments to be achieved by 2030:

- rationalise the Built Estate by 40%
- provide agile office space to enable hybrid working
- reduce emissions from our built estate from a 2019-20 baseline of 1,132 tCO<sub>2</sub>e to approximately 500 tCO<sub>2</sub>e in 2030
- where technically feasible, we will maximise on-site renewable energy generation to minimise grid imports
- champion waste prevention and minimisation in the development and running of the built estate
- ensure our environmental management system continues to be certified to the ISO14001 environmental standard, ensuring best practice in preventing and minimising pollution and continually improving environmental performance
- engage with staff to ensure the built estate enables staff to undertake their roles to their best ability while improving physical and mental Wellbeing

The Accommodation Strategy will be delivered in line with the [Principles for Managing NRW's Built Estate in Response to the Climate Emergency](#). This is already being put into practice with the project at Resolven/Coed y Cymoedd Office, which seeks to create an exemplar building and workplace with respect to decarbonisation, climate change adaptation and green infrastructure. It is hoped to reduce the energy and greenhouse gas emissions associated with the operation of the building through a fabric first approach and the use of air source heat pumps; potentially achieving the PassivHaus EnerPHit standard.

The Strategy also contains several other principles and standards including surveying properties with long term retention to establish the cost effectiveness of retrofitting to support decarbonisation, implementation of heating and lighting systems that provide maximum control, water efficiency improvements, continuing to source its electricity supply from 100% renewable sources and transitioning to a built estate that is not reliant on fossil fuel by the end of 2027-28 (within budget affordability).

Several ambitions listed in the Carbon Positive Project Enabling Plan are still relevant and will need to be incorporated into any strategic programme of energy and renewable energy retrofit to support the decarbonisation of NRW's buildings. These include:

- all staffed buildings have energy management strategies, which include a commitment to energy metering and monitoring and encourage staff behaviours that promote good energy management
- all our buildings have energy audits and delivery plans to deliver the measures identified
- all buildings to be retrofitted with solar PV, LED lighting and low carbon heating, where suitable and feasible

- any newly occupied buildings to have a high energy efficiency rating and support low carbon technologies (e.g. electric vehicle charging) or can be retrofitted to meet this ambition
- explore the potential for further homeworking to reduce office space to reduce energy demand

## Next steps

- Ensure all low and no cost energy saving measures highlighted in the Built Estate Decarbonisation Forward Plan are implemented by 2025.
- Refine the most ambitious decarbonisation pathway and scenario to provide further evidence on the estimated costs and savings and to support the business case for a strategic programme of building decarbonisation retrofit.
- Deliver asset rationalisation, energy efficiency, building renewable energy and low carbon heating across the built estate between now and 2030 through existing programmes such as Adfywio and delivery of the Accommodation Strategy.

## Fleet and plant

### NRW's transport related emissions (badged fleet)

In 2019-20, NRW's total baseline operational emissions (emissions from energy use, fuel use, waste, transport and procurement/supply chain) were 24,650 tCO<sub>2e</sub>. During that period, we travelled 4.9 million miles using our badged fleet (both operational and pool vehicles) emitting 1,673 tCO<sub>2e</sub> of GHG, which represents 7% of total operational emissions. Figure 13 below provides a breakdown of annual mileage and emissions (kgCO<sub>2e</sub>) incurred in 2019-20 (baseline) and 2022-23. In 2022-23, total mileage for badged fleet was 4,151,005 miles with emissions of 1,581 tCO<sub>2e</sub>. That is approximately a 16% reduction in mileage and a 6% reduction in emissions compared to the baseline year.



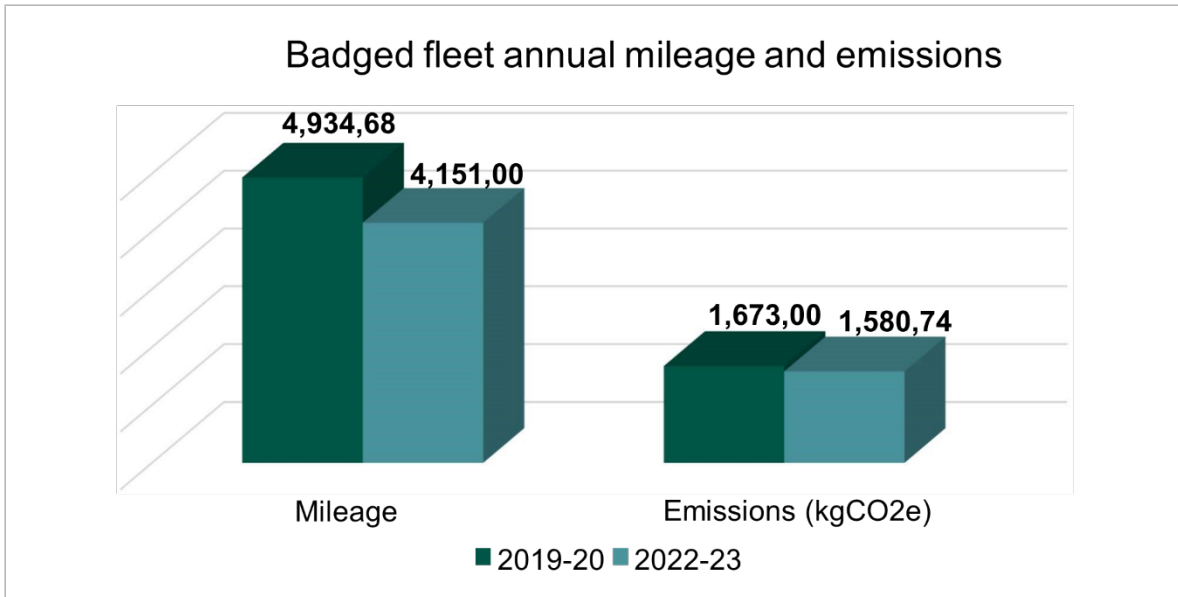


Figure 12 Annual mileage and emissions by badged fleet for 2019-20 and 2022-23.

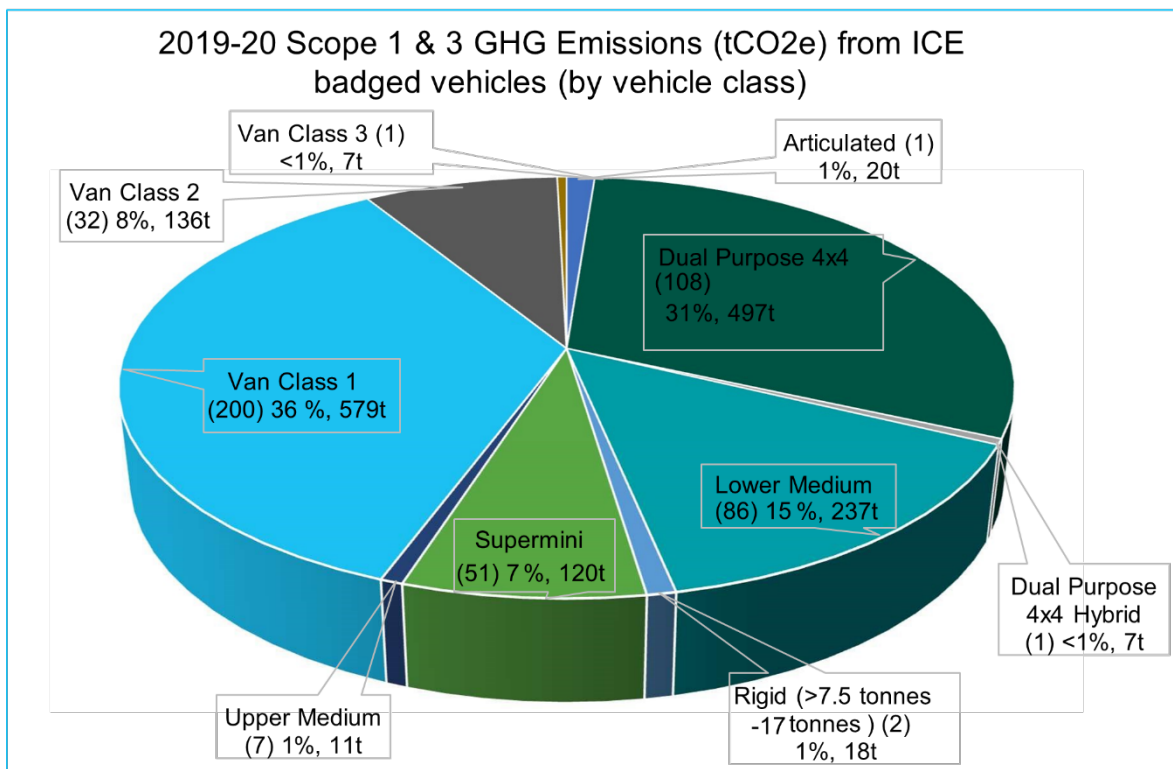


Figure 13. Pie chart showing the amount and percentage of vehicle emissions contributed by each vehicle class within the badged fleet using 2021 BEIS GHG conversion factors.

There has been a general trend in reduction of annual mileage since 2018. This is likely to be due to efforts to reduce travelling with much greater uptake of virtual meetings.

However, since the Covid-19 pandemic related travel restrictions, NRW has become predominantly a hybrid or home-based organisation, which is likely to have an influence on how we travel.

Figure 14 shows the emissions contribution by different vehicle types within the badged fleet in 2019-20 baseline year. Van class 1 (36%) and 4x4 (31%) contributed 67% of the total badged fleet emissions combined. There were 200 van class 1 in the fleet, which travelled 1.9 million miles compared to 108 4x4s, which travelled 1.2 million miles. This makes the 4x4s the most inefficient and polluting vehicle types within the badged fleet.

## Actions to reduce greenhouse gas emissions

Based on existing use data, it is entirely possible to replace all badged vehicles with BEVs including rigid truck and articulated lorries. This is supported by the Welsh Government Energy Service “ULEV Transition Fleet Review” report, which states that an initial analysis would suggest that there are no vehicles on NRW badged fleet that could not transition to BEV by 2025. Welsh Governments analysis indicates the transition from a fossil fuel fleet to a BEV fleet should reduce energy use by up to 70% and deliver energy cost savings of up to £400,000 each year (depending on fossil fuel prices and off-peak electricity tariffs). This cost saving can help offset the higher purchase cost of the BEV fleet and the cost of the charging infrastructure.

The Fleet Forward Plan sets out how NRW can meet its Net Zero Plan ambitions by reducing transport related GHG emissions and aims to provide the strategic direction to achieve this. The plan demonstrates the potential emission savings that could be realised for a range of decarbonisation pathways and scenarios.

## Badged fleet

Based on Fleet aspiration to replace 20% (circa 100 units per annum) of the badged fleet ‘year on year’, it should be feasible to replace all badged fleet (except 4x4s and HGVs) with BEVs by 2028 if not before (disregarding any supply issues).

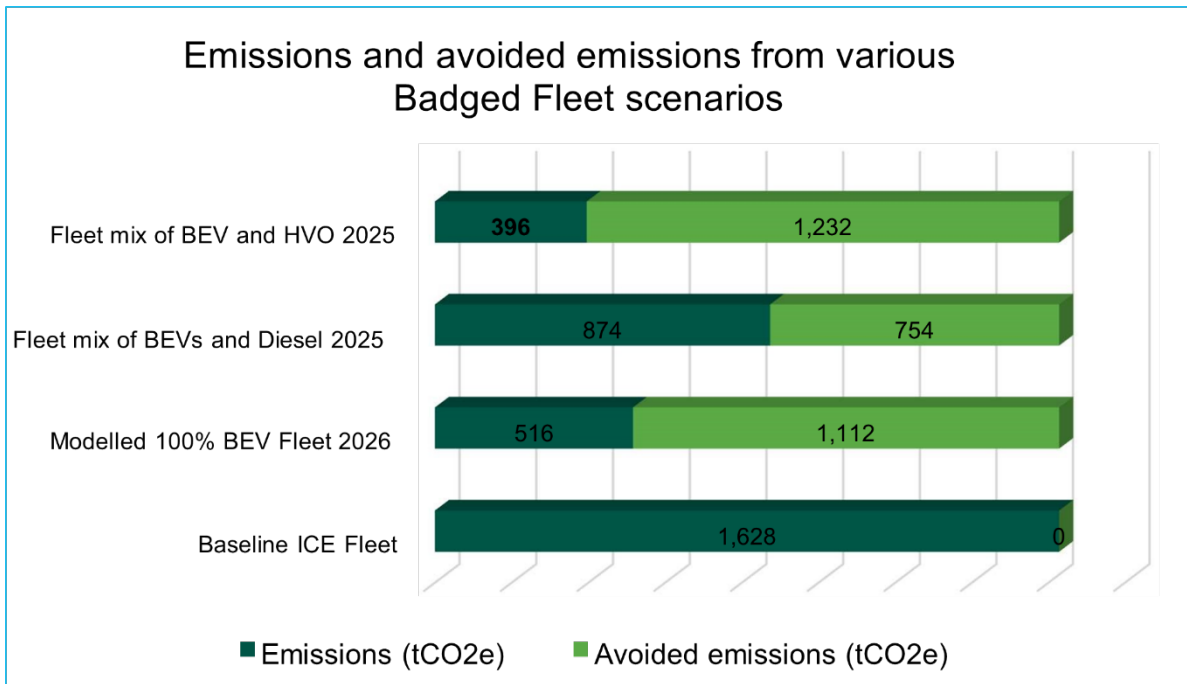


Figure 15 Potential emissions reduction and avoidance through various badged fleet scenarios.

Figure 15 above demonstrates the emissions reduction benefits against different badged fleet scenario options. In brief:

- annual baseline emissions from ICE badged fleet are 1,628 tCO<sub>2e</sub>
- with a 100% electric badged fleet by 2028 or before, the annual emissions can be reduced from 1,628 tCO<sub>2e</sub> to 516 tCO<sub>2e</sub> and 1,112 tCO<sub>2e</sub> avoided annually
- the badged fleet can be partially electrified by 2028 (excluding 4x4s and HGVs). With mixed BEV and ICE fleet from 2028, the annual badged fleet emissions can potentially be reduced from baseline 1,628 tCO<sub>2e</sub> to 874 tCO<sub>2e</sub> with 754 tCO<sub>2e</sub> avoided annually
- with a mixed fleet of BEV and ICE vehicles (mainly 4x4's and HGVs), the annual emissions can be reduced to 396 tCO<sub>2e</sub> with 1,232 tCO<sub>2e</sub> avoided annually from 2028, if we operate the existing ICE 4x4's and HGVs with HVO fuel only. There will be some additional cost due to higher price for HVO. However, this will provide the largest emissions reductions for the interim period
- the rest of the fleet (4x4s and HGVs) can be fully electrified by 2029-30, when the BEV market has technologically matured. With this approach, the annual badged fleet emissions can potentially be reduced from baseline 1,628 tCO<sub>2e</sub> to 516 tCO<sub>2e</sub> with 1,112 tCO<sub>2e</sub> avoided annually (excluding further reduction from grid decarbonisation)

- with a 100% electric badged fleet, by 2030 the annual emissions should reduce further from 516 tCO<sub>2</sub>e to as low as 168 tCO<sub>2</sub>e (scope 2 and 3 only, 212 tCO<sub>2</sub>e for Well-To-Tank) due to grid decarbonisation (avoiding 1,460 tCO<sub>2</sub>e annually)

## Next steps

To reduce emissions from NRW's Badged fleet as quickly as possible, the best and most cost-effective option is to replace existing ICE vehicles with suitable BEV models as soon as possible by adopting the following measures:

- no new ICE vehicles should be leased from 2024 onwards unless absolutely necessary and any new ICE vehicles including all existing ICE vehicles should be operated using HVO (although this will somewhat increase the operational cost due to a higher fuel price)
- all badged ICE vehicles (except 4x4s and HGVs) should be replaced with BEVs by 2028
- ICE 4x4s and HGVs should be operated using HVO and replaced with BEVs when feasible
- a review should be carried out on the use of existing ICE 4x4s to establish if current activities are necessary, can be carried out remotely or by other means with lower carbon footprint
- an investigation should be undertaken to identify the causes of low utilisation (<6k annual miles) of some badged vehicles
- identify steps to improve utilisation of existing badged BEVs by staff
- integrate data capture system to monitor mileage and energy use by BEVs as soon as technically feasible
- improve tracking data to determine peak mileage and typical patterns of use for individual vehicles

## Plant

NRW operates a large number (>200) of plant vehicles and attachments across its fleet. Fuel use for plant includes diesel, petrol and HVO. In 2019-20, total combined fuel used by plant (diesel, petrol and HVO) was 118,222 litres and emitted 399 tCO<sub>2</sub>e of GHG, which represented 1.6% of NRW's total operational emissions that year. In 2022-23, plant used 96,029 litres of fuel and emitted 225 tCO<sub>2</sub>e, a 9% and 43% reduction respectively. The 225 tCO<sub>2</sub>e emissions in 2022-23 from plant represented 1% of NRW's total emissions.

## Actions to reduce greenhouse gas emissions

NRW has taken the initiative to replace the use of red diesel with HVO for plant from April 2023. HVO has the potential to reduce GHG emissions by up to 93% when compared to diesel. This is an interim step until both the electric and hydrogen technology for plant matures over the next decade.

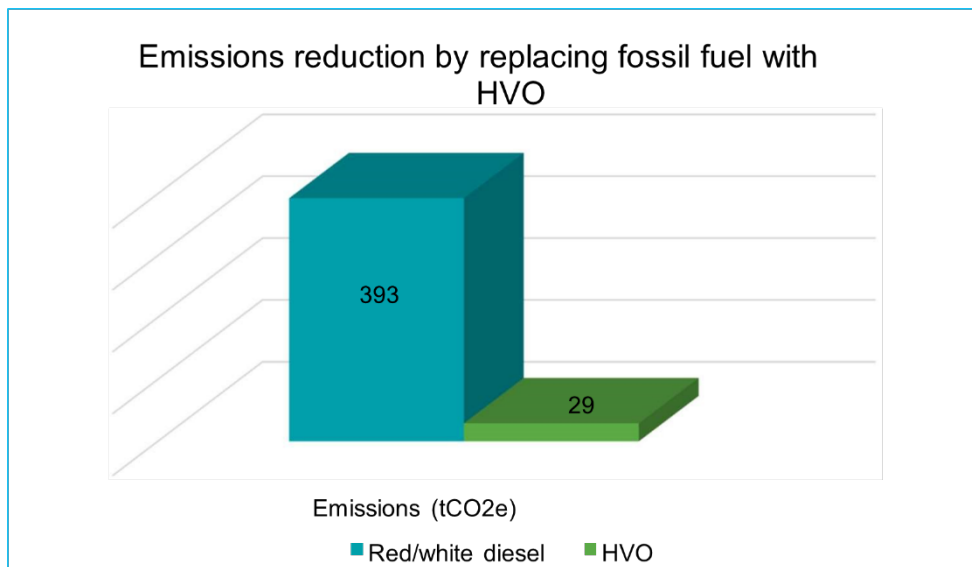


Figure 16: Potential emissions reduction (tCO<sub>2</sub>e) by replacing fossil fuel (excluding petrol) with HVO.

Figure 16 above indicates that by replacing all diesel (both red and white diesel) with HVO, the annual emissions (2019 baseline) of 393 tCO<sub>2</sub>e (excluding emissions from petrol use) can be reduced to 29 tCO<sub>2</sub>e. The total annual emissions would be 35 tCO<sub>2</sub>e (including the 6 tCO<sub>2</sub>e emissions from petrol use) when compared to 2019-20 fuel use and emissions. This is a potential 91% reduction in emissions from plant and machinery. Although HVO is exceptional in terms of its emissions reduction properties and potentially reducing maintenance cost (cleaner burning fuel) while prolonging machine life, it is comparatively more expensive than diesel, but the benefits outweigh the limited cost increase.

## Next Steps

- NRW should carry out an assessment of plant use and create a forward plan that assesses the feasibility of progressively transitioning fossil-fuel based plant with both electric and hydrogen technology.

## Business travel

In this section business travel includes travelling for business purposes using private vehicles (grey fleet, e.g. cars, motorcycle etc.), hire car and public transport. Business travel data for 2019-20 provides the baseline year.

Based on the Net Zero carbon reporting data, in 2022-23, NRW staff travelled 1,540,702 miles and emitted 430 tCO<sub>2</sub>e GHG while travelling for business purposes. The 430 tCO<sub>2</sub>e represents a 12% reduction in business travel related emissions compared to the baseline 2019-20 emissions of 491 tCO<sub>2</sub>e and represents 2% of NRW's 2022-23 total annual emissions. Figure 17 shows the business travel emissions (tCO<sub>2</sub>e) breakdown for 2019-20 to 2022-23.

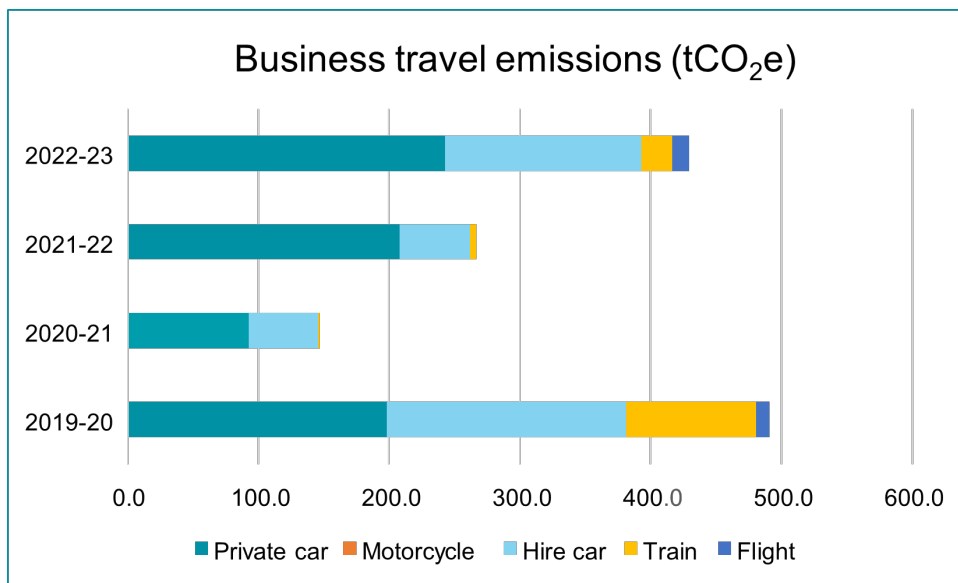


Figure 17: business travel emissions (tCO<sub>2</sub>e) breakdown by type for 2019-20 to 2022-23.

## Actions to reduce greenhouse gas emissions

Table 6 below shows the total annual business mileage (including badged fleet, air, bicycle and BEVs) from 2016-17 to 2022-23 period (based on NRW's Environmental Management System reporting data). It is evident that there has been a general decline in business mileage year on year since 2016.

Table 6: Annual business travel mileage data based on our corporate environmental reporting data.

	Unit	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
<b>Total business travel</b>	miles	8,158,327	7,269,097	7,535,717	7,317,260	3,465,488	4,484,125	4,151,005

	Unit	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
<b>Total business travel</b>	tCO <sub>2</sub> e	2,249	2,019	2,002	1,810	1,085	1,351	2,235

The general decline in business mileage can be attributed to a significant improvement in ICT infrastructure for remote working, which has led to remote virtual meetings as the default option where possible. In addition, NRW has implemented a Travel Decision-tree for journeys, which encourages only travelling when absolutely necessary, using public transport where possible, followed by use of badged pool fleet, hire car and only then private vehicles (grey fleet) as the least preferred option. In addition, since 2019-20, no domestic flights are allowed for business travel.

In March 2023 NRW conducted a staff travel survey to provide insights into staff business travel choices. The survey undertaken by Sustrans has led to the production of an Active and Sustainable Travel (A&ST) Plan for NRW. The A&ST Plan will aid us to identify opportunities and implement actions to promote greater use of active and sustainable travel (e.g. walking, cycling, use of public transport) among staff for both commute and business travel purposes.

## Grey fleet

Grey fleet is outside of NRW's direct influence but contributes towards NRW's annual GHG emissions. Baseline emissions from grey fleet in 2019-20 was 185 tCO<sub>2</sub>e, 1% of NRW's total emissions. Post Covid-19 pandemic, NRW has been transformed into an organisation that is now predominantly hybrid or home-based, which has led to emissions from grey fleet increasing from the baseline 185 tCO<sub>2</sub>e to 243 tCO<sub>2</sub>e in 2022-23 (1% of total emissions). The increase in grey fleet mileage is partly linked to staff working from home being less likely to travel to offices/depots to pick up pool badged vehicles. In addition, Covid-19 related anxieties and habits of travelling have dissuaded staff from using badged pool vehicles.

NRW can influence emissions reduction from grey fleet by introducing a salary sacrifice scheme for staff to lease BEVs. Such a scheme will make it more financially affordable for staff to lease a BEV, while reducing emissions from grey fleet and improving air quality. There will also be a positive impact on commuting emissions and potential to reduce the badged pool fleet providing a cost saving along with improved resilience. While evidence from other organisations indicates that uptake may be limited, at least in the short-term, uptake of BEVs has been increasing and bucking previous trends every year since 2019 but future uptake is challenging to predict. Tusker, a leading lease car specialist in the UK stated that salary sacrifice introduction at a workplace tends to have 3.5% uptake by employees in the first year and increasing to up to 10% by year 3. Salary Sacrifice schemes have been successfully introduced by the NHS Wales and the Welsh Government.

Figure 18 below shows a potential scenario where the annual emissions from grey fleet could be reduced from a nominal “average diesel car” baseline of 193 tCO<sub>2</sub>e to 158 tCO<sub>2</sub>e by 2030 if 30% of grey fleet mileage is done by BEVs (includes projected WTT emissions reduction due to National Grid decarbonisation). Based on the NRW 2019-20 baseline emissions of 185 tCO<sub>2</sub>e if 30% of the baseline mileage is done by BEVs, then emissions would reduce to 143 tCO<sub>2</sub>e.

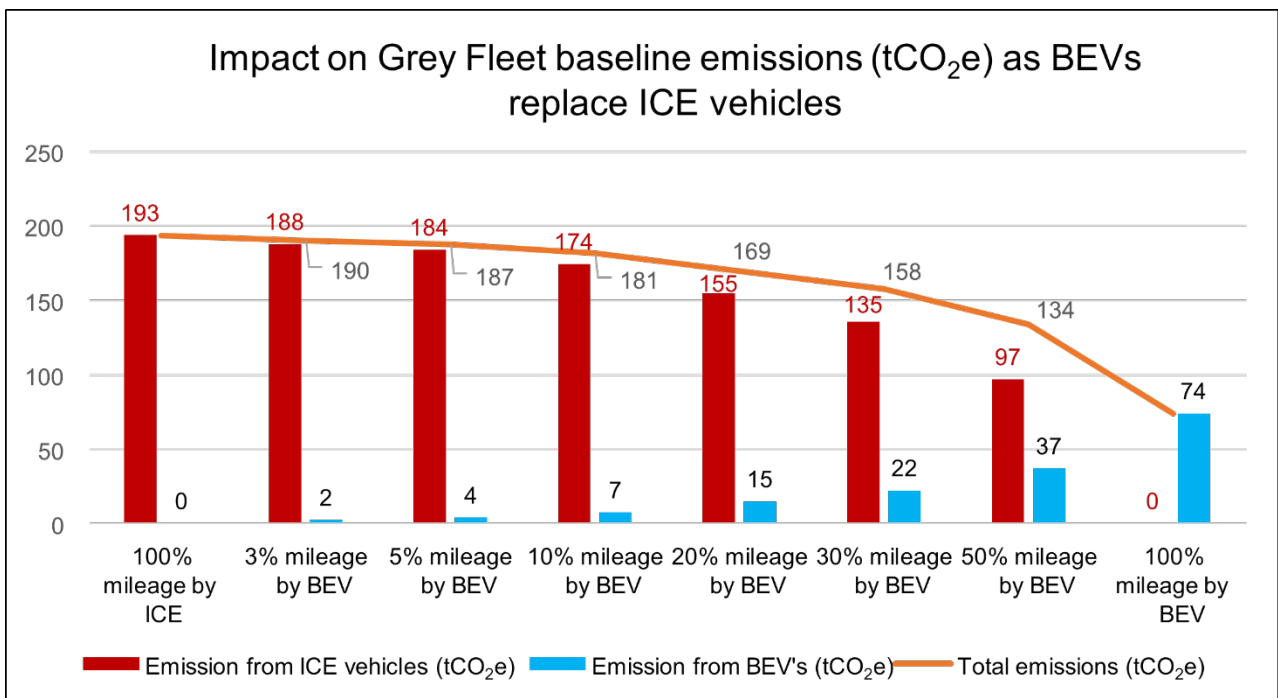


Figure 18. Impact of BEV on grey fleet emissions as ICE vehicles are gradually replaced by BEVs.

## Hire car

Between now and 2028, NRW should encourage staff to use hire cars as a last resort and increase utilisation of existing badged vehicles. There should be regular reviews to ensure the Travel Decision-tree is applied and the appropriate vehicle type hired as hire companies transition to BEVs. By 2028 in line with the Welsh Government Net Zero Plan it should be possible for all hire cars used to be BEVs.



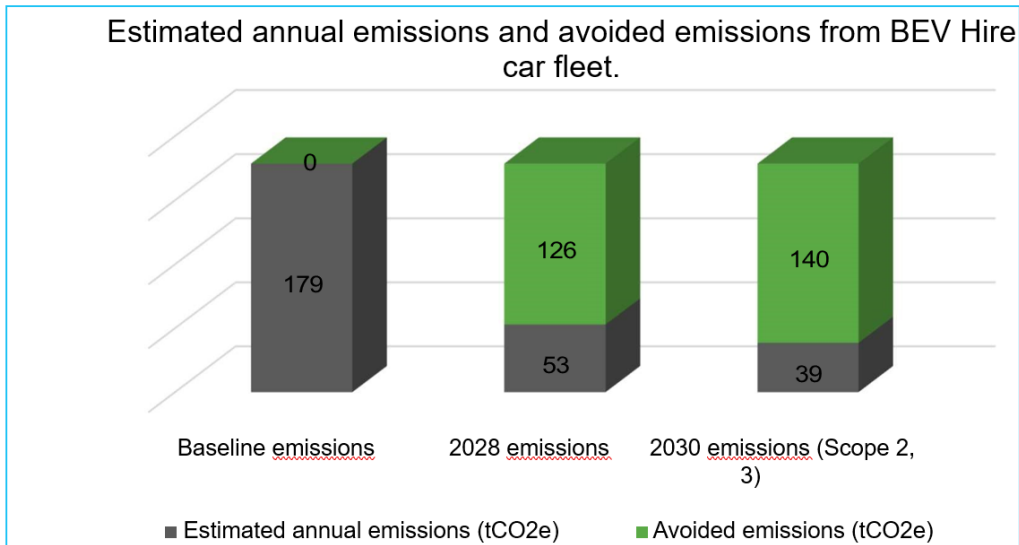


Figure 19 Graph showing estimated annual emissions compared to baseline year from 2019 to 2028. The values for 2030 includes projected grid decarbonisation impact on emissions.

Figure 19 above indicates by 2030, the annual emissions from hire car fleet could be as low as 39 tCO<sub>2</sub>e assuming a similar mileage as 2019-20. That is potentially a 78% reduction from the baseline emissions.

## Next steps

### Grey fleet

- A periodic review should be carried out to ensure NRW's Travel Decision Tree is fit for purpose and applied when travelling for business purposes.
- Staff should be encouraged to use badged pool vehicles for business travel where possible if the private vehicle is not a ULEV (<75g/CO<sub>2</sub>/km).
- NRW should introduce a salary sacrifice scheme for staff to lease BEV's, which will have a positive impact in terms of emissions reduction from grey fleet and staff commute.

### Hire car fleet

- In association with a periodic review of NRW's Travel Decision Tree an assessment to ensure that the most efficient vehicle types are being hired (suitable for the intended use) should be undertaken to assess BEV uptake.

## Agile working, homeworking and commuting

Agile working refers to a more flexible, mobile way of working, optimising the use of workspaces and modern technology. Agile working provides an opportunity to reduce emissions as it encompasses the interaction between office space utilisation, working from home and commuting. Employee commuting and energy consumption in office spaces are major components of our baseline operational carbon footprint. However, COVID-19 has resulted in permanent shift in working culture and a move to hybrid working patterns has occurred for many in our workforce. The changing dynamics of work has and will continue to impact the composition of our emissions. Reductions in commuting mileage and office energy consumption are likely to correspond with an increase in domestic energy consumption from homeworking, which will be seasonally affected. Welsh Government have set out an ambition for 30% of the Welsh workforce to be working at or near home.

Internally, we have established a cross-disciplinary Adfywio/Renewal Programme and team to address the changes in working bought about by the pandemic. This Programme is addressing office rationalisation given the greatly reduced use of office space, while maintaining convenient, accessible, productive places for people to work. It is also developing agile working policies and practices that ensure work is delivered while providing flexibility for staff and reducing emissions.

The significant impact of agile working on NRW's emissions is illustrated through pre-pandemic and mid-pandemic modelled data for office and home heating and electricity emissions along with commuting in Figure 20.

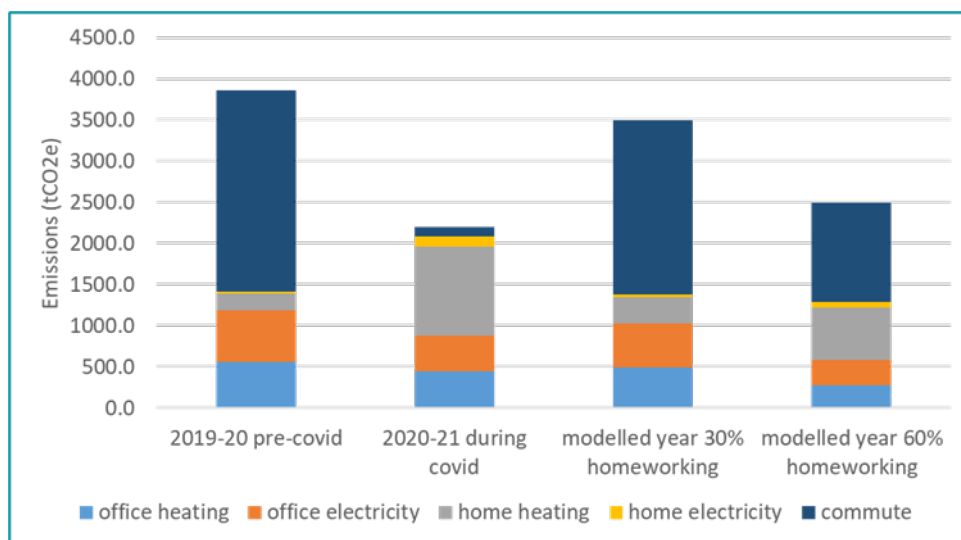


Figure 20. Modelled estimates for pre- and mid pandemic emissions for office and home heating/electric use and commuting.

Our modelling has shown that homeworking reduces total emissions, mainly through reduced commuting emissions, and should be promoted particularly during the summer months, and in rural areas to maximise the emissions benefit. Improved office energy management is also a requirement to maximise the emissions benefit by shutting down

rooms during periods of low usage. Office space rationalisation and ways of working should focus on reducing commute distances given the need to reduce the gap between the NRW (30 mile) and Welsh national (19 mile) average daily commute distance.

Decarbonisation of our staff commute through the use of active travel and low emission vehicles is crucial to help reduce emissions associated with office working. We have developed a corporate position and linked policies facilitating our approach to “agile working”, informed by a review of staff working patterns and their carbon emissions impacts. This is providing strategic direction to inform investment decisions in the built estate and ICT.

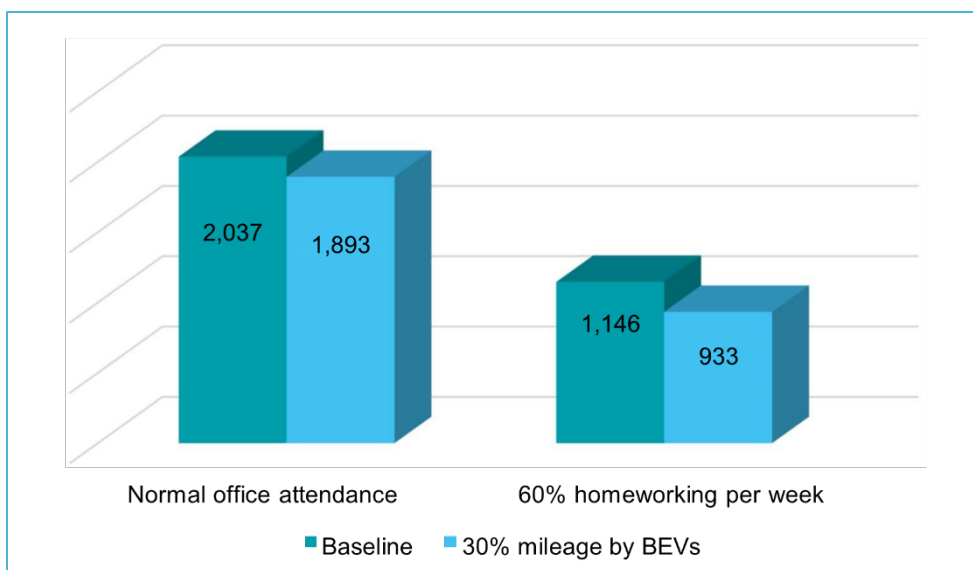


Figure 21: Graph showing modelled emissions reduction in both normal office attendance and staff WFH 60% of the time if 30% mileage done by BEVs.

The baseline 2019-20 emissions from staff commute were 2,037 tCO<sub>2</sub>e. Figure 21 shows that modelling indicates that if 30% of commuting mileage is done by BEVs, it would reduce baseline annual emissions to 1,893 tCO<sub>2</sub>e were staff to be attending the office as normal prior to the pandemic. However, if on average staff work from home 60% of the time per week, then the modelled annual emissions reduces from the baseline and drops to 1,146 tCO<sub>2</sub>e. If then, 30% of the annual mileage is done by BEVs the emission reduces further to 933 tCO<sub>2</sub>e per annum.

The annual staff commute emissions in 2022-23 was 313.5 tCO<sub>2</sub>e. This is an 85% reduction in emissions compared to the baseline 2,037 tCO<sub>2</sub>e. It is largely due to a majority of staff working from home most days of the week. Consequently, to reduce the emissions further from the current annual 313.5 tCO<sub>2</sub>e, the most viable options are for staff to uptake BEVs or the greater use of active and sustainable travel. Uptake of BEVs can be influenced with a salary sacrifice scheme and the introduction of further incentives for staff to use active and sustainable travel should be explored.

## Next steps

- We will continue optimising existing low carbon IT services and investing in digital infrastructure that enables productive remote working and connectivity across the organisation.
- We have, and will continue to, conduct a 'staff travel' survey to reduce our reliance on generic benchmarks and identify tailored decarbonisation initiatives related to agile working.
- We will continue to align our planning/decision making to the Sustainable Travel Hierarchy and support its' uptake among staff to shift commuting habits to low carbon forms of travel.
- We will engage with staff to understand existing barriers to the use of active travel and public transport.
- We will continue to provide an enabling environment for low carbon travel, including improvements to provision of bicycle storage, showers, electric vehicle chargers, and maintain enabling policies such as our cycle-to work scheme.
- We will be developing a staff calculator to explore the impact of householder heating fuel and commuting distance on emissions to inform staff decisions.

## Supply chain

### Total supply chain emissions and hotspots

NRW's supply chain emissions were estimated to be 17,626 tCO<sub>2</sub>e in 2022-23, accounting for 77% of the organisation's total carbon footprint.

Supply chain emissions include all upstream emissions from the extraction, production and transportation of goods and services used by the organisation. These emissions are out of the direct control of the organisation and are dispersed across multiple purchase types, locations, organisations, and processes, making this the most challenging category of emissions for NRW to reduce.

The organisation spends approximately £100 million annually on goods and services accounted for within supply chain emissions calculations, which excludes spending on staff, energy and travel.

Figure 22 below sets out the breakdown of NRW supply chain emissions by standard industrial classification categories as used in Welsh public sector net zero emissions

reporting. Significant emissions contributions within the main product categories include works and services delivered by contractors and consultants within the “Professional, Scientific and Technical Activities” category; services to buildings and landscape within the “Administrative and Support Services” category; machinery, equipment, computer and electronic products within the “Manufactured Goods” category and plants and livestock within the “Agriculture, Forestry and Fishing Products” category.

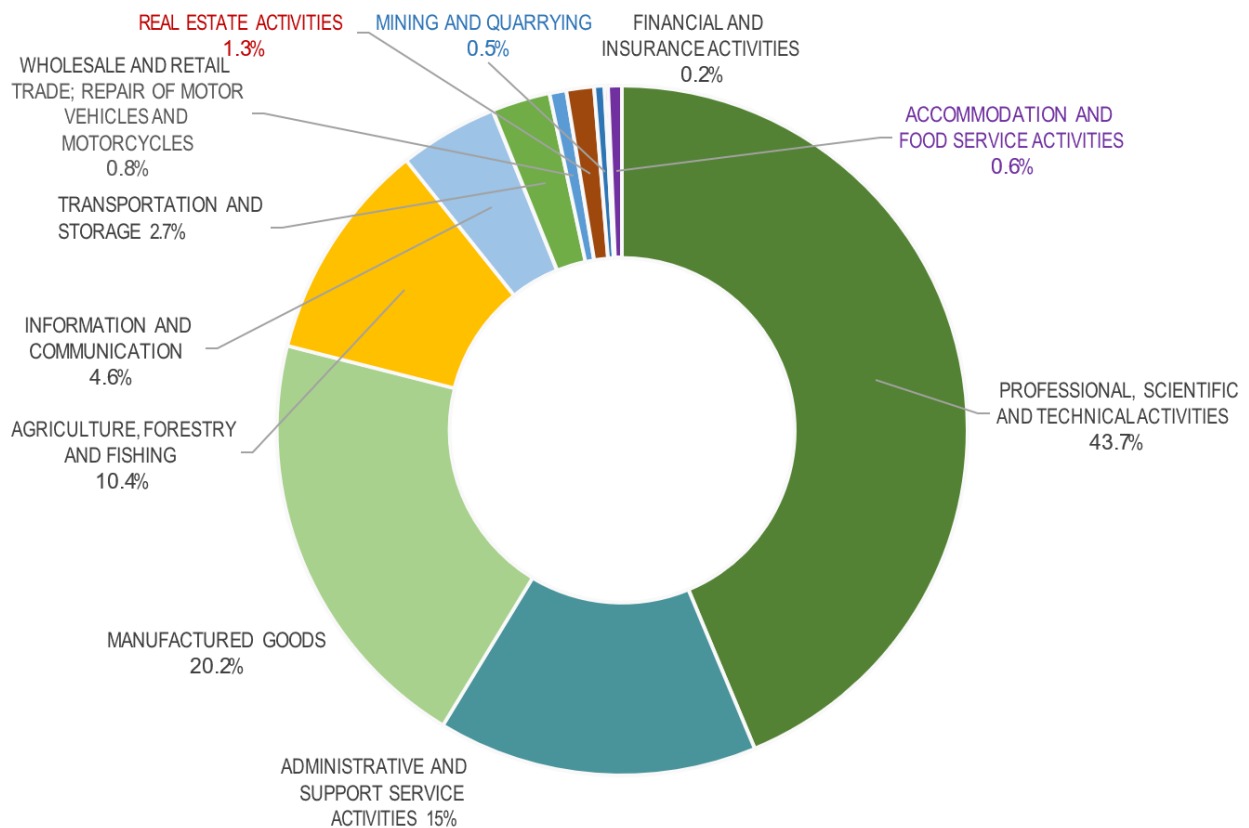


Figure 22. Breakdown of NRW supply chain emissions by Standard Industrial Classification (SIC) product categories used in Welsh public sector net zero emissions reporting. Note these are not NRW specific product categories and many NRW account codes are not easily matched to an SIC category, for example those relating to land management activities.

Our supply chain emissions are currently estimated using spend data as a proxy for emissions – mapping NRW spend to average emissions factors per £ spent on categories of products and services. This approach introduces a high level of uncertainty to estimates but provides a quick approach to gaining an overview of whole supply chain emissions, and a crucial first step to guide further work. Estimates using this calculation method will not reflect individual supplier efficiencies nor improvements over time.

In the absence of more specific emissions data (i.e., supplier specific or product or service average data), we analysed our spend based emissions results by NRW account codes, cross-checking with top suppliers and account codes by spend, and across year to identify

consistent emissions hotspots in our supply chain. Our working list of NRW hotspots is given in Table 7. The identification of hotspots in this way is somewhat subjective but provides an initial steer on priorities.

Table 7. Working list of NRW’s supply chain emissions hotspots. Full details of how the hotspots list was created is included in “Decarbonising NRW’s supply chain: Forward plan to 2030”.

Categories	Specific areas, contracts or suppliers of interest
Service level agreements (SLAs)*	Environment Agency
Reservoir operating agreements (ROAs)*	Dwr Cymru Cyf - Welsh Water Ltd
Plants/Shrubs/Trees	-
Forestry related contractors	Harvesting felling, forest roads (current case study), restocking preparation,
ICT contractor and consultant services	-
ICT annual software licences, support and maintenance (included due to high spend)	-
Flood asset delivery	Construction & Consultancy frameworks (previously CEFA) (current case study)
Engineering contractors	-
Fleet purchase, hire and maintenance	-
Plant purchase and hire	Plant hire Framework - Low Loader & Lorry Hire & Sourcing of Aggregates
Plane and helicopter hire	-
Operational equipment purchase and maintenance	-
Other	Facilities Management hard services maintenance contract; Integral; Asset maintenance framework; MEICA preventative maintenance contract

\*These are non-procurement agreements.

Other key points from the analysis of spend-based emissions are:

- that 10 NRW account codes contributed 62.7% of organisational emissions in 2021-22
- a qualitative analysis of likely activities driving emissions from our top 10 account codes by spend value suggest that transport of materials, waste and employees;

construction materials; components; construction plant and equipment are likely to be the main sources of emissions within these contract types

- in 2020-21, 25% of NRW supply chain emissions were from contracts under £25,000 in value, 50% under £90,000 (including under £25,000), 75% under £225,000 and 90% under £1,000,000

## Supply chain decarbonisation work to date

Since 2019 we have been using the hotspots analysis alongside our procurement pipeline to identify upcoming contracts and frameworks as case studies for supply chain decarbonisation. We have used these case studies to trial approaches to asking suppliers to reduce and report emissions.

### Case study 1: Forest Roads Framework

Key emissions sources: Plant fuel use, transport of materials and plant to site.

#### Approach:

- scored questions in tender on managing organisational and contract emissions (15% weighting)
- scored question in tender on EURO emissions categories of owned plant (15%)
- scored question in tender on technical competence included ways of working on peat soils (35%)
- requirement to report annual fuel emissions as a KPI for the life of the framework, with reductions demonstrated per unit of work delivered

### Case study 2: Construction and Consultancy Frameworks for civil engineering projects

Key emissions sources: Material and energy use in the construction and use of assets.

#### Approach:

- scored question in tender on managing organisational emissions
- use of the EA's Carbon Planning Tools set out as mandatory on all projects within the Framework Agreement, to calculate and drive emissions savings against project baseline
- suite of documents on the use of the tools and reporting requirements developed for contractors and consultants
- quarterly progress report required to NRW project manager on each Framework project
- project managers trained in the use of the tools by EA

This case study approach to supply chain decarbonisation was initially adopted to help target resources and to provide the organisational knowledge and experience necessary to expand carbon consideration into procurement procedures more widely. Building on the

work to date and recognising the need to increase the scale and pace of our procurement decarbonisation efforts in a strategic and consistent way, we have developed a strategic plan “Decarbonising NRW’s supply chain: Forward plan to 2030”, setting out how NRW can commit to decarbonising its supply chain between 2023 and 2030 through a series of actions and milestones. This Forward Plan provides more detail on the decarbonisation approach for our supply chain and specifically covers the period 2023-2030 but will also put in place the organisational framework and tools required for long term supply chain decarbonisation.

The forward plan consists of four main elements:

1. targeting top emitting contracts and frameworks - continuing the hotspots case study approach to target top emitting contracts and suppliers in a tailored way, to ensure maximum impact in these areas and to continue to provide learning to feed into the strategic approach
2. introducing levels of carbon requirements for suppliers - introducing a tiered system of carbon reduction and reporting requirements for all contracts, referred to as carbon levels, determined by contract value and emissions intensity. This will provide a consistent approach for carbon consideration across NRW procurement. To be rolled out to all contracts and framework agreements by 2026
3. developing supporting tools and templates - developing a procurement decarbonisation toolkit to support staff to incorporate carbon reduction and reporting requirements based on the carbon level relevant to their particular contract and purchase type
4. developing a supply chain emissions monitoring framework - developing an emissions monitoring framework linked to the levels of supplier reporting requirements to improve the quality of NRW supply chain emissions monitoring over time

The plan contains 31 actions to deliver these four elements, a proposed timeline and indicates who will need to be involved in the delivery of each.

## Setting targets for supply chain decarbonisation

Because our supply chain emissions estimates are currently based on spend based emissions factors rather than product and service specific data or supplier specific data, quantitative progress monitoring is not currently possible. Our supply chain decarbonisation forward plan will support absolute emissions target setting and monitoring by 2026.

Few organisations have quantified and reported supply chain emissions reductions. The communications company BT have a 29% target for supply chain emission reduction by 2030 and achieved an 8% reduction in the first three years, equivalent to 2.67% annually. The NHS in Wales has also set itself a target for procurement emissions equivalent to reductions of 2.63% per year by 2030.



At the time of writing our supply chain decarbonisation forward plan, aligning with the Science Based Targets Initiative (SBTi) for scope 3 emissions would have meant an annual linear reduction rate of 2.5% between 2020 and 2035 aligned to keeping global temperatures well below 2°C higher than pre-industrial temperatures. This was updated as part of the SBTi Corporate Net-zero standard, which recommends setting scope 3 targets which are consistent with limiting warming to at least well-below 2°C for near-term targets (5-10 years) and 1.5°C for long-term targets (by 2050). For scope 3 emissions for near-term targets a 7% year on year reduction is now suggested and a minimum 97% overall reduction for long-term targets.

The decarbonisation scenarios set out in Figure 23 show the possible trajectory of NRW supply chain emissions to 2030 under three illustrative scenarios: 1) business-as-usual (the average emissions between 2019 and 2022 continued out to 2030), 2) an evidence based scenario equivalent to the previous SBTi 2.5% linear annual reduction rate as outlined in the supply chain decarbonisation forward plan, and 3) an updated SBTi scenario assuming a 7% year on year reduction to 2030 (calculated for absolute emissions rather than physical intensity emissions as recommended, because no single physical intensity metric would be applicable to the whole NRW supply chain). Scenario 2 would achieve an overall 25% reduction from the baseline by 2030 and scenario 3 would achieve an overall 51.6% reduction from the baseline by 2030.

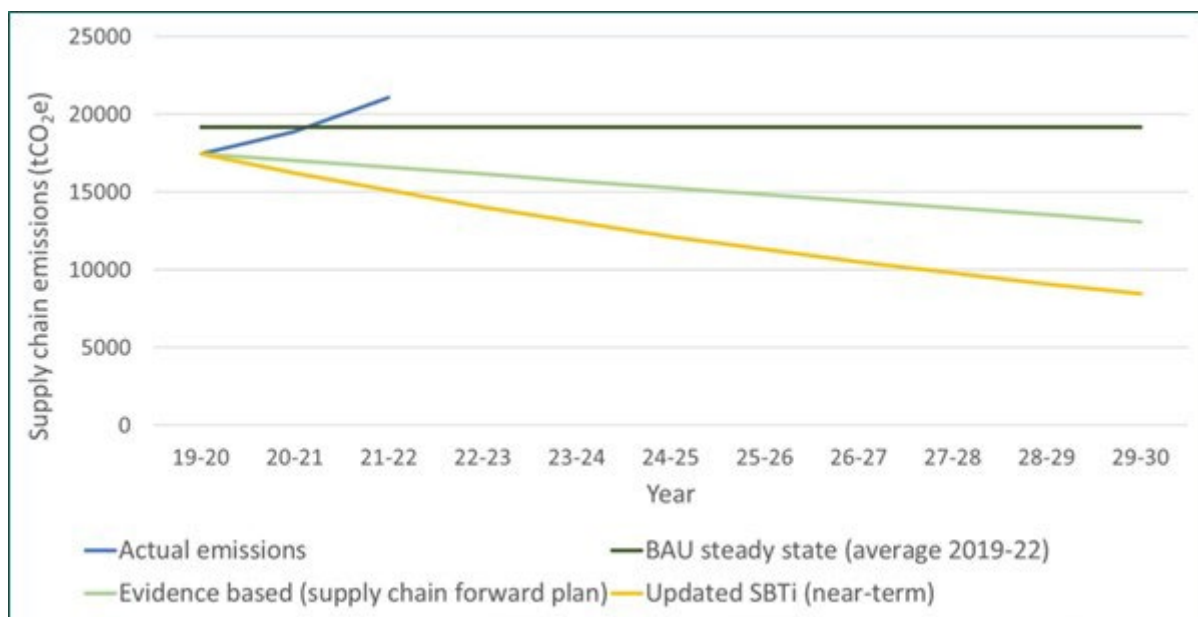


Figure 23. NRW supply chain decarbonisation scenarios out to 2030, and actual emissions calculated for 2019-22.

## Next steps

- Implementing our supply chain decarbonisation forward plan (which includes actions below), including its resourcing.

- Introducing a tiered system of carbon reporting and reduction requirements for all suppliers by 2026.
- Developing a toolkit for staff to support contract managers to include the carbon reduction and reporting requirements relevant to their contract tier.
- Developing a supplier emissions questionnaire for their organisational emissions.
- Integrating basic carbon questions into all of our tender and quotation templates for suppliers.
- Exploring the use of carbon calculators for high value, high emission contracts and frameworks to require suppliers to baseline and demonstrate contract or project level savings.
- Developing a system to centrally record contract level emissions data and combine this with allocated organisational emissions and spend based emissions data for lower value contracts to produce whole supply chain emissions estimates.

## NRW operational assets

### Overview of greenhouse gas emissions

NRW's Hydrometry and Telemetry (H&T) operational teams manage around 700 remote assets, including pumping stations, rain gauges and gauging stations, which require electricity to monitor river levels and flow, rainfall and groundwater. This electricity is usually provided via a grid connection or through on-site batteries. An overview of the majority of these assets can be found [here](#). The data from these operational assets is used for flood protection and flood warnings, water resource management and reducing the environmental damage from over abstraction, to inform water quality policies and many other NRW and external customer requirements. Operational assets accounted for approximately 1% of NRW's GHG emissions in 2021-2022. Table 8 gives a breakdown of the different assets and their associated electricity consumption and GHG emissions in 2021-2022. The majority of the c.700 assets operate using batteries, for which there is little or no energy consumption data available. Consequently, Table 8 only accounts for around 250 operational assets where energy usage is known.

Table 8: Energy usage and GHG emissions for NRW's operational assets.

Asset type	Electricity kWh	tCO2e
CCTV	101,922	24
Flood Warning Site	19,192	4
Gauging Station	153,806	36
Pumping Station	539,602	125
Rain Gauge	64,550	15
River Level Station	21,146	5
Unknown	168,742	39
Weir	29,703	7
Total	1,098,662	254

Travel emissions are one of the largest sources of carbon from H&T assets, which is captured within the Fleet and Business Travel emissions. These assets require regular maintenance, which requires staff to travel to site. Although some maintenance can be carried out in a systematic way or remotely, the nature of the network does not allow this routinely.

### Actions to reduce greenhouse gas emissions

Solar PV has been installed on a number of assets including 42 hydrometric sites in Southeast Wales and the Cilfrew gauging station. Installing renewable energy reduces the GHG emissions as the reliance on grid electricity is lowered and can also reduce the number of visits required for maintenance at sites that rely on batteries. Bespoke solar PV

cabinets or small pole mounted solar PV were installed at hydrometric sites. A roof mounted solar PV was installed at the Cilfrew gauging station. The estimated annual GHG emission savings from these installations in 2018 was 948 kgCO<sub>2</sub>e and increases to 1376 kgCO<sub>2</sub>e if staff travel reductions are included.

There are 458 operational assets in South Wales and currently 135 of these have solar PV installed. These are typically flood warning sites with an equipment kiosk but there are a small number of solar only buildings. The solar PV on these assets recharges internal batteries. There are 57 sites where power is provided by an internal battery to a small data logger and a number of rain gauges which are manually read. The majority of operational assets in South Wales are grid connected or have power provided by other organisations.

There are approximately 220 operational assets in North Wales, circa 80 of which have solar PV installed which provides the main source of power. The majority of assets have batteries to provide back-up power in the event of solar PV or electricity grid failure. For example, at Garndolbenmaen a large array of solar panels with battery back-up are used to power a pump for the Eel Pass at the weir. Other assets which have recently been converted to solar PV and battery back-up include Fardon, Llansantffraid and Cyfronydd River Level Stations. Brynhyfryd Rain gauge has also had solar PV installed. There are also approximately 100 standalone data loggers which are low power devices powered by internal batteries. Assets are also being rationalised and being combined into one per site where appropriate.

For NRW to meet its net zero ambitions operational assets will need to play their part. The following actions are suggested:

- ensure electricity supplies have Automatic Meter Readers (AMR) so that electricity data and invoices are accurate, and ensure all assets are on our main 100% renewable energy contract
- review current progress in retrofitting renewable energy technologies to assets and revisit previous feasibility studies and update where necessary
- install ground mounted renewable energy to self-supply energy to NRW assets, where suitable and feasible
- retrofit all NRW managed pumping stations with energy efficient pumps and renewable energy generation, where feasible
- retrofit all smaller NRW managed assets (e.g. gauging stations) with microgeneration renewable energy, where feasible
- ensure solar PV is considered when designing and developing all new assets

## Next steps

Review progress with the Hydrometry and Telemetry teams and develop a programme of further renewable energy retrofit across operational assets.

## Land use and management

NRW manages around 7% of Wales' land area covering some 143,300 ha. The vast majority of this is the Welsh Government Woodland Estate, leased to and managed by NRW. Timber production on the NRW Estate represents 60% of the Welsh harvested timber volume, and an important carbon store and source of wood products that have the potential to substitute for some other products with higher embedded carbon. NRW also manages most National Nature Reserves that protect a diverse range of habitats including woodlands, heathlands, grasslands, dunes and saltmarsh. Other parts of the Estate comprise flood defences and some areas of coastal inter-tidal habitat, such as the Dee Estuary. Finally, there are small parcels of land associated with our offices, depots, pumping and monitoring stations.

As part of the Carbon Positive project, we have undertaken detailed modelling into the carbon stores, sequestration and emissions from all the habitats on the Estate. This included a specific assessment of the carbon status of our forests by Forest Research that modelled each stand of trees based on criteria such as species composition, age and soil type (Matthews *et al.*, 2017). This has provided us with a detailed baseline net carbon status of the forest estate, including projections into the future to 2040. Given peatlands store such large quantities of carbon per hectare, we also commissioned research from the Centre for Ecology and Hydrology (CEH) to model the net carbon status of peatlands on the Estate (Williamson *et al.*, 2016). This showed that while a small proportion of sites in favourable condition were likely to be sequestering carbon the majority of peatland is in a degraded condition so is emitting carbon. Indeed, the estimated emissions from peat on the Estate are greater than our operational emissions. Given that forests and peatlands represent over 85% of the Estate, we used the best available cited carbon flux data sources for all other habitats rather than more in-depth analysis.

The total net quantity of carbon sequestered in habitats on the NRW estate in the base year 2015-16 was estimated to be -390,924 tCO<sub>2</sub>e. This is a GHG balance figure, where habitat emissions are subtracted from total sequestration to give a net carbon sequestration figure for the Estate. Emissions to the atmosphere are reported here as positive numbers and sequestration (removals) as negative. The estate's sequestration is dominated by removals in woodland habitats (-418,156 tCO<sub>2</sub>e in the base year) but coastal habitats contribute to removals on the Estate (-6,661 tCO<sub>2</sub>e) – see Figure 24. All other habitats are net emitters, apart from open water, rock exposure and waste for which no emissions or removals were assumed.

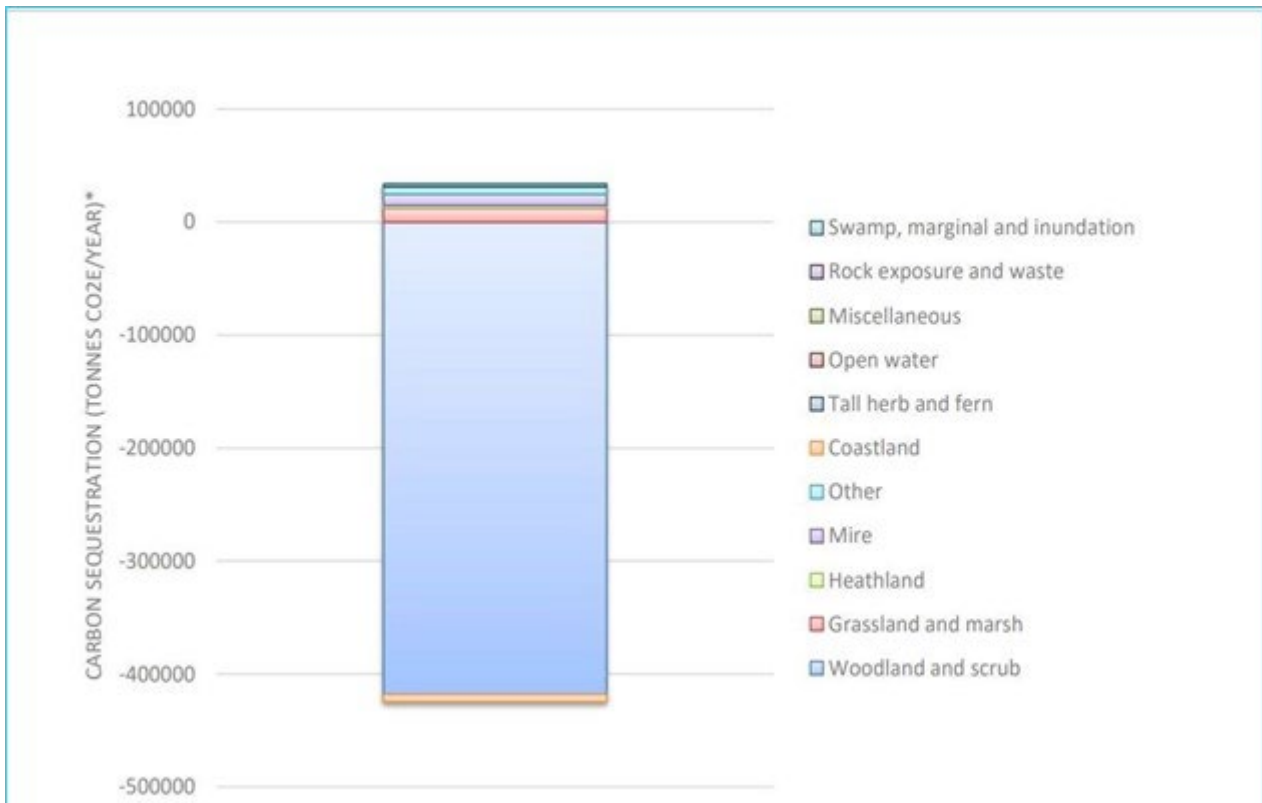


Figure 24. Carbon sequestration on the NRW estate by habitat type. (\*Positive values indicate that the habitat type is a net source of emissions).

Grassland, marsh and mire habitats are the largest sources of emissions. Table 9 shows how many habitats on the estate were estimated to be net emitters. Results from the deep peat emissions mapping work by CEH indicate that while near natural blanket bog and raised bog habitats are net sequesters, current scientific evidence suggests that all other deep peat habitats are net emitters (Williamson *et al.*, 2016). The majority of habitats on mineral soils were assumed to be in equilibrium with no net emissions or sequestration, therefore there were no removals to counterbalance or outweigh emissions from the habitat areas on deep peat.

Table 9. Carbon sequestration removals (-) or emissions (+) in tonnes CO<sub>2</sub>e/year by underlying soil type, i.e. GHG balance of habitats on the NRW estate by underlying soil type.

Habitat category	Deep peat soils	Mineral soils (including organo-mineral)	All soils total
Woodland and scrub	-23,580	-394,576	-418,156
Grassland and marsh	12,124	0	12,124
Heathland	2,581	0	2,581
Mirea	9,781	203	9,984
Other	6,614	0	6,614
Coastland	0	-6,661	-6,661
Tall herb and fern	194	0	194
Open water	0	0	0
Miscellaneous	50	0	50
Rock exposure and waste	0	0	0
Swamp, marginal and inundation	2,346	0	2,346
<b>Totals</b>	<b>10,109</b>	<b>-401,034</b>	<b>-390,924</b>

As well as assessing carbon sequestration and emissions from the habitats on the Estate, estimates were calculated for the carbon stored in the habitats and soils. Woodland and scrub habitats hold 80.9% of total carbon stocks and mires (primarily bog and fen) a further 9.1% of the total. Total carbon stocks in habitats on the NRW estate were estimated to be 32,862,000 tCO<sub>2</sub>e in the base year 2015-16. If released these stocks would give rise to 120,494,000 tCO<sub>2</sub>e, which is equivalent to almost four years of total Welsh GHG emissions. This serves to illustrate the importance of ensuring that existing habitats are managed and protected to maintain these stores of carbon.

This baseline assessment of the carbon status of the NRW Estate provided further impetus for establishing a programme for restoration of peat on the Estate, which is now part of the National Peatland Action Programme (NPAP) that has restored over 1650 ha of peatland over its first 2 years (2020-2022), of which 640 ha has been on the NRW Estate.

## Next steps

While NRW manages a large Estate, there is very limited potential for land use change, such as woodland creation to increase carbon storage as most of the Estate is already woodland or managed for the existing habitats for wildlife or is otherwise unsuitable for land use change, for example its role in flood defence or intertidal in nature. Consequently, much of NRW's work that will contribute to land use change is outside of the Estate in

partnership with others through for example the National Peatland Action Programme (NPAP) that NRW manages or our input to the development of the National Forest, which is beyond the scope of this report. Where there has been a permanent land use change, for example due to windfarms constructed on the Welsh Government Woodland Estate, we are undertaking compensatory planting to counteract that loss of woodland cover through acquiring land and planting trees.

We are revising the net carbon status modelling assessment of the habitats on the Estate, taking account of the latest available estimates of carbon fluxes for each habitat, as well as the restoration of peatlands on the Estate.

We will also continue to consider impacts on the carbon status of our land resulting from management interventions across the Estate. The principal action to enhance the carbon status will remain the restoration of degraded peat by restoring the hydrological condition of bogs, which will be delivered through the NPAP.

## Governance, decision-making and finance

Delivering decarbonisation within a large complex organisation such as NRW requires a clear governance framework and work programme that facilitates the effective delivery of the future actions set out in proceeding sections of this Plan. In response to the Welsh Government declaration of a Climate Emergency in 2019, we reviewed the governance of our climate change related work and established a strategic management group including a sub-group of our Leadership Team along with climate change thematic experts. This group has a central role in both steering our climate work programme but also enabling actions and decision-making to be mainstreamed across the organisation. Following the development of our new Corporate Plan to 2030 - *Nature and People Thriving Together*, we have reviewed our wider work programme governance to align with the three Corporate Plan Wellbeing Objectives that include a specific climate focussed objective - Well-being objective 2: Communities are resilient to climate change. We intend to incorporate both operational GHG emissions data and a climate risk metric into our new corporate performance reporting system so that in evaluating our organisational performance, action on decarbonisation and climate risk are considered.

Currently, we are developing our approach to require all of our programmes and projects to consider climate change and decarbonisation, and as detailed above we are working to incorporate consideration of carbon into our procurement and contract management processes. This wider work on embedding consideration of carbon and climate risk in our governance and processes to influence decision-making will be an on-going action over the next few years.

Most of the actions set out in this Plan require a combination of capital or revenue funding and/or staff resource for their delivery. While there is some potential to deliver them using existing resources, it is very clear that specific budgetary costs and staff resources will be required for delivery. For some elements we have already estimated or calculated costs, while other actions will require further evaluation. A key action following publication of this Plan will be the development of a delivery plan that identifies not only the financial



resources but the teams responsible for delivery so that decarbonisation is mainstreamed across the organisation.

## Behaviour change

The UK Climate Change Committee (CCC) identifies that nearly 60% of the changes in the Balanced Pathway to Net Zero (Climate Change Committee 2020) for the UK rely on societal or behavioural changes. The Welsh Government's Carbon Budget 2 also highlights the importance of behavioural change to reach Net Zero, with the development of a climate change Strategy for public engagement & action recognised as crucial to Wales-wide action.

NRW recognises the important role behavioural change has to play in reducing our own organisational carbon footprint too. As part of our work to embed consideration of decarbonisation and climate change in everyone's work, NRW has worked with Manchester Metropolitan University (MMU) and Cynnal Cymru-Sustain Wales to develop a bespoke climate change training package that meets the Carbon Literacy standard. A definition of Carbon Literacy is an awareness of the carbon costs and impacts of everyday activities and the ability and motivation to reduce emissions on an individual, community and organisational basis.

Some of the main aims of this training programme is to:

- raise climate change awareness in terms of both decarbonisation and adaptation to climate risk
- help staff embed consideration of carbon into their own decision-making
- develop an organisational culture for emission reduction
- normalise the discussion of climate change within teams
- empower staff to recognise and minimise embedded carbon in every action we take

Following an initial trial, we have made the one-day course available to all staff delivered by experienced external trainers from both MMU and Cynnal Cymru-Sustain Wales. While the training seeks to both inform and upskill staff in their understanding of climate change and carbon, it goes further requiring them to identify and submit work related actions to deliver decarbonisation within their role or team. There is already evidence that some attendees are seeking to make changes and consider how climate change can be addressed through their role or the processes that they are involved in delivering.

As part of the effort to both normalise consideration of carbon and drive behavioural change, NRW now provides badged fleet vehicle telematics data to team leaders and managers. This data provides accurate mileage data incurred by each team as well as information on driving styles. Such information can aid teams to identify new ways of working to reduce business mileage, including identifying opportunities for further training to improve routes, time of driving (e.g. to avoid rush hour traffic congestion), along with information on driving style (e.g. engine idling, hard acceleration/deceleration, excessive engine revving etc.) to improve efficiencies and minimise emissions.

## Next steps

Continue the roll out of our bespoke climate change training to staff and to monitor through post course surveying its impact on behaviour and decision-making.

## Waste

NRW's waste production arises through a wide variety of business activities including one-off large-scale projects, operational delivery work, purchasing of goods and services, running our offices, depots and Visitor Centres, along any waste left by others.

Figure 25 shows the waste produced per year from 2016 to 2022. Over the last six years on average NRW produced 1,218 tonnes of waste per year. There is no discernible trend in our waste data to suggest production of waste is significantly increasing or decreasing.

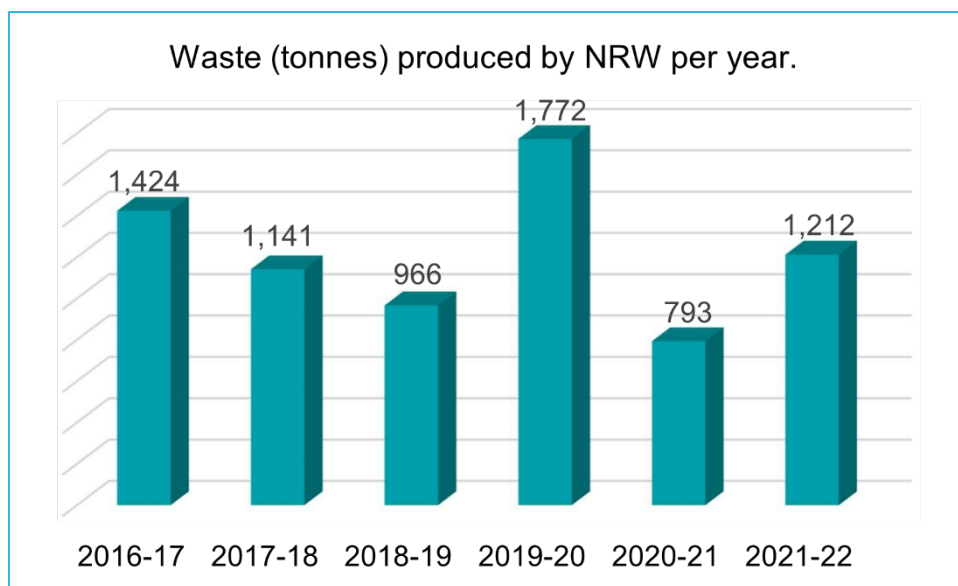


Figure 25: Amount of waste (tonnes) produced in NRW by year.

The amount of waste reported through the annual Welsh Government Net Zero reporting process is lower than the actual amount of waste generated by NRW because the reporting requirement does not include all waste types currently. Table 10 below shows the amount of waste sent to landfill, the waste reported to Welsh Government and the emissions from the reported waste between 2019 to 2023. The reduction in waste including associated emissions during 2020-21 is likely to be due to the pandemic when our buildings and sites were closed to both staff and the public.

Table 10. Details of waste sent to landfill, reported to Welsh Government and associated GHG emissions.

	2019-20	2020-21	2021-22	2022-23
<b>Waste landfilled (tonnes)</b>	550	220	497	351
<b>Total waste reported to Welsh Government (tonnes)</b>	1,151	711	1,131	841
<b>Emissions (tCO<sub>2</sub>e) from reported waste</b>	67	111	245	193

## Actions to reduce greenhouse gas emissions

NRW has created a waste minimisation project team to reduce the overall amount of waste we generate and reduce GHG emissions through:

- improved waste segregation and recycling rates to ensure organisation-wide compliance with the Welsh Governments Business and Public Sector Recycling Regulations that came into force in April 2024
- quantification of end-of-life ICT equipment and investigation of waste reduction and circular economy options to ensure items are reused and recycled. New laptops will have less packaging with only recyclable paper-based packaging used to minimise waste while old laptops will be redistributed for reuse and recycling by specialist contractors
- quantifying single use plastic use and investigating waste reduction and circular economy options at the Analytical Services laboratory. The usage of disposable plastic in the Lab has been assessed to identify potential areas where plastic use could be reduced. For example, use of a pipette washer that will prevent the disposal of single use plastic pipettes

## Next steps

- Align with Welsh Government’s Beyond Recycling Strategy through aiming to achieve zero waste to landfill by 2026.
- Strategically assess waste impacts through NRW’s Procurement Category Management approach and further embed circular economy principles into procurement activity i.e. stipulating no use of single use plastics in our tender documentation.
- Work with large scale infrastructure projects to influence waste reduction and embed circular economy principles.
- Develop a Circular Economy and Waste Minimisation internal policy and raise internal awareness of the principles and how they directly contribute to SMNR.

## Monitoring and reporting

Continuing to improve the collection and analysis of high-quality operational data through our net zero reporting is a key priority if we are to understand and reduce carbon emissions. The data will be essential to further develop and assess the impact of mitigation measures and the overall delivery of this Plan.

We will continue to report annually our organisational carbon footprint to Welsh Government using the Public Sector Net Zero Reporting Guide, including developing more efficient and accurate processes for monitoring using our plan for continuous data and reporting improvements that has come from the first three years of reporting. We will build upon our Environmental Management System (EMS), which already reports on most direct emissions and electricity emissions, as part of maintaining the organisation's ISO14001:2015 certification. For some emissions sources, such as staff commute and homeworking emissions, we are intending to undertake a staff travel survey to improve reporting and help monitor progress over time.

The organisation's supply chain emissions have been calculated using emissions factors for broad groups of goods and services that have enabled us to identify procurement hotspots and key contracts and frameworks. However, as set out in our Forward Plan for decarbonising our supply chain, we will be seeking to gather supplier or service and product specific data where possible to track decarbonisation progress. Increasingly many larger contractors are beginning to gather data to meet customer expectations. However, this will not be possible for many contracts so monitoring progress to reduce supply chain emissions will also require the development of relevant metrics such as the proportion of NRW contracts containing carbon criteria or number of key suppliers with mitigation targets and plans.

Further refining the effective collection and use of data will be an iterative process that will require clear roles and responsibilities across the organisation as to who is responsible for collection, collation and evaluation of data. An agile approach will be promoted to ensure that systems and ways-of-working that are proportionate are adopted.

## Working with the Welsh public sector and support to our customers and stakeholders

In establishing our strategic work on organisational decarbonisation through the Carbon Positive project, we sought to share the outputs, lessons learnt, resources and experience with others through publishing our reports and a suite of case studies as well as holding workshops across Wales. Since the completion of the Carbon Positive project, we have continued to seek to work collaboratively with the Welsh public sector on decarbonisation to support the collective public sector ambition to be carbon neutral by 2030. To this end, we have organised or contributed to workshops with various Public Service Boards (PSBs) in relation to the development of a common carbon reporting approach across the public

sector and understand approaches to the delivery of decarbonisation actions. In particular, our advice on how to consider carbon in terms of land use has been sought to develop proposals for peatland restoration and woodland creation. We also provide technical advice to a range of other organisations, for example, through the Local Government Climate Strategy Panel (LGCSP) to help facilitate the collective efforts of Local Authorities in Wales to decarbonise. We have also sought to collaborate and learn from others. For example, we have benefited from the technical advice provided by the Welsh Government Energy Service (Welsh Government) that has helped us to evaluate the feasible energy actions required on many of our buildings and to provide technical evidence making the case for electrification of our fleet. We intend to continue this collaborative approach in future, through continuing our interactions with a range of public partners including PSBs, Welsh Government and the LGCSP.

While this Plan is focussed on our action to decarbonise NRW as an organisation, it is important to recognise that much of our efforts on decarbonisation seek to contribute to the wider delivery of a net zero Wales by 2050. While not the subject of this Plan the following activities provide a sense of the range of action that is helping others to decarbonise across Wales:

- production of around 60% of Welsh timber and through our Timber Marketing Plan seeking to encourage its greater use in Welsh buildings
- enabling development of windfarms on the Welsh Government Woodland Estate and facilitating development of marine renewables through monitoring impacts and developing innovative regulatory approaches
- delivering the National Peatland Action Programme by restoring the hydrological status of peatlands to reduce their emissions
- facilitate the development of the National Forest and woodland creation across Wales
- develop our role to support industrial decarbonisation through our work as an industrial regulator
- supporting the development of the Climate Action Wales website that provides support for people across Wales to take decarbonisation measures

## Our position on net zero, offsetting and residual emissions

Based on the internationally recognised principle of taking account of both the emissions and removals (sequestration) that is within our operational control, we are technically already a net zero organisation by virtue of the woodland estate that we manage.

However, as set out in this plan that doesn't mean we should in anyway avoid further action to reduce our emissions. The carbon removals provided by the NRW forest estate and other habitats will be critical to balancing out the residual emissions of other organisations in the Welsh public sector if the ambition for a net zero Welsh public sector is to be in any way possible. The more we can reduce our operational emissions and increase the net sequestration status of our estate by improving the condition of peatlands, the greater the contribution that NRW can make to the collective goal for the public sector as a whole.

In developing our Net Zero Plan, we have sought to apply the principles of the Science Based Targets Initiative, which includes setting a target to cut emissions by more than 90% over the long-term – the evidence that we have gathered for this plan show that this won't be possible by 2030, but that this should be our long-term ambition. The credibility of voluntary offsetting schemes is questionable at best. Reducing your own emissions should always be the preferred option in terms of addressing climate change whether organisationally or personally. There remains a healthy debate as to the validity of offsetting, and whether it is in large part to assuage people's conscience or for organisational corporate social responsibility reasons. But the key issue is that offsetting doesn't actually reduce net global emissions merely avoid increasing them through offsetting so in view of NRW's net zero status we will not look to offset any of our emissions but focus all our efforts on mitigation and supporting others to do so too.

## Acknowledgements

We acknowledge the contributions from a range of staff across NRW who helped in developing and agreeing the targets and actions set out in the Plan.

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