PEMBROKESHIRE COUNTY COUNCIL

Action plan towards becoming a **net zero carbon** local authority by 2030

Pembrokeshire County Council

Action Plan towards Becoming a Net Zero-carbon Local Authority by 2030

Mae'r eitem hon ar gael yn Gymraeg hefyd / This item is also available in Welsh

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Foreword

Climate change is real, and it is happening all across the world and impacting on local communities in Pembrokeshire. Sir David Attenborough in 2019 called climate change *'our greatest threat in thousands of years'*, adding, *'while Earth has survived radical climactic changes and regenerated following mass extinctions, it's not the destruction of Earth that we are facing, it's the destruction of our familiar, natural world and our uniquely rich human culture.'* It is up to us all to change this.

While Pembrokeshire County Council (PCC) has previously invested in 'green' initiatives, this plan aims to bring together all council directorates and services in order to make it a local authority that takes climate change seriously and acts upon it. In May 2019 members of this Council voted to declare a climate emergency, and in July 2019 members voted to create an action plan to steer PCC towards becoming a net zero-carbon local authority by 2030.

As Chair of the Net Zero Carbon Task and Finish Group, I recognise the scale of the challenge faced by all of us and our services but take comfort from the fact that members and officers alike are enthusiastic and willing to change.

As a starting point, this Action Plan outlines a pragmatic route towards the Council becoming a net zero-carbon local authority by 2030. It is intended to be a living document and will evolve over time. This is a long-term plan for the next ten years and, as such, more proposals will be added as it develops. Further technological breakthroughs will inevitably come forward in due course, but the most important thing is that the Council has started on this crucial path.

We want everyone in our communities to be involved in this journey. We look forward to reducing emissions from our own activities and, more widely, to working with partners in order to bring about equal change.

Cllr Joshua Beynon, Chair of the Net Zero Carbon 2030 Group

1. Background

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) published a Special Report on the impacts of global warming of 1.5°C. The IPCC found that a 1.5°C world would have significantly lower climate-related risks for natural and human systems than a 2°C world, and that global carbon emissions would need to reach net zero around 2050 in order to have no, or limited, overshoot beyond the effects of 1.5°C of climate change. Behind this report is a huge body of scientific research and analysis with near-unanimous agreement among the world's scientific community.

Consistent IPCC reports and United Nations Framework Convention on Climate Change summits have come and gone. They attract publicity and media attention at the time, but action by world leaders to work towards the plans agreed at these meetings has been slow.

The IPCC Special Report of October 2018 was the strongest yet – effectively saying that the world had just 12 years to get a grip on this issue or our ecosystem would suffer irreparable damage.

This has led to a realisation that time is fast running out, which resulted in a climate emergency being declared during 2019 by many organisations including Pembrokeshire County Council and over 280 other UK local authorities. The Welsh Government and UK Government have also declared a climate emergency.

From 1 to 12 November 2021, the UK will host the 26th United Nations Climate Change Conference (COP26) in Glasgow.

2. Notice of Motion and Policy Landscape

Notice of Motion

The meeting of Pembrokeshire County Council on 9 May 2019 (Full Council 9 May 2019) received the following Notice of Motion submitted by Cllr Joshua Beynon:

Pembrokeshire County Council resolves to:
1. Declare a Climate Emergency;
2. Commit to making Pembrokeshire County Council a net zero carbon local authority by 2030;
3. Develop a clear plan for a route towards being net zero carbon within 12 months which is then reported back to council;
4. Call on Welsh and UK Governments to provide the necessary support and resources to enable effective carbon reductions;
5. Work with the Public Services Board and Swansea Bay City Deal partners to develop exciting opportunities to deliver carbon saving;
6. Collaborate with experts from the private sector and 3rd sectors to develop innovative solutions to becoming net zero carbon.

The full Council agreed points 1 and 4 of the Motion, and requested that the Motion be referred to the Corporate Overview and Scrutiny Committee to consider points 2, 3, 5 and 6.

The Corporate Overview and Scrutiny (O&S) Committee met on 6 June 2019 (Corporate O&S 6 June 2019), and resolved:

(a) That the Committee noted the progress and actions already taken in delivering carbon reduction and sustainability, which contribute toward Pembrokeshire County Council to be net zero carbon local authority by 2030. Also that the Committee supported the continuation and development of such approaches, and new techniques, to meet the commitment, subject to the development of an action plan.
(b) That the Committee noted the progress on developing approaches for a route towards being net zero carbon, and will receive a further report on a more detailed Action Plan within 12 months.
(c) That the Committee noted the work being done with the Public Services Board and Swansea Bay City Deal partners, and the collaboration with experts from the private sector and third sectors. Also to receive a further progress update on these approaches within 12 months.
(d) That the Committee recommends to Council that a whole Council working group be set up, to include evidence from experts from the private, third sector and relevant individuals, to develop an action plan, timescales and recommendations to support the Authority in aiming to become a net carbon zero organisation by 2030.

The resolutions of the Corporate O&S Committee went back to full Council for approval – and on 18 July 2019 (Full Council 18 July 2019), it was unanimously resolved:

(a) That a seven-Member politically-balanced Working Group of the Council be set up to consider evidence from experts from the private, third sectors and relevant individuals, to develop an action plan, timescales and recommendations to support the Authority in aiming to become a net carbon zero organisation by 2030.

(b)(i) That the progress and actions already taken in delivering carbon reduction and sustainability which contribute towards Pembrokeshire County Council becoming a net zero carbon local authority by 2030 be noted; and to support the continuation and development of such approaches and new techniques, to meet the commitment, subject to the development of an Action plan.

(b)(ii) That the progress made on developing approaches for a route towards being net zero carbon be noted; and a further report on a more detailed Action Plan be received within 12 months.

(b)(iii) That the work being done with the Public Services Board and Swansea Bay City Deal partners, and the collaboration with experts from the private sector and third sectors be noted; and a further progress update on these approaches be received within 12 months.

(b)(iv) That the Council formally approaches the Welsh Government to express its interest in becoming an 'early adopter'. This will allow the County Council to gain an early insight into, and potentially shape, Welsh Government's development of a National Greenhouse Gas Reporting and Footprinting Methodology for public bodies in Wales to meet the net zero carbon local authority by 2030 target; and that the process be subject to a Cost Benefit Analysis being undertaken.

(b)(v) That Councillors Neil Prior and Jon Harvey be appointed as the non-affiliated Members on the Working Group.

The **'**Net Zero 2030 Working Group', as it has now become known, first met on 20 September 2019 and has subsequently met quarterly (with an interruption due to Covid-19). Subgroups were established for the following areas: Procurement, Energy/Buildings/Housing, Land Use/Assets/Development, Fleet/Transport/ Mobility/Active Travel and Behaviours.

The subgroups have met quarterly between the full group meetings. **This proposed Action Plan sets out the recommendations to support the Authority in aiming to become a net zero-carbon organisation by 2030.**

Policy Landscape

The policy landscape around decarbonisation is constantly evolving, but relevant recent policy is captured here:

The Welsh Government (WG) target for a carbon-neutral public sector by 2030.

WG Environment Act Part II specifies an 80% reduction in all-Wales net emissions by 2050 against a 1990 baseline *[PCC did not exist in 1990 and started recording emissions data in 2003/04, so 2003/04 is PCC's only viable baseline year].*

WG target for 70% of electricity used in Wales to be from renewable sources by 2030 *[the equivalent of 50% of Wales' electricity consumption was met from renewable sources in 2018 compared with 48% in 2017 and 43% in 2016].*

WG target for 1 gigawatt (GW) of renewable-electricity capacity in Wales to be locally owned by 2030 and for all new projects to have an element of local ownership by 2020. *[Wales is already 77% towards having 1 GW of renewable-energy capacity that is locally owned, with the total installed capacity of locally owned electricity projects up to the end of 2018 at almost 778 megawatts (MW)].*

In March 2019, WG launched 'Prosperity for All: A Low Carbon Wales' – a cross-government plan to cut emissions and contribute to the global fight against climate change.

In May 2019, the UK Committee on Climate Change (UKCCC) recommended that a **100% reduction** in greenhouse gas emissions should be legislated for 'as soon as possible', and urged government to set a net-zero CO_2 emissions target by 2050.

In June 2019, WG declared that Wales would accept the Committee on Climate Change (CCC) recommendation for a 95% reduction in (Wales-specific) greenhouse gas emissions by 2050 and go further with an ambition to reach net zero.

In May 2019, following the lead set by both Welsh and Scottish governments, the House of Commons declared a climate emergency.

3. Net Zero-carbon Local Authority by 2030

3.1 Outline Approach

When a council passes any motion, it reflects the importance that the organisation places on the issue and it signals its intent to address it. Therefore, if a council passes a climate-emergency motion the same can be said for this agenda. The use of the term 'emergency' is significant and, by definition, this is not a normal motion. If that is the case, then the actions that a council takes should not be normal either.

Pembrokeshire County Council is a member of the Association of Public Service Excellence (APSE) and in 2019 joined APSE Energy – a collaboration of over 100 UK local authorities who are working towards the municipalisation of energy. APSE Energy was established to help support local authorities to make the most of their assets in the energy arena and to help them take a leadership role within it. The APSE Energy publication *Local Authority Climate Emergency Declarations: Strategic and practical considerations for climate emergency declarations, targets and action plans* (June 2019) has informed the Council's approach. This recognises that while an emergency declaration deserves an appropriate response, a local authority cannot abandon everything else in order to tackle climate change as there are other legal duties and responsibilities to fulfil as well as locally identified priorities that it has committed to addressing.

A pragmatic approach, therefore, is being adopted for the route towards PCC becoming a net zero-carbon local authority by 2030. This initially focuses on the carbon emissions that are presently measured by the Council; however, it is recognised that this approach needs to be sufficiently flexible to accommodate changing circumstances – including the reporting requirements yet to be introduced by the Welsh Government as part of its ambition for a carbon neutral public sector by 2030. This initial focus is not intended to limit or preclude other potential wider actions to address the climate emergency, and some of these are identified in Appendix 3.

PCC has, over a number of years, adopted proactive programmes to reduce its carbon emissions, and has previously reported performance in its annual reports. It is proposed that these reported emissions initially constitute the scope of the Council's commitment to become net zero carbon by 2030. These carbon emissions come from:

(a) non-domestic buildings;
(b) streetlighting;
(c) fleet mileage; and
(d) business mileage.

While the Council is committed to significantly further reduce its carbon footprint it also recognises that however energy/carbon efficient its services become it will inevitably still have a residual carbon footprint. This situation is acknowledged by the 'Net' in the Net Zero Carbon equation, as it enables this residual carbon footprint to be compensated for by the generation of renewable energy and/or via carbon offsetting (such as by the planting of trees). This can be summarised thus:

Carbon Footprint	**–**	**Renewable-energy Generation Carbon Offsetting**	**=**	**Net Zero Carbon**

3.2 Carbon Footprint

Carbon Footprint	–	Renewable-energy Generation Carbon Offsetting	=	Net Zero Carbon

(a) Non-domestic buildings

Non-Domestic Buildings	2003/04	2016/17	2017/18	2018/19	2018/19 v. 2017/18	
	Result	Result	Result	Result	Progress	% change
Consumption (kWh)	71,127,847	49,217,855	48,446,196	48,272,333	Improved	-0.36%
Carbon emissions (tCO_2e)	18,564	12,765	11,762	10,285	Improved	-12.58%

The Council has reduced carbon emissions from its non-domestic buildings by 45% since 2003/04 – from 18,564 tCO_2e to 10,285 tCO_2e. A reduction in emissions of 12.58% occurred from 2017/18 into 2018/19.

Energy consumed by the Council's non-domestic buildings in 2018/19 and resultant emissions:

Utility	Consumption (kWh) [4]	Carbon Emissions (tCO_2e)
Electricity	14,005,501	3,965
Gas	28,943,605	5,324
LPG*	2,180,161	468
Oil	1,589,291	439
Kerosene	281,247	69
Biomass	1,272,527	19
Total	**48,272,332**	**10,284**

* liquefied petroleum gas

The Council's 'top' energy-consuming/carbon-emitting buildings in 2018/19:

Buildings	Consumption [4]						CO_2 Emissions (tCO_2)
	Biomass (kWh)	Oil (kWh)	LPG (kWh)	Gas (kWh)	Electricity (kWh)	Total (kWh)	
Haverfordwest High School (Prendergast Campus)	0	0	0	1,455,484	453,824	1,909,308	382
Haverfordwest Leisure Centre	1,178,352	0	0	560,176	1,006,753	2,745,281	377
Haverfordwest High School (Portfield Campus)	0	0	0	1,486,044	319,063	1,805,107	354
Ysgol Harri Tudur / Henry Tudor School	0	0	0	957,048	632,989	1,590,037	336
Milford Haven Leisure Centre	0	0	0	1,482,035	234,978	1,717,013	332
Fishguard Leisure Centre	0	0	0	1,235,896	368,790	1,604,686	320
Milford Haven Comprehensive School	0	0	0	1,120,660	299,199	1,419,860	282
Tenby Leisure Centre	0	0	0	1,033,770	281,948	1,315,718	261
Ysgol y Preseli	0	602,764	13,015	0	356,378	972,157	246
Greenhill School Tenby	0	0	0	905,657	313,194	1,218,851	246
Ysgol Bro Gwaun / Fishguard High School	0	0	0	928,373	237,499	1,165,872	231
County Hall (Main Building)	0	0	0	520,101	476,196	996,297	216
						Total tCO_2	3,583

Notes:

(1) 2003/04 was the year that PCC first recorded and reported energy consumption and emissions from non-domestic buildings to the Welsh Government, and thus represents the oldest data set available.

(2) While consumption (in kilowatt hours – kWh) decreased only 0.36% in 2018/19 (consumption was held steady due to the expansion in the floor area of the corporate estate), carbon emissions (tonnes of carbon-dioxide equivalent – tCO_2e) decreased rapidly by 12.58% due to a reduction in the emission-conversion factor for electricity. The continuing decarbonisation of the national electricity-distribution network will help to accelerate the reduction of carbon emissions from the Council's consumption of electricity. The Council contributes to the decarbonisation of the electricity grid every time it connects a renewable-electricity generator (e.g. solar PV [photovoltaic] panels) to the grid network.

(3) The performance data quoted in this document uses, where appropriate, UK emission-conversion factors issued by the Department for Business, Energy and Industrial Strategy (BEIS). These factors are published annually – for example: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018 – and the tCO_2e factor for electricity transmission and distribution losses is included.

(4) All fuels used for heating have been suitably weather corrected against the latest 20-year average mean annual heating degree-day total for the base temperature of 15.5°C for the Wales region. This ensures that the consumption/emissions data for fuels used for heating is not distorted by unusually cold/mild winters.

The Council's non-domestic asset structure

Headline Actions – Existing non-domestic buildings

- PCC spends around £3 million on electricity, gas, liquefied petroleum gas (LPG), oil and biomass fuels each year in its non-domestic buildings – a figure that has held steady in the face of rapidly rising markets due to energy-efficiency work and the resulting reduced consumption.
- The procurement of energy has become increasingly complex, with prices volatile and linked to both UK and global factors. In order to minimise risk, the Council procures its energy using Crown Commercial Services Framework Agreements, via the National Procurement Service (NPS), for the vast majority of supplies.
  - The Council sits on the Welsh Government National Procurement Service (NPS) Energy Sub Group, shaping the NPS energy-procurement strategy.
  - All electricity procured via the NPS comes from renewable energy sources, with about 50% of this being sourced from within Wales *(**Note:** The consumption of this 'green' electricity is already reflected in the [decreasing] UK emission-conversion factor for electricity, and as a consequence the Council is currently unable to directly benefit from carbon savings resulting from its procurement of 'green' electricity as this would effectively amount to double-counting the carbon savings).*
  - The NPS authorities are part of the seventh-largest purchase (after the 'Big 6') of electricity and gas in UK markets taking advantage of the Crown Commercial Service's professional energy-trading desks.
  - The NPS is actively seeking low-carbon gas sources – e.g. bio methane from Anaerobic Digestion (AD) – and monitoring the hydrogen-gas agenda.
  - Purchasing occurs across an 18-month buying window, with the aim of buying at market lows.
- Since 2003, the Council has implemented over 300 energy-efficiency and energy-generation schemes at non-domestic council properties across the County. Together, these are estimated to be saving over £700,000 and 4000 tonnes of CO_2 (tCO_2) each year. This investment – coupled with the Council's ongoing property rationalisation, agile working and maintenance programmes – is producing financial and carbon savings in times of increasing utility prices.
- PCC is currently participating in the Welsh Government-supported Re:fit Cymru energy-efficiency programme:
  - Re:fit Cymru Phase 1 – A £1.3 million scheme (funded by WG Salix interest-free loans) that will see the installation of 50+ energy-efficiency measures across 25 sites during 2019–2021, saving £200,000 and 416 tonnes of CO_2 annually. The scheme is in the delivery phase and will see the installation of LED lighting, controls upgrades, variable-speed drives, valve insulation, combined heating and power (CHP), and solar PV.
  - Re:fit Cymru Phase 2 – PCC is currently working with its provider to deliver condensing-boiler upgrades at a further five sites, for delivery by the end of 2020.
- The Council is using Welsh Government education backlog maintenance funding to carry out LED lighting upgrades in nine further schools by March 2021.
- PCC has qualified staff producing Display Energy Certificates (DECs) in-house. DECs show the actual energy used by a building in one year of operation. An advisory report on how to reduce energy and water use accompanies the certificate. The average DEC performance of corporate buildings has improved year-on-year to the current score of 73, which gives an operational rating of 'C' (a score of 100, with a rating of 'D', being the default UK average).

Actions – New build

- The Council has one of the largest new-build programmes among local authorities in Wales. All major new-build projects incorporate renewable-energy technologies where appropriate, with solar PV installations being incorporated into all recent Modernising Education Provision 21st Century Schools projects and into new housing developments. Battery storage is also being investigated, and has been proposed for inclusion in new housing developments (where provision for electric-vehicle charging is also being made).
- Other low- or zero-carbon technologies that have been installed and evaluated for future inclusion, where viable, include:
  - ground-source heat pumps;
  - air-source heat pumps (the South Quay regeneration project in Pembroke will use ASHP technology);
  - biomass boilers (installed at Haverfordwest Leisure Centre); and
  - solar thermal systems.

  In addition, and in order to minimise energy use from new buildings, a 'Fabric First' approach to energy efficiency is also being progressed and consideration is being given to 'Passivhaus' or equivalent certification.

(***Note:*** *The 'Passivhaus' standard is a rigorous energy standard for buildings that provides quality assurance for both energy and environmental performance. This involves designing buildings to meet the required performance standards and includes:*

- *very high levels of insulation;*
- *extremely high-performance windows with insulated frames;*
- *airtight building fabric;*
- *'thermal-bridge-free' construction; and*
- *a mechanical ventilation system with highly efficient heat recovery.*

'Passivhaus' buildings have been shown to achieve a 75% reduction in space-heating requirements compared with standard practice for UK new build).

- PCC's design team is currently working with the contractor, consultants and the Welsh Government to establish the practicality and costs of building the new Haverfordwest High School and Sports Hall to net zero-carbon standard.
- The Council routinely implements measures across its new-build programme, including:
  - designing:
    - to BREEAM 'Excellent' sustainability standards
    - for optimal orientation for passive heat gain/shading/ventilation
    - for low energy and water use
  - incorporating:
    - PV solar panels as standard
    - community benefits from projects (local use/employment)
    - site-waste management plans
    - site emissions tracking
    - biodiversity surveys and landscaping measures to mitigate any impacts on wildlife
  - specifying:
    - recycled floor coverings
    - WWF 'chain of custody' certification for all timber
    - recycled glass bottle and hemp loft insulation
    - recycled aggregates
    - concrete blocks from ISO14001 EMS certified suppliers
    - vernacular local species of plants that require only rainwater for all external planting
  - monitoring:
    - 'materials miles' for all materials
    - likely future revisions of BREEAM, Part L (Building Regulations for Energy Efficiency) and the likely future (2021) requirement for nearly Zero Energy Buildings (nZEBs).
- The Stark ID energy-management system has been procured in order to achieve better monitoring of PCC's energy consumption and better management of billing (potentially via paperless systems) – and to allow web-based access to individual sites. Accurate data is critical for planning, monitoring and reporting progress towards becoming net zero carbon. Accordingly, 'smart' and sub-metering technology will be extended to ensure the timely capture of energy-consumption data.
- Half-hourly (HH) electricity metering has been rolled out for all feasible buildings, and HH gas metering is installed for all larger supplies. This data feeds into Stark ID.

Target

An appropriate carbon-reduction target is to be developed as part of the annual review of the Action Plan.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-01	Complete delivery of Re:fit Cymru (Energy Efficiency) Phases 1 and 2 projects to achieve energy/carbon savings.	Head of Infrastructure	Apr 2021
NZC-02	Complete Welsh Government education backlog maintenance funded LED lighting upgrades in nine further schools.	Head of Infrastructure	Apr 2021
NZC-03	Develop further phases of Re:fit Cymru (Energy Efficiency) project, or similar (e.g. use of WG backlog maintenance funds for energy efficiency in schools), to achieve accelerated energy/carbon savings.	Sustainable Development & Energy Manager	Ongoing
NZC-04	Incorporate wording into new-build design briefs to state that Pembrokeshire County Council require that new buildings are carbon neutral/net zero carbon in their energy use – and	Sustainable Development & Energy Manager,	Ongoing

	preferably carbon positive, in that they generate more energy than they can consume.	Senior Architect and Senior Engineers	
NZC-05	Consider the 'Fabric first' or 'Passivhaus' standard, where appropriate, in new building-construction projects.	Senior Architect	Ongoing
NZC-06	Continually review and amend design specifications and briefs to reflect new technologies and energy-efficient equipment.	Senior Architect and Senior Engineers	Ongoing
NZC-07	Extend 'smart' and sub-metering technology to ensure accurate and timely capture of energy-consumption data. Consider application for water smart metering.	Various	Ongoing
NZC-08	Develop appropriate carbon-reduction target for the Council's non-domestic buildings as part of annual review of Action Plan.	Sustainable Development & Energy Manager	Apr 2021

(b) **Streetlighting**

Street Lighting	2008	2016/17	2017/18	2018/19	2018/19 v. 2017/18	
	Result	Result	Result	Result	Progress	% change
Consumption (kWh)	4,316,478	2,993,488	2,953,158	2,883,115	Improved	-2.37%
Carbon emissions (tCO_2e)	2,220	1,345	1,135	886	Improved	-21.94%

The Council has reduced carbon emissions from its streetlighting by 60% since 2008 – from 2,220 tCO_2e to 886 tCO_2e. A reduction in emissions of 21.94% occurred from 2017/18 into 2018/19.

Notes:

(1) 2008 was the year that PCC first recorded energy consumption and emissions from streetlighting for the UK Carbon Reduction Commitment scheme, and thus represents the oldest data set available.

(2) While consumption (kWh) decreased by 2.37% in 2018/19 carbon emissions (tCO_2e) decreased rapidly by 21.94% due to a reduction in the emission-conversion factor for electricity. The continuing decarbonisation of the national electricity-distribution network will help to accelerate the reduction of carbon emissions from the Council's consumption of electricity. The Council contributes to the decarbonisation of the electricity grid every time it connects a renewable-electricity generator (e.g. solar PV panels) to the grid network.

(3) The performance data quoted in this document uses, where appropriate, UK emission-conversion factors issued by the Department for Business, Energy and Industrial Strategy (BEIS). These factors are published annually – for example: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018

Actions

- Since 2008, PCC has taken the bold decision to convert 12,726 of 15,747 streetlights to 'part night' (i.e. lamps are automatically switched off from midnight to 5:30 am) which has generated annual savings of £178,000, 1,229,000 kWh and 563 tCO_2. This policy followed rigorous consultation and has led to a number of compliments from biodiversity and 'dark skies' advocates.
- As of August 2019, a total of 3,507 LED streetlamps had been installed.
- In 2019, it was agreed in Cabinet to decommission streetlights that no longer comply if the Council cannot economically repair them – i.e. if their repair requires more than the cost of a new lamp.
- In March 2020, PCC agreed to undertake a Welsh Government-supported Salix interest-free-loan-backed streetlighting project. This entails a two-year upgrade scheme using the Council's streetlighting maintenance framework contactor to convert all remaining high-power-demand streetlight fittings to LED between 2020 and 2022. This will ensure that Pembrokeshire County Council operates a 100% LED-based streetlighting network. This project focuses on luminaire replacement only, with no column replacement. It will see 11,231 remaining high-power-demand streetlights upgraded to LED. The project will reduce carbon emissions by 322 tonnes annually, and save £205,000 per year in electricity costs. Due to the inherent longevity of LED technology, there will also be a significant additional saving in ongoing maintenance costs associated with existing deteriorating fittings.

Target

An appropriate carbon-reduction target is to be developed as part of the annual review of the Action Plan.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-09	Develop appropriate carbon-reduction target for the Council's streetlighting as part of annual review of Action Plan.	Street Lighting Engineer	Mar 2021
NZC-10	Upgrade 11,231 remaining high-power-demand streetlights to LED between 2020 and 2022 using agreed Salix and PCC funding.	Street Lighting Engineer	Dec 2022
NZC-11	Decommission streetlights that no longer comply if the Council cannot economically repair – i.e. repair costs more than a new lamp.	Street Lighting Engineer	First annual review Mar 2021

(c) Fleet Mileage

Fleet Mileage	2016/17	2017/18	2018/19	2018/19 v. 2017/18	
	Result	Result	Result	Progress	% change
Mileage (miles)	3,255,494	3,307,554	3,463,415	Declined	+4.71%
Carbon emissions (tCO_2e)	3,734	3,714	3,848	Declined	+3.60%

The Council has seen a 3.60% increase in carbon emissions from its fleet vehicles from 2017/18 into 2018/19 – from 3,714 tCO_2e to 3,848 tCO_2e. Carbon-emissions factors can vary each year – hence, lower emissions in 2017/18 v. 2016/17 even though mileage was higher.

Actions

Condition/age of fleet

- As of summer 2020, PCC operates a fleet of approximately 450 vehicles and over 1,100 items of plant. The fleet has an average age of five years – the oldest being a 20-year-old Land Rover, and the youngest vehicle being a one-month-old 3.5-tonne pickup.
- PCC has a seven-year vehicle renewal policy. During renewal, vehicle functions and use are scrutinised and, where appropriate, smaller vehicles that are more efficient and lower in cost are being procured. For example, where 3.5-tonne vehicles have been used in the past, these are now being reduced to 2 tonnes or lower if possible.
- The Council's tyre policy is to fit premium brand tyres, to reduce pollution through better wear and rolling resistance.
- On average, PCC has an annual renewal of 40 vehicles, to the value of an estimated £1.5 million. Replacing a percentage of these vehicles with ULEVs each year is required to reduce the fleet's overall CO_2 emissions.

Emissions/fuel

- Diesel-engine emission values are measured using European emission standards – ranging from Euro 1, introduced in 1992, to the most current Euro 6d (introduced in September 2019). PCC fleet vehicle engines range from Euro 2, introduced in 1997, to Euro 6d. Thirty-one Euro 6d vehicles are currently on fleet, making these vehicles the Council's most emission-effective diesels. As vehicles are replaced, they are renewed to the lowest emissions standard.
- Last year, £1.4 million was spent on fuel – producing 3,848 tonnes of CO_2.

Tracking / limiters

- In order to optimise the use of fleet vehicles, 80% of PCC fleet vehicles are fitted with telematics (tracking). The existing telematics system has been in operation since 2010, and provides regular reports; a new system is currently being procured. Interrogating the telematics systems would aid the identification of vehicles that could be suitable for ultra-low emission replacements. New, up-to-date reporting systems can provide more detailed analysis on CO_2 emissions, and support the reduction of whole-fleet emissions.
- Vehicles are specified with speed limiters, restricting the speed to 62mph – and, where appropriate, engine rev limiters.

Battery power

- There are three BEVs on fleet: two cars and one van.
- Petrol-powered hand tools are now being replaced with battery-powered ones. The advantages of these include lower emissions, noise reduction and less hand-and-arm vibration. Newly procured vehicles are

specified with battery-charging facilities, while older vehicles on fleet are being retrofitted with inverters to charge battery-operated hand tools.
- Walk-behind diesel sweepers are being replaced with battery-powered ones. Advantages of battery-powered sweepers include lower whole-life costs; reduced noise pollution, enabling PCC's Maintenance Department to sweep from 6:00 am onwards in built-up areas; lower emissions; and less hand-and-arm vibration.

Buses
- Buses are now parked at optimum locations; historically, they were taken home and commenced from home. Vehicles – where and when appropriate, and if more efficient – are parked at Thornton.

Vans
- BEV small car-derived vans have a reported range of up to 240 miles, and could be a possible alternative to the existing diesel-fuelled small vans on fleet. Charging infrastructure would need to be installed at each depot and possibly other strategic sites across the County.
- PCC should consider installing home charging points, as a high percentage of its van-fleet vehicles are taken home at the end of the working day. Smart meters would need to be included here, directing all charging costs back to the Authority.
- Demonstrator BEV vans, which were trialled for a period of four weeks in 2019, received positive feedback from officers. The average framework price for these vehicles is £21,000, in comparison to an estimated price of £11,000 for an equivalent diesel model.
- Larger BEV panel vans are also available, and have a range of up to 225 miles per charge and a payload of nearly 2 tonnes. Research suggests that some vans will take a 60-mile charge in 30 minutes. Costing of these vehicles is still relatively high; they currently retail at approximately £75,000 prior to framework discounts, against a £16,000 diesel equivalent.
- PHEVs could be considered as a 'quick fix' alternative for the larger panel vans on fleet. PHEV vans are reported to have a 35-mile range before switching to petrol/diesel. Their main downside is that charging could be neglected, resulting in the vehicle continuously running on petrol/diesel. With strict management, PHEV vans would result in reduced emissions overall in comparison to diesel vehicles. PHEVs currently retail at around £30,000, prior to framework discounts, against £14,000 for diesel equivalents.

HGVs
- Renewing the Council's HGV fleet with alternative fuel is more problematic due to demographics, infrastructure and cost:
  - BEV trucks are being introduced onto the market, with a leading manufacturer recently launching a 26-tonne refuse-collection vehicle with a range of 60 miles, eight-hour charge and limited to a maximum of 1:20 gradient for a price of £400,000. PCC recently purchased three of these trucks in a diesel variant for £160,000 each.
  - Hydrogen or CNG is another potential option, but local infrastructure is not available as yet to facilitate its use. There is an opportunity here for PCC to work with partners and other stakeholders in developing a hydrogen / CNG infrastructure in Pembrokeshire.
- Following the recent renewal of its refuse fleet, 49% of PCC's HGV fleet are operating on Euro 6d engines, which are all under 12 months old. On replacement in seven years, technology and local infrastructure will have developed significantly, opening up further avenues of alternative fuel options.

Gritters
- Since 2012, the Council has procured stainless-steel gritter bodies. Despite being, on average, £10,000 more expensive than mild-steel equivalents, their 25-year body-corrosion warranty allows the body to be re-fitted to new chassis at least twice – thus saving CO_2 in the production process and realising a reduction in whole-life cost.
- PCC's dedicated and existing gritter chassis fleet of four vehicles is approximately 15 years old. These vehicles are fixed gritter bodies, as opposed to gritter bodies being dropped into tipper trucks during winter months. They would be classed as 'dirty engines' (Euro 3) by today's standards, but as they are relatively low mileage and high cost (£100,000 per chassis) they are kept on fleet for an extended life. This is a compromise for PCC – vehicles can either change every seven years to keep up with engine technology at £100,000 per chassis or have their life extended.

ULEVs
- Welsh Government's stated objective is for all public-sector road transport to transition to ULEV by 2030.
- PCC could give consideration to alternative ULEV options, or to setting emission levels for chief officers' leased cars.
- To repair and maintain ULEVs, the workforce would need to be upskilled. This would need to be done prior to and during the introduction of ULEV vehicles.

- The Council has engaged (May 2020) with the Welsh Government Energy Service (WGES) to undertake a full review of fleet and business transport in order to ascertain the business and environmental case for switching to ULEVs. WGES aims to help organisations meet the WG's stated objective of all public-sector road transport transitioning to ULEV by 2030 and to support the move to Net Zero.

Other sources

- PCC has installed a rainwater-harvesting system at its Thornton Depot automated vehicle washer, which recycles rainwater that has been captured from the roof of the vehicle workshop.
- LED lighting has been installed in the vehicle workshop.
- The Council is installing a hydrogen-vehicle refueller at Milford Marina under the Milford Haven: Energy Kingdom (MH:EK) project, whereby it is intended that two Riversimple Rasa Hydrogen Fuel Cell Electric Vehicles (HFCEV) will be used by PCC and Port of Milford Haven staff for business trips. The aim of the project is to gather data to support the business case, and demonstrate usability and the demand for HFCEV vehicles.

Target

An appropriate carbon-reduction target is to be developed as part of the annual review of the Action Plan.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-12	Undertake a review to identify the most appropriate fuel-powered vehicles for each of the Council's services and to identify opportunities for the introduction of ULEVs.	Head of Infrastructure and Fleet Manager	Mar 2021
NZC-13	Procure a new, up-to-date telematics reporting system and scrutinise to provide a more detailed analysis on CO_2 emissions; identify opportunities to support the reduction of whole-fleet emissions.	Head of Infrastructure and Fleet Manager	Mar 2021
NZC-14	Develop appropriate carbon-reduction target for the Council's fleet mileage as part of annual review of Action Plan.	Head of Infrastructure and Fleet Manager	Mar 2021

(d) Business Mileage

Business Mileage	2016/17	2017/18	2018/19	2018/19 v 2017/18	
	Result	Result	Result	Progress	% change
Mileage (miles)	1,841,242	1,786,730	1,858,148	Declined	+3.99%
Carbon emissions (tCO_2e)	555	526	544	Declined	+3.42%

Note: This indicator covers work-related duties undertaken by Council staff in their own cars or using pool vehicles.

The Council has reduced carbon emissions from its business mileage by over 1.98% since 2016/17 – from 555 tCO_2e to 544 tCO_2e. An increase in emissions of 3.42% occurred from 2017/18 into 2018/19.

Notes:

(1) The performance data quoted in this document uses, where appropriate, UK emission-conversion factors issued by the Department for Business, Energy and Industrial Strategy (BEIS). These factors are published annually – for example: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018

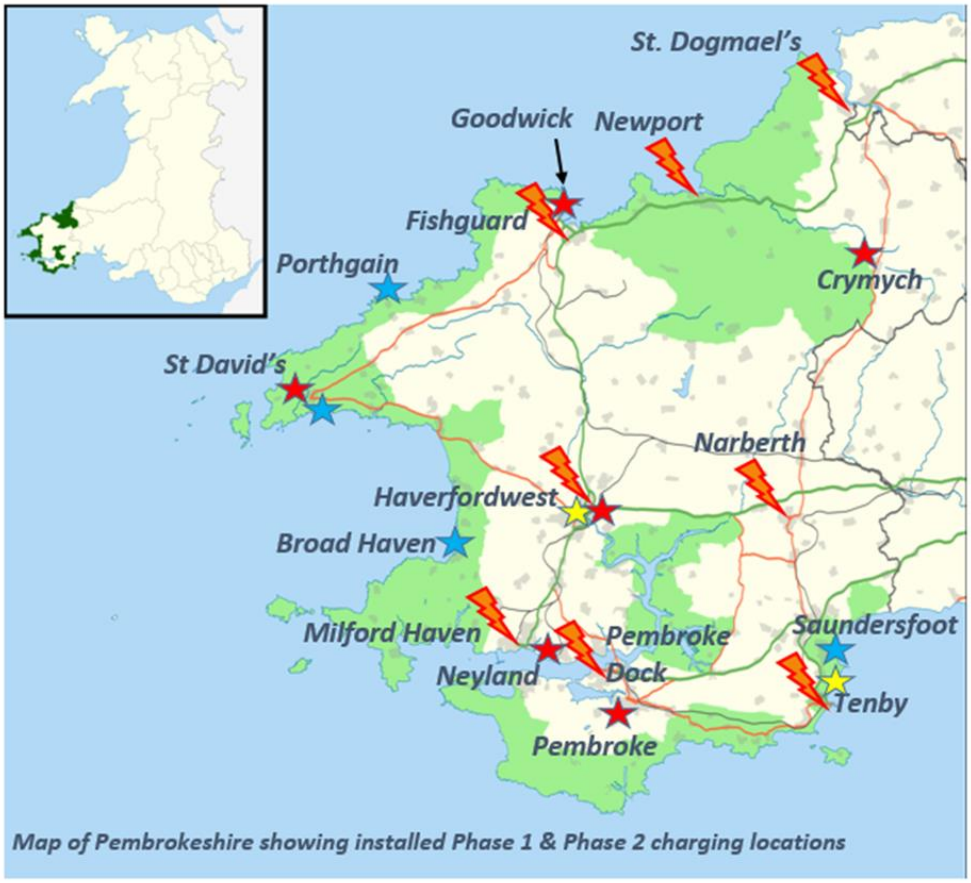
Actions

- The Council is preparing a Green Travel Plan. As part of the Local Transport Plan and Annual Progress report, the Authority is committed to reducing car-related traffic and demonstrating good practice. The travel plan is aimed at promoting sustainable travel choices and reducing reliance on the car. For the benefit of the employer and the employee, PCC intends to encourage staff and others visiting County Hall to use more environmentally friendly and healthier alternatives than driving alone. It is further intended to include commuter journeys, business travel and visitor travel within this approach. Travel plans tackle the financial waste and environmental damage caused by our society's over-reliance on private motor transport. The Green Travel Plan will cover commuter journeys, business travel, pool cars

and visitor travel to and from the Council's workplaces, and will explore alternatives to travel such as video conferencing, home working and flexible/Agile/Smart working hours. This plan should aim to take advantage of the lower pollution and emissions levels resulting from the COVID-19 pandemic in order to argue that these should be maintained for the good of people and the environment.

- The Council is aiming to increase the number of its electric pool cars (currently two) as an alternative to existing diesel-powered cars.
- £368,000 grant funding has been obtained from the Welsh Government Local Transport Fund to install 28 fast electric-vehicle charging points (56 sockets – i.e. 'double-headed' chargepoints, which are capable of charging two vehicles at once) and two rapid charging points throughout the County.
  - In 2018/19, the Phase 1 rollout of 16 'fast' chargeposts (32 sockets) occurred at eight locations.
  - In 2020, the Phase 2 rollout is nearly complete and will add 12 more fast charging facilities (24 sockets) at seven further locations. Phase 2 will also see the installation of two rapid chargeposts at two strategic transport and tourist locations (Haverfordwest and Tenby) adjacent to the trunk-road network in Pembrokeshire.
  - PCC has also supported the Pembrokeshire Coast National Park Authority (PCNPA) by jointly procuring Phase 2 fast electric-vehicle chargers for it at four sites – thus ensuring a joined-up approach to EV charging in the County. See Image 1 for a map of the provision of EV charging in Pembrokeshire in 2020.
  - A Phase 3 bid is being prepared for delivery in 2021/22 and, subject to funding, intends to expand the Council's charging network further still by adding an additional 26 fast chargeposts (52 sockets) at 11 further locations. Phase 3 would also see the installation of a total of four further rapid chargeposts at four strategic transport and tourist locations adjacent to the trunk-road network and international ferry terminals in Pembrokeshire.
- The installation of more electric-vehicle chargepoints, including the expansion of charging at County Hall and potentially charging at the Council's Thornton Depot, will encourage greater use of electric pool cars, which are currently under-used due to a lack of charging facilities for longer journeys.
- Greater EV charging provision will also encourage wider uptake of ULEVs in the staff 'grey' fleet (the fleet of drivers who use their own cars for business purposes – including commuting). The EV charging rolled out so far is aimed at meeting the needs of residents and visitors, and primarily to support and encourage the transition to electric vehicles. Given Pembrokeshire's established and vital tourism industry, the project also enables the County to promote the concept of 'eco-tourism' to visitors.
- PCC has engaged (May 2020) with WGES to undertake a full review of fleet and business transport, in order to ascertain the business and environmental case for switching to ULEVs.
- Staff pool bicycles are provided in and around Haverfordwest to help reduce business mileage associated with short journeys. In addition, the Council operates a staff cycle-to-work scheme with the intention of these bicycles being used for commuting and business journeys.
- The Council is installing a hydrogen-vehicle refueller at Milford Marina under the Milford Haven: Energy Kingdom (MH:EK) project, whereby it is intended that two Riversimple Rasa Hydrogen Fuel Cell Electric Vehicles (HFCEV) will be used by PCC and Port of Milford Haven staff for business trips. The aim of the project is to gather data to support the business case and demand for, and to demonstrate the usability of, HFCEV vehicles.

Image 1. 2020 Map of EV charging locations owned by PCC and PCNPA



Trunk Road ----------

A Road ----------

Phase 1 (2019) PCC* operational Fast Charge point locations

Phase 2 (2020) PCC operational Fast Charge point locations

Phase 2 (2020) PCC operational strategic Rapid Charge locations

Phase 2 (2020) PCNPA** operational Fast Charge point locations

*PCC – Pembrokeshire County Council
**PCNPA – Pembrokeshire Coast National Park Authority
It is intended further Phases 3 and 4 are to follow.

Target

An appropriate carbon-reduction target is to be developed as part of the annual review of the Action Plan.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-15	Prepare a Green Travel Plan, including undertaking a review of the Council's pool cars to identify opportunities for the introduction of ULEVs.	Head of Infrastructure	Mar 2021
NZC-16	Continue to expand the Council-owned EV-charging network.	Head of Infrastructure	First annual review Mar 2021
NZC-17	Develop appropriate carbon-reduction target for the Council's business mileage as part of annual review of Action Plan.	Head of Infrastructure	Mar 2021
NZC-18	Gather data to support the business case and demand for, and to demonstrate the usability of, HFCEV vehicles.	Head of Infrastructure / Sustainable Development & Energy Manager	Mar 2022

3.3 Renewable-energy Generation / Carbon Offsetting

Carbon Footprint	_	Renewable-energy Generation Carbon Offsetting	=	Net Zero Carbon

As of summer 2020, PCC has the following levels of renewable and low-carbon energy measures installed:

- Solar photovoltaic (PV) panels: 498 kW at 34 separate buildings, including schools.
- Solar PV-powered signs, lamps and street furniture – various locations.
- Solar hot-water panels: 40 kW at ten separate buildings, including schools.
- Biomass wood-pellet heating and hot water: 500 kW at three separate buildings, including schools.
- Small wind turbine: 6 kW at Mary Immaculate School, Haverfordwest.
- Gas-fired combined heating and power (CHP): 260 kWe/520 kWthermal at 15 separate buildings, including schools.

Over recent years, the Council has sought to significantly increase the amount of renewable electricity that it generates but has been frustrated by the limited capacity of the local electricity-distribution network (National Grid). Previous applications to the electricity-distribution network operator – Western Power Distribution – for connecting to the electricity network have resulted in unviable costs due to significant reinforcement costs having to be met by prospective developers such as the Council.

Therefore, while PCC's preferred primary method of compensating for its residual carbon footprint is to significantly increase the amount of renewable energy generated on its land, this depends on enhancements to the capacity of the local electricity-distribution network. Unfortunately, this is beyond the direct control of the Council – and discussions are ongoing with Western Power Distribution and the Welsh Government to seek the necessary improvements.

Carbon offsetting involves compensating for carbon dioxide (CO_2) emissions arising from industrial or other human activity by participating in schemes designed to make equivalent reductions of CO_2 in the atmosphere. Because one unit of CO_2 has the same climate impact wherever it is emitted, the benefit is the same wherever it is reduced or avoided. Achieving verified carbon reductions could include protecting rainforests in South America or, potentially, local tree planting. This can be a complex issue and represents the option of last resort unless tree planting/peatland enhancement on Council-controlled land is deemed to qualify for carbon offsetting *(**Note:** This to be confirmed when the Welsh Government publishes its land-use guidance as part of the carbon-neutral public services reporting framework)*.

PCC is working with the Welsh Government Energy Service to explore and deliver opportunities for large-scale renewable-energy projects. The WGES supports the public sector in Wales to bring tangible projects to fruition and advises on energy-related issues. It is currently undertaking a review of the Council's land in order to identify potential opportunities for ground-mounted solar PV and wind turbines. Historically, similar exercises have been undertaken with the Partnerships for Renewables and Local Partnerships – but while potential sites were identified, they were not deemed financially viable due to cost/local grid and/or land-use constraints. Major renewable-energy projects typically take several years to develop to completion *(**Note**: 'Energy Generation in Wales 2018', October 2019, sets out the current energy-generation capacity of Wales and analyses how it has changed over time)*. It is notable that the County of Pembrokeshire has 20% of all installed solar PV capacity in Wales, which is testament to the excellent solar irradiance found at Pembrokeshire's latitude compared with other areas of the country. Future renewable-energy generation on Council-owned land will depend on grid capacity (or having a local off-loader for power generated), and will also need to be satisfactory in planning terms.

The Council is working, and in some cases leading, on a number of regional initiatives that are aimed at creating a Pembrokeshire-based market and centre of excellence for renewable-energy technologies. See sections 3.4, 3.5 and 3.6.

Actions

General

- As mentioned previously, 100% of the electricity procured via the NPS comes from renewable energy sources, with about 50% of this being sourced from within Wales. This purchasing provides a market for renewable generators and thus stimulates the renewable-electricity market. *(**Note:** The consumption of this 'green' electricity is already reflected in the [decreasing] UK emission-conversion factor for electricity, and as a consequence the Council is currently unable to directly benefit from carbon savings resulting from its procurement of 'green' electricity as this would effectively be double-counting the carbon savings).*

- The NPS is actively seeking low-carbon gas sources – e.g. bio methane from Anaerobic Digestion (AD) and monitoring the hydrogen-gas agenda.
- The Council Development Plans team completed a Renewable Energy Assessment in 2017, which forms part of the Local Development Plan (LDP) 2 evidence base. It has informed the emerging General Policies GN 4 and GN 5 of LDP 2.
- PCC continues to monitor the situation to assess the emergence of market mechanisms such as the Smart Export Guaranteed (SEG), which allows negotiations with electricity suppliers in order to secure an agreed level of payment for exported renewable electricity.

Solar

- In 2019/20, PCC agreed to enter into a partnership with Egni Community Co-op, who provided capital-free rooftop solar PV systems to six schools at Saundersfoot, Lamphey, Prendergast, Ysgol y Frenni, Golden Grove and Ysgol Bro Ingli. These schools are provided with the renewable electricity from the solar systems at a 20% cheaper cost than that offered by the school grid electricity tariff.
- In 2016, the Council entered into a partnership with British Gas and Generation Community, who provided capital-free rooftop solar PV systems to Greenhill and Milford Haven secondary schools. These schools are provided with the renewable electricity from the solar systems for free.
- Solar PV systems have been installed on an invest-to-save basis in multiple schools; across PCC's sheltered accommodation; at Fishguard Leisure Centre; and at Glan-Yr-Afon Library and Gallery, Haverfordwest.
- Solar PV systems are installed at all new 21st Century Schools.
- Since 2015, there has been a decline in Feed-in-Tariff (FiT) subsidies for new solar PV installations, and FiT payments for solar PV ceased altogether in 2019. The removal of the subsidy resulted in a dramatic reduction in the number of applications for renewable-energy projects in the PCC planning area. However, the cost of solar PV systems has continued to decline (by around 70%) and battery technology has emerged as a potential mainstream application. Coupled with the rising cost of electricity at many sites, where there is adequate consumption there is still a viable solar PV solution.
- The Council is due to install PV solar car-parking canopies at Pembrokeshire Archives (28 kW) and County Hall (70 kW) car parks in 2020/21 as part of the Re:fit Cymru Phase 1 scheme.
- The Council has installed solar hot-water panels at eight schools, one sports hall and a youth centre.

Biomass

- PCC was the first local authority in Wales to adopt biomass wood-pellet heating, with the Preseli biomass project in 2003. In 2015, the Council partnered with Pembrokeshire Bioenergy for a 20-year energy supply contract (ESCo) for the installation of a capital-free 400 kW biomass wood-pellet boiler system at Haverfordwest Leisure Centre, resulting in ultra-low-emission heating provision for its swimming pool and hot-water systems.

Tree planting / carbon sequestration

- The Council intends to review its tree strategy for implementation – including the future management of existing and proposed areas of woodland, management plans, removal of trees and life cycle.
- In recognising that the carbon-sequestration ability of soils and grasslands should not be overlooked, and that managed pasture for soil health instead of production gives benefits to carbon storage and the regulation of water runoff, the Council is reviewing practices for safeguarding and increasing carbon storage in soils and biomass, such as:
  - Changing agricultural practices on Pembrokeshire's County Farms to reduce emissions production and increase carbon sequestration through good soil management.
  - Engaging with the agri-food sector to gain an understanding of how the Council might be able to support more sustainable farming practices across the County.
  - Increased green infrastructure.
  - Coastal management – since 'coastal squeeze' is an issue in coastal habitats, exploring allowing habitats to retreat one field back from the shoreline in order to increase extent.
  - Engaging with a local researcher and Swansea University regarding the potential for diorite rocks to be crushed and spread on fields to capture the carbon.

Target

An appropriate target for renewable-energy generation is to be developed as part of the annual review of the Action Plan.

Notes:

(1) A significant increase in renewable-energy generation will be required to compensate for the Council's residual carbon footprint.

(2) A target for renewable-energy generation has been inserted into the Deposit (public consultation draft) of LDP 2 – policy GN 5. The setting of a target referred to here is specifically in relation to PCC activities/initiatives – unlike that in LDP 2, which considers all planning matters.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-19	Work with Welsh Government Energy Service to explore and deliver opportunities for large-scale renewable-energy projects.	Sustainable Development & Energy Manager	Ongoing
NZC-20	Work with National Procurement Service to support greater procurement of energy from locally generated renewable-energy projects.	Sustainable Development & Energy Manager	Ongoing
NZC-21	Explore the feasibility of, and identify land for, tree planting and other such measures (such as increasing the carbon store in soils and biomass) on Council-controlled land in order to contribute towards carbon offsetting.	Strategic Asset Manager	Ongoing
NZC-22	Develop appropriate target for renewable-energy generation as part of annual review of Action Plan.	Sustainable Development & Energy Manager / Head of Infrastructure	Mar 2021

3.4 Working with Welsh Government

The Environment (Wales) Act 2016 sets a target for the Welsh Government to reduce greenhouse gas emissions by at least 80% (on 1990 levels) by 2050. The Welsh Government declared a climate emergency on 29 April 2019 and, as a response, accepted the recommendations from the UK Committee on Climate Change for emission reduction of 95% by 2050 with the ambition to be net zero *(**Note**: For Wales/Pembrokeshire carbon emissions, see https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018, June 2020)*.

'Prosperity for All: A Low Carbon Wales' (March 2018) sets out the Welsh Government's approach to cutting carbon emissions and increasing efficiency in a way that maximises the wider benefits for Wales, ensuring a fairer and healthier society. It sets out 100 policies and proposals that directly reduce emissions and support the growth of the low-carbon economy across all areas of government, including:

- increasing tree planting to, initially, at least 2,000 hectares per year and then doubling that to 4,000 hectares as rapidly as possible;
- commissioning an independent feasibility study on carbon-capture use and storage;
- reducing emissions from power generation in Wales, including using consenting, planning and permitting powers and developing a policy position on the fuels used to generate power;
- encouraging the take-up of electric vehicles by developing a rapid charging network;
- an ambition for buses, taxis and private-hire vehicles to be zero emission by 2028;
- reviewing Building Regulations to explore how higher energy-efficiency standards can be set for new builds;
- working with partners to include more about sustainability and decarbonisation in the new curriculum; and
- providing fruit and fuel trees for the entire Mount Elgon region in Uganda by 2030 (carbon offsetting).

From 2010 to 2014, PCC participated in Phase 1 of the mandatory UK-wide Carbon Reduction Commitment (CRC) Energy Efficiency Scheme. Consequently, it has been required to purchase non-refundable allowances for each qualifying tonne of carbon arising from its electricity and gas consumption. The Council paid £233,000 under this scheme, based on its emissions for 2013/14. Via energy-efficiency work, it was exempted from Phase 2 of CRC, which ran from 2014 to 2019 (the exemption effectively saved PCC £932,000 for the duration of Phase 2). Under CRC, while the Council's emissions continued to reduce, the level of 'tax' levied for each tonne of carbon emitted increased annually in order to further incentivise carbon reduction. The CRC Energy Efficiency Scheme was abolished following the 2018/19 compliance year; however, this 'taxation' cost will not disappear as the Climate Change Levy will be raised to compensate. The Welsh Government is to consult on options for a successor to the CRC Scheme (Policy 19, 'Prosperity for All: A Low Carbon Wales').

The Welsh Government has an ambition for a carbon-neutral public sector by 2030, and will be supporting the public sector to baseline, monitor and report progress towards carbon neutrality (Policy 20, 'Prosperity for All:

A Low Carbon Wales'). Based on recent carbon footprinting undertaken by Natural Resources Wales and NHS Wales, the Welsh Government proposes to prioritise the following four key themes to meet this ambition:

(1) Mobility and Transport;
(2) Procurement;
(3) Land Use; and
(4) Buildings.

Aether Ltd has secured the contract to develop the reporting guidance, and PCC is one of several public bodies that have agreed to become 'early adopters' and work with the Welsh Government to establish consistent, Wales-wide methodologies for carbon-emissions reporting. The final set of documentation was to be delivered to the Welsh Government by the end of 2019/20 but this has been delayed due to COVID-19. It is currently intended that final documentation be circulated to all public bodies as soon as possible. This will assist in baselining carbon emissions, developing plans and monitoring progress towards emissions-reduction targets.

As mentioned in previous sections, the Council is working with the Welsh Government Energy Service to explore and deliver opportunities for large-scale renewable-energy projects and ULEVs.

As outlined previously, the Re:fit Cymru project is a collaboration between Welsh Government and the Council using a WG pre-procured contractor framework and Salix invest-to-save funds.

From 2014 to 2019, PCC collaborated on a WG-funded 'Smart Living' project looking at the creation of a zero-carbon area at Milford Waterfront. WG's 'Smart Living Initiative' funded the studies and the Council provided the 'governance' link to what was, in fact, a Port of Milford Haven (PoMH)-led project. The final report, via a consortium led by Cardiff University, recommends the use of renewable-energy generators to power a smart grid; battery storage for grid balancing; electrolysed green hydrogen production (for storage, heat and transport); biogas production from AD plant(s); and the use of heat pumps for hybrid heating. This project was the catalyst for the Milford Haven: Energy Kingdom (MH:EK) project, which is expanded upon in Section 3.6.

The Council is part of the WG Hydrogen Reference Group, which intends to promote discussions on the best way for Wales to progress this market. The group is closely linked into MH:EK and the South Wales Industrial Cluster (SWIC), as well as the broader hydrogen supply chain and networks. WG intends to develop its hydrogen policy position and identify funding opportunities. The outcomes from this group work will, in turn, feed through into the Welsh Government's internal hydrogen group, which includes representatives from across many departments with interests in hydrogen.

The Welsh Government Energy Service is proposing to develop a Regional Energy Plan for the Swansea Bay City Region based on recent work produced by the Institute of Welsh Affairs (IWA) and Regen SBCR a Renewable Energy Future. The Council is engaged with this work stream.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-23	Collaborate with Welsh Government and other 'early adopter' public bodies in order to introduce carbon reporting as part of the ambition to achieve a carbon-neutral Welsh public sector by 2030.	Sustainable Development & Energy Manager	Jun 2021
NZC-24	Continue to engage with Welsh Government in all spheres of decarbonisation.	Sustainable Development & Energy Manager	Ongoing

3.5 Working with Pembrokeshire Public Services Board / Swansea Bay City Deal partners

The Well-being of Future Generations (Wales) Act 2015 established a statutory board, known as a Public Services Board (PSB), in each local authority area in Wales. Each PSB is a collection of public bodies working together to improve the well-being of its county. The Pembrokeshire Public Services Board is currently undertaking a Climate Change and Environmental Risk Assessment for Pembrokeshire, via a working group of that name, in order to develop clear and defined actions that can be taken by individuals, communities and organisations.

The Swansea Bay City Deal programme includes 11 projects across four key themes:

(1) Economic Acceleration;
(2) Life Science and Well-being;
(3) Energy; and
(4) Smart Manufacturing.

These include the Pembroke Dock Marine (PDM) and Homes as Power Stations (HAPS) projects.

Pembrokeshire County Council is the Lead Authority for the PDM project. The aim is to support the existing marine-engineering cluster in Pembroke Dock in order to benefit from inward-investment opportunities attracted to the area because of its unrivalled location, knowledge and expertise, supply chain and connectivity. PDM offers the opportunity for Pembrokeshire to create the right combination of terrestrial and maritime assets to become a UK leader in the developing global market in marine renewables, including floating offshore wind. PDM can also unlock future potential support for decarbonisation, with the UK-wide Offshore Renewable Energy Catapult now cemented in the County and actively promoting the area through the UK Government's Industrial Strategy Challenge Fund. The project can also do so by hosting the Swansea Bay City Region's largest renewable-energy generating station in the Pembrokeshire Demonstration Zone.

The regional HAPS programme aims to coordinate the delivery of smart, low-carbon, energy-efficient homes by encouraging the use of domestic HAPS technologies. The programme intends to coordinate the adoption of HAPS technologies for both new-build and retrofit developments across the public and private sectors, proving the concept in the public sector before rolling it out in the private sector.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-25	Work with Pembrokeshire Public Services Board's Climate Change and Environmental Risk Assessment Working Group to undertake a Climate Change and Environmental Risk Assessment for Pembrokeshire.	Corporate Policy & Partnership Manager	Ongoing
NZC-26	Work with Swansea Bay City Region partners to deliver the Pembroke Dock Marine and Homes as Power Stations projects	Head of Regeneration	Ongoing

3.6 Collaboration with Experts from the Private, Third and Community Sectors

The Well-being of Future Generations (Wales) Act 2015 requires public bodies in Wales to think about the long-term impact of their decisions; to work better with people, communities and each other; and to prevent persistent problems such as poverty, health inequalities and climate change. The Act requires public bodies to implement five key ways of working in future decision-making:

(1) looking to the long-term;
(2) taking an integrated approach;
(3) involving a diversity of the population;
(4) working with others in a collaborative way; and
(5) understanding the root causes of issues to prevent them from recurring.

The Council works in close collaboration with a vast range of private, third-sector and community partners. The following (non-exhaustive) lists give examples of some of the private- and third-sector organisations that it proposes to work with in order to deliver this Action Plan.

Led by Pembrokeshire County Council Milford Haven: Energy Kingdom (MH:EK) is a two-year £4.5 million project, completing in 2022, exploring what a decarbonised, 'smart', local energy system could look like for Milford Haven, Pembroke and Pembroke Dock. The project partners are:

- PCC;
- The Port of Milford Haven;
- Offshore Renewable Energy Catapult;
- Riversimple;
- Wales & West Utilities;
- Arup; and
- Energy Systems Catapult.

Project supporters and collaborators are:

- RWE Generation UK plc;
- Simply Blue Energy;
- The Welsh Government Energy Service; and
- Community Energy Pembrokeshire.

The project will explore the potential of hydrogen as part of a multi-vector approach to decarbonisation. Central to the project, and to achieving net-zero, is a commitment to engage with the community and local industry, providing insight and opportunities for growth. PCC's ambition is to gather detailed insight into the whole energy system around Milford Haven in order to identify and design a future, smart, local energy system based on a truly multi-vector approach (heat, electricity, transport) and comprehensive energy-systems architecture. The project is multi-faceted, and will see the team investigate the following areas:

- local renewable energy – including solar, onshore wind, future offshore wind and biomass for decarbonised gas transition;
- diversified seed markets for hydrogen across buildings, transport and industry;
- consumer trials of fuel-cell vehicles; and
- hydrogen-ready hybrid heating systems.

The project promises to showcase the far-reaching benefits of low-carbon energy. If successful, it has the potential to lead the way and become the first of many Smart Local Energy Systems supporting the UK and its local communities in reaching the government's target of net zero greenhouse gas emissions by 2050. MH:EK is one of the chosen 'Detailed Design' projects within the Prospering from the Energy Revolution (PfER) programme of works funded by Innovate UK as part of its Industrial Strategy Challenge Fund (ISCF).

The Council is a non-funded collaborator on the South Wales Industrial Cluster (SWIC) Roadmap project, which will seek to identify the best options for the cost-effective decarbonisation of industry in South Wales – including the industrial cluster on the Milford Haven Waterway. The project will look at the infrastructure required for the development of the hydrogen economy; for large-scale carbon capture, utilisation and storage (CCUS) and transport; as well as on-site strategic opportunities specific to each industry. Key partners for the Phase 2 £1.5m bid will be industry, infrastructure providers, power generators and councils – bodies such as:

- Wales and West Utilities;
- National Grid Electricity Transmission plc;
- Western Power Distribution;
- Calon Energy;
- RWE Generation UK plc;
- Pembrokeshire County Council; and
- Neath Port Talbot County Borough Council.

Other planned partners include:

CR Plus Limited
Costain Limited
Progressive Energy Limited
Siemens plc
ITM power
University of South Wales (USW)
Environmental Resources Management Limited
Capital Law Limited
Tata Steel
Valero Energy Limited
Vale Europe Limited
Celsa Manufacturing (UK) Limited
Milford Haven Port Authority (MHPA)
Tarmac Trading Limited
Confederation of Paper Industries
Associated British Ports
National Farmers' Union (NFU)
BOC
Rockwool Limited
Calor

PCC has established working relationships with locally based private and community groups, and with regional and national groups operating locally, in the arena of clean energy and sustainability –including:

- Community Energy Pembrokeshire (CEP)
- Transition Bro Gwaun (TBG)
- The Environmental Network for Pembrokeshire (TENP)
- Planed
- Pembrokeshire Coastal Forum (PCF)
- Pembrokeshire Association of Voluntary Services (PAVS)
- Ynni Sir Gar

- Cwm Arian Renewable Energy (CARE)
- Egni Co-op
- Awel Aman Tawe
- Marine Energy Wales (formerly Marine Energy Pembrokeshire)
- ateb (formerly Pembrokeshire Housing Association)
- Western Solar – Tŷ Solar
- Silverstone Green Energy (PV Solar) and Dragon Charging (EV charging)
- Bourne Leisure Ltd, Bluestone Resorts Ltd and Folly Farm Ltd (all members of the Pembrokeshire Energy Forum)

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-27	Work with the Council's private-sector partners and major landowners to explore innovative approaches to carbon reduction.	Various	Ongoing
NZC-28	Collaborate with Pembrokeshire's third sector and community organisations to explore carbon-reduction opportunities and further renewable-energy aims.	Various	Ongoing

3.7 Integration, Communication and Behaviours

PCC has adopted a corporate approach to drafting this Action Plan, with the member-led cross-party **'**Net Zero Carbon 2030 Working Group' meetings chaired by Cllr Joshua Beynon and attended by various officers and interested parties to explore decarbonisation actions.

It is recognised that staff, and member, awareness and buy-in will be required to enable the Council to successfully deliver significant carbon reductions. This may require specific training and communications skills.

In partnership with Pembrokeshire Coastal Forum and Cardiff University (using funding from their Coastal Communities Acting Together [CCAT] project), a staff climate-change-awareness baselining survey has been undertaken. A total of 86% of respondents rated the issue of climate change as important or very important. The Council is awaiting the detailed report and outcomes, and it is proposed to follow up this baselining survey with further staff engagement. A staff survey could identify how individuals can contribute to PCC's commitment to become a net zero-carbon local authority. The Council needs to consider how to engage with staff who work outside of its fixed office locations, as currently surveys generally only capture those 'desk based' staff connected to the Authority's email system.

Potentially, PCC could add a requirement in staff performance reviews for each member of staff to volunteer to undertake an action each year to contribute to decarbonisation – whether in their personal or work environments. These actions could be anything from swapping to low-energy light bulbs to eating less meat, buying an ULEV car, using the electric pool cars, taking one less flight per year, switching to a renewable-energy tariff at home or using public transport. This helps everyone in the organisation to take ownership of the decarbonisation issue, which is needed in order to make substantial progress.

Consideration should be given to incentivising more sustainable forms of travel when staff take a short-haul holiday. This might involve, for example, agreeing to provide one day's additional annual leave should staff elect to take the train to Europe rather than fly, or when staff choose to holiday in the UK rather than take a flight abroad.

Once the Council's migration from Skype to MS Teams is complete, it is proposed that the Conversation Cafe forum is used for a staff discussion on the net zero-carbon 2030 work.

PCC has been implementing agile and smarter working since 2018. For desk-based staff, this resulted in a relatively simple migration to home working when the COVID-19 pandemic commenced. The Council should consolidate smarter working practices in order to create further decarbonisation efficiencies – specifically around the smarter use of workplaces, home working and reduced commuting mileages. The well-being and working conditions of employees must be paramount in this consideration. Consideration should be given to equipping staff with suitable office furniture and energy-efficient equipment, making an allowance for the increased energy costs of home working and incentivising staff to upgrade to superfast broadband internet where it is available.

In 2019, the Council constructively engaged with local environmental campaign groups – for example, hosting a climate youth forum and meeting with representatives of Extinction Rebellion at County Hall. Consideration should be given to continuing to engage with residents of Pembrokeshire, potentially through the Council's new Engagement HQ online system.

PCC runs the successful Sustainable Schools Award Scheme (SSAS). The scheme was set up in 2003 to help schools embed Education for Sustainable Development and Global Citizenship (ESDGC), in both teaching and learning and the sustainable management of Pembrokeshire's schools. The Council should ensure that the SSAS aligns with the objective in WG's 'Prosperity for All: A Low Carbon Wales' for 'working with partners to include more about sustainability and decarbonisation in the new curriculum'.

An Integrated Impact Assessment (IIA) of Council proposals and decisions will need to be completed before the implementation of the Action Plan in 2020/21. An IIA will include requirements to assess impacts as stipulated in the following legislation:

- Well-being of Future Generations (Wales) Act 2015
- Public Sector Equality Duty and the Equality Act 2010
- Welsh Language (Wales) Measure 2011 and Welsh Language Standards
- United Nations Convention on the Rights of the Child 1989, and Rights of Children and Young Persons (Wales) Measure 2011
- General Data Protection Regulation 2016
- The inclusion of Environment (Wales) Act 2016 impact-assessment requirements will help to write climate change/carbon reduction 'into the DNA' of the Council.

Performance on progress towards becoming a net zero-carbon local authority by 2030 will be reported annually, together with annual reviews of the Action Plan.

Actions to be undertaken

Ref	Action	Lead Officer	By When
NZC-29	Undertake staff survey to identify how individuals can contribute to PCC's commitment to become a net zero-carbon local authority. The Council is to consider how to engage with staff who work outside of its fixed office locations.	Marketing Manager	Mar 2021
NZC-30	Consider adding a requirement in staff performance reviews for each member of staff to volunteer to take an action each year to contribute to decarbonisation – whether in their personal or work environments.	Head of Human Resources	Mar 2021
NZC-31	Consider incentivising more sustainable forms of travel when staff take a short-haul holiday – for example, agreeing to provide one day's additional annual leave should staff elect to take the train to Europe rather than fly, or when staff choose to holiday in the UK rather than take a flight abroad.	Head of Human Resources	Mar 2021
NZC-32	Use the Conversation Cafe forum for a staff discussion on the net zero-carbon 2030 work and the Action Plan.	Transformation and IT Team	Mar 2021
NZC-33	Consolidate smarter working practices to create further decarbonisation efficiencies – e.g. smarter use of workplaces, home working and reduced commuting mileages. The well-being and working conditions of employees must be paramount in this consideration – including equipping staff with suitable office furniture and energy-efficient equipment, making an allowance for the increased energy costs of home working and incentivising staff to upgrade to superfast broadband internet where it is available.	Transformation and IT Team	Mar 2021
NZC-34	Consideration should be given to continuing to engage with the residents of Pembrokeshire, potentially through the Council's new Engagement HQ online system.	Marketing Manager	Mar 2021
NZC-35	Ensure that the Sustainable Schools Award Scheme aligns with the objective in WG's 'Prosperity for All: A Low Carbon Wales' of 'working with partners to include more about sustainability and decarbonisation in the new curriculum'.	Sustainable Schools Officer	Mar 2021
NZC-36	Carry out an Integrated Impact Assessment (IIA) on Council net zero 2030 Action Plan proposals.	Corporate Policy & Partnership Manager	Mar 2021

NZC-37	Review Action Plan following publication of Welsh Government guidance regarding new national carbon-reporting framework.	Sustainable Development & Energy Manager	Mar 2021
NZC-38	Publish annual performance reports on progress towards becoming a net zero-carbon local authority by 2030.	Sustainable Development & Energy Manager	Annually

Appendix 1

Action Plan

Ref	Action to be undertaken	Lead Officer	By When
Carbon Footprint – Non-domestic buildings			
NZC-01	Complete delivery of Re:fit Cymru (Energy Efficiency) Phases 1 and 2 projects to achieve energy/carbon savings.	Head of Infrastructure	Apr 2021
NZC-02	Complete Welsh Government education backlog maintenance funded LED lighting upgrades in nine further schools.	Head of Infrastructure	Apr 2021
NZC-03	Develop further phases of Re:fit Cymru (Energy Efficiency) project, or similar (e.g. use of WG backlog maintenance funds for energy efficiency in schools), to achieve accelerated energy / carbon savings.	Sustainable Development & Energy Manager	Ongoing
NZC-04	Incorporate wording into new-build design briefs to state that Pembrokeshire County Council require that new buildings are carbon neutral / net zero carbon in their energy use – and preferably carbon positive, in that they generate more energy than they can consume.	Sustainable Development & Energy Manager, Senior Architect and Senior Engineers	Ongoing
NZC-05	Consider the 'Fabric first' or 'Passivhaus' standard, where appropriate, in new building-construction projects	Senior Architect	Ongoing
NZC-06	Continually review and amend design specifications and briefs to reflect new technologies and energy-efficient equipment	Senior Architect and Senior Engineers	Ongoing
NZC-07	Extend 'smart' and sub-metering technology to ensure accurate and timely capture of energy-consumption data. Consider application for water smart metering.	Various	Ongoing
NZC-08	Develop appropriate carbon-reduction target for the Council's non-domestic buildings as part of annual review of Action Plan.	Sustainable Development & Energy Manager	Apr 2021
Carbon Footprint – Streetlighting			
NZC-09	Develop appropriate carbon-reduction target for the Council's streetlighting as part of annual review of Action Plan.	Street Lighting Engineer	Mar 2021
NZC-10	Upgrade 11,231 remaining high-power-demand streetlights to LED between 2020 and 2022 using agreed Salix and PCC funding.	Street Lighting Engineer	Dec 2022
NZC-11	Decommission streetlights that no longer comply if the Council cannot economically repair – i.e. repair costs more than a new lamp.	Street Lighting Engineer	First annual review Mar 2021
Carbon Footprint – Fleet Mileage			
NZC-12	Undertake a review to identify the most appropriate fuel-powered vehicles for each of the Council's services and to identify opportunities for the introduction of ULEVs.	Head of Infrastructure and Fleet Manager	Mar 2021
NZC-13	Procure a new, up-to-date telematics reporting system and scrutinise to provide a more detailed analysis on CO_2 emissions; identify opportunities to support the reduction of whole-fleet emissions.	Head of Infrastructure and Fleet Manager	Mar 2021
NZC-14	Develop appropriate carbon-reduction target for the Council's fleet mileage as part of annual review of Action Plan.	Head of Infrastructure and Fleet Manager	Mar 2021
Carbon Footprint – Business Mileage			
NZC-15	Prepare a Green Travel Plan, including undertaking a review of the Council's pool cars to identify opportunities for the introduction of ULEVs.	Head of Infrastructure	Mar 2021
NZC-16	Continue to expand the Council-owned EV-charging network.	Head of Infrastructure	First annual review Mar 2021
NZC-17	Develop appropriate carbon-reduction target for the Council's business mileage as part of annual review of Action Plan.	Head of Infrastructure	Mar 2021
NZC-18	Gather data to support the business case and demand for, and to demonstrate the usability of, HFCEV vehicles.	Head of Infrastructure / Sustainable Development & Energy Manager	Mar 2022

Ref	Action to be undertaken	Lead Officer	By When
Renewable Energy Generation / Carbon Offsetting			
NZC-19	Work with Welsh Government Energy Service to explore and deliver opportunities for large-scale renewable-energy projects.	Sustainable Development & Energy Manager	Ongoing
NZC-20	Work with National Procurement Service to support greater procurement of energy from locally generated renewable-energy projects.	Sustainable Development & Energy Manager	Ongoing
NZC-21	Explore the feasibility of, and identify land for, tree planting and other such measures (such as increasing the carbon store in soils and biomass) on Council-controlled land in order to contribute towards carbon offsetting.	Strategic Asset Manager	Ongoing
NZC-22	Develop appropriate target for renewable-energy generation as part of annual review of Action Plan.	Sustainable Development & Energy Manager / Head of Infrastructure	Mar 2021
Working with Welsh Government			
NZC-23	Collaborate with Welsh Government and other 'early adopter' public bodies in order to introduce carbon reporting as part of the ambition to achieve a carbon-neutral Welsh public sector by 2030.	Sustainable Development & Energy Manager	Jun 2021
NZC-24	Continue to engage with Welsh Government in all spheres of decarbonisation.	Sustainable Development & Energy Manager	Ongoing
Working with Pembrokeshire Public Services Board / Swansea Bay City Deal partners			
NZC-25	Work with Pembrokeshire Public Services Board's Climate Change and Environmental Risk Assessment Working Group to undertake a Climate Change and Environmental Risk Assessment for Pembrokeshire.	Corporate Policy & Partnership Manager	Ongoing
NZC-26	Work with Swansea Bay City Region partners to deliver the Pembroke Dock Marine and Homes as Power Stations projects.	Head of Regeneration	Ongoing
Collaboration with experts from the private, third and community sectors			
NZC-27	Work with the Council's private-sector partners and major landowners to explore innovative approaches to carbon reduction.	Various	Ongoing
NZC-28	Collaborate with Pembrokeshire's third sector and community organisations to explore carbon-reduction opportunities and further renewable-energy aims	Various	Ongoing
Integration, Communication and Behaviours			
NZC-29	Undertake staff survey to identify how individuals can contribute to PCC's commitment to become a net zero-carbon local authority. The Council is to consider how to engage with staff who work outside of its fixed office locations.	Marketing Manager	Mar 2021
NZC-30	Consider adding a requirement in staff performance reviews for each member of staff to volunteer to take an action each year to contribute to decarbonisation – whether in their personal or work environments.	Head of Human Resources	Mar 2021
NZC-31	Consider incentivising more sustainable forms of travel when staff take a short-haul holiday – for example, agreeing to provide one day's additional annual leave should staff elect to take the train to Europe rather than fly, or when staff choose to holiday in the UK rather than take a flight abroad.	Head of Human Resources	Mar 2021
NZC-32	Use the Conversation Cafe forum for a staff discussion on the net zero-carbon 2030 work and the Action Plan.	Transformation and IT Team	Mar 2021
NZC-33	Consolidate smarter working practices to create further decarbonisation efficiencies – e.g. smarter use of workplaces, home working and reduced commuting mileages. The well-being and working conditions of employees must be paramount in this consideration – including equipping staff with suitable office furniture and energy-efficient equipment, making an allowance for the increased energy costs of home working and incentivising staff to upgrade to superfast broadband internet where it is available.	Transformation and IT Team	Mar 2021
NZC-34	Consideration should be given to continuing to engage with the residents of Pembrokeshire, potentially through the Council's new Engagement HQ online system.	Marketing Manager	Mar 2021
NZC-35	Ensure that the Sustainable Schools Award Scheme aligns with the objective in WG's 'Prosperity for All: A Low Carbon Wales' of 'working with partners to include more about sustainability and decarbonisation in the new curriculum'.	Sustainable Schools Officer	Mar 2021

NZC-36	Carry out an Integrated Impact Assessment (IIA) on Council net zero 2030 Action Plan proposals.	Corporate Policy & Partnership Manager	Mar 2021
NZC-37	Review Action Plan following publication of Welsh Government guidance regarding new national carbon-reporting framework.	Sustainable Development & Energy Manager	Mar 2021
NZC-38	Publish annual performance reports on progress towards becoming a net zero-carbon local authority by 2030	Sustainable Development & Energy Manager	Annually

Appendix 2

Carbon-reduction Summary

Key Measures of Success	2016/17	2017/18	2018/19	2018/19 v 2017/18	
	Result	Result	Result	Progress	% change
Non-Domestic Buildings					
Consumption (kWh)	49,217,855	48,446,196	48,272,333	Improved	-0.36%
Carbon emissions (tCO_2e)	12,765	11,762	10,285	Improved	-12.58%
Streetlighting					
Consumption (kWh)	2,993,488	2,953,158	2,883,115	Improved	-2.37%
Carbon emissions (tCO_2e)	1,345	1,135	886	Improved	-21.94%
Fleet Mileage					
Mileage (miles)	3,255,494	3,307,554	3,463,415	Declined	+4.71%
Carbon emissions (tCO_2e)	3,734	3,714	3,848	Declined	+3.60%
Business Mileage					
Mileage (miles)	1,841,242	1,786,730	1,858,148	Declined	+3.99%
Carbon emissions (tCO_2e)	555	526	544	Declined	+3.42%
TOTAL					
Consumption (kWh)	52,211,343	51,399,354	51,155,448	**Improved**	-0.47%
Mileage (miles)	5,096,736	5,094,284	5,321,563	Declined	+4.46%
Carbon emissions (tCO_2e)	**18,399**	**17,137**	**15,563**	**Improved**	**-9.18%**

Carbon Footprint 2018/19	_	Renewable-energy Generation	=	Net Zero Carbon

		Wind Turbines	or	Solar PV panels	
Non-Domestic Buildings					
Carbon emissions (tCO_2e)	10,285	28	or	148,359	= 0 tCO_2e
Streetlighting					
Carbon emissions (tCO_2e)	886	2	or	12,780	= 0 tCO_2e
Fleet Mileage					
Carbon emissions (tCO_2e)	3,848	11	or	55,506	= 0 tCO_2e
Business Mileage					
Carbon emissions (tCO_2e)	544	2	or	7,847	= 0 tCO_2e
TOTAL					
Carbon emissions (tCO_2e)	**15,563**	**43**	or	**224,492**	= 0 tCO_2e
		21.50 MW		56.12 MW	

Comparators:

Equivalent number of 500 kW wind turbines (~362 tCO_2e/year | ~1,315 MWh/year)

Equivalent number of individual 250 W solar PV panels (~0.069325 tCO_2e/year | ~0.00025 MWh/year)

Renewable electricity generated by Council solar PV systems in 2018/19 = 498,000 kWh (saving 138 tCO_2e)

Notes: (1) The equivalent number of wind turbines and solar PV panels is based on a 2019 CO_2 factor calculation that will change year-on-year with changes in the UK emission-conversion factor for electricity. While this metric is used to help demonstrate the scale of the task, it is purely meant for illustrative purposes only as it is dependent on many external variables.

Appendix 3

Climate Emergency

The initial focus of this Action Plan for a route towards becoming a net zero-carbon local authority is not intended to limit or preclude other potential wider actions that contribute towards addressing the climate emergency.

Some of these actions are identified below (this is not an exhaustive list):

Housing

- PCC maintains around 5,650 dwellings for the provision of social housing. Following comprehensive energy-efficiency retrofit measures as part of the Council's progress under the Welsh Government's current Welsh Housing Quality Standard (WHQS), it has achieved a very good average Standard Assessment Procedure (SAP) rating of 75 (in the middle of the 'C' band). WHQS requires the SAP 2005 methodology that produced this rating to be updated to SAP 2012. This will impact on non-gas properties, probably dragging the average rating down to 72.
- Measures installed include:
  - Cavity-wall and loft insulation completed at most properties where applicable.
  - A gas-boiler replacement programme – ultra-efficient gas combi boilers installed at all gas-boiler properties *(**Note:** Boilers replaced every 15 years, so PCC is now replacing first-generation gas combis with new gas combis; therefore, there is little improvement in efficiency – typically, 88% v. 90% – and this does not change the SAP score for a property)*.
  - Oil boilers – PCC has changed 550 of 805 oil boilers for ultra-efficient condensing combi boilers. It is currently looking at trialling six hybrid oil boilers as part of the replacement programme – additional cost per unit is in the region of £7,500.
  - Windows programme – five-year programme of installing 'A' rated double glazing nearing completion.
  - Doors – programme nearly complete to replace all doors with high-performance composite doors.

  All of the above only applies where the tenant has accepted the works, and issues such as listed status and Conservation Areas have to be considered.

- There will be a new WHQS post-2020, which will probably place demands on PCC to further improve in stages towards zero-carbon housing stock. Therefore, the Council has not yet set its own target pending further guidance and targets from the Welsh Government in 2020. It is apparent that WG is finding it harder and more expensive than expected to achieve this new standard. For example, an air-source heat pump (ASHP) might improve energy efficiency over oil but actually costs more to run; however, the Council cannot pass that cost on to the tenant if trying to tackle fuel poverty.
- The Welsh School of Architecture has completed Stage 3 of its review 'Homes of Today for Tomorrow', including discussion of case studies of individual social-housing units. Their findings are summarised below:
  - For houses, fabric retrofit is expensive – particularly for old/poor-quality dwellings – but without it, decarbonisation could dramatically increase fuel bills.
  - Retaining mains-gas central heating constrains decarbonisation to around 70% (range: 60–71%).
  - Switching to heat from electricity dramatically increases decarbonisation levels, from 70%+ to 90%+.
  - Installing renewables has a moderate effect on decarbonisation. More critically, it reduces heating bills by over £500 per year. The predicted cost of decarbonising houses is consistently around £30,000 (range: £27,000–£33,000) per unit.
  - Fabric improvements for flats are typically less expensive, but also less effective, than those for houses – making it more difficult to decarbonise flats to target levels.
  - Flat retrofits are more complicated – party walls also limit effectiveness, and shared ownership is a recurring issue.
  - The size of smaller flats makes space-consuming measures such as internal wall insulation (IWI) problematic.
  - In some cases, SHLs (Social Housing Landlords) are reviewing whether demolition and new build is preferable.
  - Successful retrofitting of flats demands greater coordination than that for houses, and may require a more creative response – e.g. the introduction of district heating.
  - The predicted cost of decarbonising flats is consistently around £22,000 (range: £19,000–£25,000) per unit.
  - Achieving decarbonisation targets requires fabric retrofit, a transition to low-carbon heating and a significant renewable component.
  - Renewables (for example, PV) are essential if tenants are to see retrofit as desirable. Benefits for tenants are still typically less than those seen for homeowners.

- Successful decarbonisation is a more complex and challenging process than simply complying with the WHQS programme targets (2004–14), and requires more holistic understanding and actions.
- SAP ratings predict energy efficiency and fuel costs, but cannot be used as the sole basis on which to judge whether retrofit will meet decarbonisation targets. Decarbonisation requires transition to a low-carbon heat source.
- If the dwelling fabric is improved to an enhanced standard, the retrofitting of low-carbon heating systems can be cost-effective for tenants – and could take the place of boiler-replacement programmes.
- Renewables are effective in reducing fuel bills for tenants, and they reduce pressure on the energy-supply network.
- Unengaged tenants can significantly reduce the effectiveness of housing retrofit.
- Accurate modelling and holistic retrofit are critical to decarbonisation being perceived positively by tenants.
- Without in-house skills and expertise, it will be difficult for SHLs to develop and evolve decarbonisation strategies.
- The retrofit strategy should always be modelled as accurately as possible prior to commencing schemes in which renewables are already installed.

- The current 'direction of travel' is not to consider electric and fossil-fuel-based heating as mutually exclusive. So-called 'hybrid' heating systems (a combination of a gas boiler and heat pump) represent both an optimal heat-transition accelerator and an enduring sustainable-destination technology. Hybrids are the lowest carbon solution and do not 'lock-in' fossil fuels any more than heat pumps or boilers on their own do. Electricity supply locks-in fossil fuels for powering heat pumps; natural-gas supply locks-in fossil fuels for running boilers. Both are equally reliant on decarbonised gas to cut emissions in the power sector for flexible supply during periods of low renewables or to supply directly to the buildings sector. Hybrids give the greatest flexibility in escaping from fossil fuels used in space heating. They also represent the low-carbon domestic-heating technology that offers the greatest carbon savings – with an enduring role to deliver net zero by 2050, combined with the decarbonising gas grid that is transitioning completely away from fossil fuel. As both electricity and gas go 'green', they combine to deliver the best of both worlds as the third vector for decarbonised heating: they are able to immediately 'soak-up' low-carbon electricity when it is available, and to fall back on a greening gas grid at other times. Hybrid heating systems can meet the energy demand for all dwellings irrespective of the energy performance of a building. They make green gas go further, compounding the benefit of actions taken to 'green' the gas grid.
- The Council has an officer qualified to prepare domestic Energy Performance Certificates (EPCs) in-house. (EPCs provide an asset rating for a building, and are required every ten years.) This is largely to provide EPCs for council housing and to assist the property team with their landlord's obligations to meet the Minimum Energy Efficiency Standards for leased or sold buildings.
- The Pembrokeshire Energy Company Obligation (EcoFlex 3) grant scheme commenced in April 2019. It covers energy-inefficient homes that either spend more than 10% of their income on fuel or are vulnerable to the cold. The grant goes towards home energy-efficiency measures involving heating upgrades and insulation. So far, over 100 properties have received improvements through the scheme.
- The Arbed 3 programme is being evaluated for application in Pembrokeshire for the potential delivery of energy-infrastructure schemes (e.g. whole-estate energy efficiency) in areas of mixed private and public housing.
- PCC has recently committed to the provision of new affordable and energy-efficient homes, as follows:
  - Johnston – 33 affordable Council-owned new-build homes. The build tender was awarded in 2020. The design will go beyond Part L of the Building Regulations for energy efficiency with a requirement on the design & build contractor to achieve an EPC rating of 'A'. It is likely that this will be achieved via solar PV and over-insulation (i.e. putting in more insulation than Building Regulations demand, in order to enhance U-values), and the proposal also includes Tesla Powerwalls (power-storage batteries) in two of the properties. Infrastructure for electric-car charging is also being installed.
  - Milford Haven, Charles Street – 15 older-person affordable Council-owned flats in a three-storey development. The design will go beyond Part L of the Building Regulations for energy efficiency with a requirement to achieve an EPC rating of 'A'. It is likely that this will be achieved via solar PV and over-insulation. The design & build provider has been asked to consider heat-pump and hybrid heating systems. Battery storage is a consideration, depending on prevailing tech costs/efficiencies. Although there are limited parking spaces, two will be electric-car charging points.
  - Tiers Cross – demolition of ten non-standard 'Airey'-type (concrete-panel) houses, which are highly energy inefficient, to be replaced with 11 affordable Council-owned new-build homes. Heat and hot water to the properties will be wholly provided by electricity – thereby avoiding the use of oil, which served the previous units. The electricity will be provided via a mains supply and will be supplemented by PV and air-source heat pumps; it will provide heating and hot water with the use of hot-water cylinders and electric showers. Internal battery storage will also be incorporated in order to further reduce the demand on mains supply during the evenings/night. Electric-car charging points will be provided.

- Boncath, Tŷ Solar (Western Solar) – ten ultra-low-energy affordable 'towards zero carbon' homes to be built using the Innovative Housing Fund. Development has started, and the properties will be owned by a Registered Social Landlord (RSL).
- Tenby, land at Brynhir – around 140 homes; 100+ will be affordable Council-owned new-build dwellings. The remainder will be for sale on the open market and a number of self-build plots with planning will be offered, supported by the Development Bank of Wales. An outline planning application has been submitted to the National Park Planning Authority.
- Former school sites – development of affordable Council-owned homes. Numbers not yet available.

- The 'Homes as Power Stations' project aims to deliver smart, low-carbon, energy-efficient homes through a coordinated approach across the Swansea Bay City Region. The project will deliver a programme of new-build developments, the retrofitting of existing buildings and local supply-chain development support. It aims to help tackle fuel poverty, cut carbon emissions and meet the need for more housing. The project will monitor the health and well-being aspects of warmer homes and the impact of the 'homes as power stations' concept on fuel poverty.

Planning, Development, Land Use and Biodiversity

- The Pembrokeshire Local Development Plan (LDP) is used to determine all planning applications in the PCC planning area and to guide development. The current LDP is underpinned by the overriding principle of achieving sustainable development. It also has a key objective linked to reducing / tackling the causes and impacts of climate change. This is delivered in the Plan's strategy: a settlement hierarchy is used to ensure that development is directed to locations that have good levels of services. This aims to reduce the need for travel, and therefore to reduce carbon production. The principle of sustainable development is carried through all policies within the Plan, including promoting energy-efficient design and ensuring that new proposals such as community facilities are well related to existing settlements. Review of the Local Development Plan is under way, and climate change and the need to promote sustainable development will remain key elements within LDP 2.
- PCC has prepared a Biodiversity and Ecosystems Resilience Plan (awaiting formal sign-off) to detail how the Authority intends to fulfil its duties under Section 6 of the Environment Act to enhance biodiversity and the resilience of ecosystems. The plan sets out a number of corporate actions that, when undertaken, will also help with reducing PCC's impacts on climate change – including how it manages Council land.
- The Council has produced a Green Infrastructure Study for Pembrokeshire (which includes PCNPA and PCC Plan areas). This identifies opportunities to enhance green infrastructure across the main settlements in the County through a range of actions including tree planting. Some projects are already progressing elements of this study – e.g. the Haverfordwest Green and Blue Infrastructure project. LDP 2 will include a specific policy on Green Infrastructure, and PCC will be considering whether it can allocate specific land for this over the next few months (the Welsh Government requires the Council to consider this under national policy as a result of the Well-being of Future Generations Act).
- PCC hosts the Pembrokeshire Nature Partnership and Local Nature Partnership, and supports these initiatives both financially and through the allocation of officer time. The partnerships consider a whole range of projects, which support biodiversity/tackling habitat fragmentation and addressing climate change.
- The Council works with two marine groups who are engaged with the marine environment, and supports these historically through the Single Revenue Grant (SRG) and directly through officer time and limited financial contributions. They are the Milford Haven Waterway Environmental Surveillance Group and the Pembrokeshire Marine Special Area of Conservation Regulatory Authorities Group. The former primarily gathers evidence of the conditions of the waterway, and is critical in providing information on changes to the waterway over time. The latter group is focused on a range of projects and actions around the Marine Special Area of Conservation – including work with schools about reducing plastic/marine litter and a recent study using citizen science to monitor nitrate levels in the Marine SAC.
- PCC/PCNPA have been looking at light pollution in Pembrokeshire and potential actions to reduce this. The team has recently finalised mapping of light pollution in the County against recorded bat roosts/flight paths. This will be included in a forthcoming Biodiversity Supplementary Planning Guidance document, and will provide additional information when planning applications are considered. This should ensure that the authorities can design out unnecessary lighting on schemes where this is a planning matter. Separately, PCC has been working on a lighting standard for HRA (Housing Revenue Account) schemes in conjunction with the local Secured by Design advisor. This standard is based around the criteria that HRA schemes have to meet in order to minimise lighting and also to use lamps of a wattage designed to minimise carbon production and impact on bats.
- Evidence base – PCC has a range of evidence that it uses to inform decision-making with the intention of reducing the causes and impacts of climate change. This includes the Land Use Mapping tool, which shows habitats and species. The Council has also, via the LDP, developed further evidence on flood risk through the recently completed Strategic Flood Consequence Assessment, which is taking a precautionary approach and building in an allowance for climate change and for sea-level rise to the current WG flood maps. This precautionary approach will inform LDP allocations. The recent Renewable Energy Assessment (referred to in Section 3.3) also forms part of the LDP 2 evidence base.

- The Council is seeking to identify key habitats and species at risk from climate-change impacts, and to review its biodiversity plan in order to ensure that it is climate proof. It is recognised that resilience to pressure (such as climate change) is increased by improving the diversity, extent, condition, connectivity and adaptability of ecosystems: any work on any or all of these attributes increases resilience. The Council's Biodiversity Supplementary Planning Guidance (SPG) is currently being reviewed jointly with PCNPA.
- PCC is considering opportunities to increase pollinator areas in parks and open spaces via methods such as increasing the use of wildflowers in highway verges and roundabouts, and creating wildflower meadows. A wildflower-meadow harvest can occur just once a year in order to produce hay/compost, reducing land management and therefore reducing the use of petrol/diesel emissions. It also provides wildlife benefits and colour for people to enjoy.
- Reduced frequency of grass cutting in strategic areas should be considered in order to complement initiatives such as the Wales Biodiversity Partnership Action Plan for Pollinators and Buglife B-Lines Wales.
- The Council recognises that there is scope to explore opportunities for enhancing or creating nature reserves in the County, and to create nature-based tourist attractions – e.g. high-rope activities and camping.
- Examples of nature-enhancing projects undertaken by PCC and its partners:
    - The Council has worked with a number of community groups to establish community allotments on both PCC land and land donated by local owners. It aims to continue identifying land for local produce and supporting the use of allotments so that communities can grow their own food and reduce food miles and waste – e.g. community gardens, orchards, 'produce pockets' where space is limited. This increases community resilience and is also good for health, well-being and biodiversity.
    - PCC supports a Pembrokeshire Coastal Forum and Pembrokeshire Marine Special Area of Conservation pilot project to restore underwater seagrass meadows at Dale Bay in order to tackle climate change. Despite experts saying that it acts as a 'nursery for a wide variety of marine life', 92% of seagrass has been lost over the last 100 years. The World Wide Fund for Nature (WWF), Sky Ocean Rescue and Swansea University are partners in the Dale Bay scheme. Seagrass is key to reducing levels of carbon dioxide, a gas that contributes to global warming, as it absorbs carbon dioxide from the atmosphere up to 35 times faster than tropical rainforests can. It also accounts for 10% of annual ocean carbon storage globally, despite only taking up 0.2% of the seafloor.
    - In March 2020, a tree-planting event occurred at Wolfscastle that showcased best practice in working together across public bodies and the third sector to deliver real benefits for people and the environment. The event was volunteer led and aimed to plant 1,000 trees in a day, with the intention of repeating this each year to match the number of births in Pembrokeshire annually. This ties in with the Welsh Government Plant Scheme, but delivers planting to create a woodland in Pembrokeshire, for the people of the County, celebrating births in Pembrokeshire and taking the opportunity to engage new parents in issues of sustainability. It is a collaboration between PCC (which has made land available for the project), Hywel Dda Health Board (engaging new parents in sustainability and the benefits of access to natural areas), Tir Coed and PCNPA (both engaging volunteers in planting and maintaining the trees), the Woodland Trust (advising on and sourcing suitable mixes of local-provenance trees) and Pembrokeshire Lamb (preparing and maintaining the land). The project is funded through the Pembrokeshire Nature Partnership, which is supported by the Welsh Government's Enabling Natural Resources and Well-being (ENRaW) fund.
    - Cleddau Walk, Haverfordwest Green and Blue infrastructure – a key regeneration project that delivered a new route around Haverfordwest, improving access, leisure and recreation opportunities. The path highlights biodiversity and includes a European protected-species habitat.
    - Hayscastle Community Woodland – the community was supported and received funding through PCC to purchase a one-acre (roughly half-hectare) site upon which they established a community woodland.
    - Johnston Millennium Park Community Woodland – the community was supported and partly funded through PCC to manage an established community woodland and ponds.
    - Jubilee Park East Williamston – the community was supported and, in part, funded by PCC to purchase and enhance 22 acres (9 hectares) of land, delivering eight key habitats and planting in excess of 8,000 trees. Additionally, a team of over 40 local volunteers has been established to 'grow' Jubilee Park.
    - Orchard Mawr, Haverfordwest – PCC supported and, in part, funded a volunteer group in Haverfordwest to plant approximately 550 fruit and nut trees on PCC-accessible land. This included planting on the urban streetscape, and resulted in the establishment of three orchards.
    - PCC Woodlands, county-wide – enhanced 33 PCC native broadleaved woodlands through the Better Woodland Wales grant for biodiversity, thus creating public access to 15 woodlands and, through linkages with Norman Industries, managing PCC timber stocks through thinning, resulting in a supported income-generation scheme through biomass sales.
    - Saltings, Haverfordwest – the enhancement, in collaboration with Haverfordwest Town Council, of an old landfill site, transforming it into a public country park. It is now planted with Pembrokeshire wildflower seed and 300 broadleaf trees, with much-enhanced public access opportunities.

- Village Green/Common Land, county-wide – working with a wide range of community groups to access funding, which was used to adopt and manage PCC's Section 9 Common Land, incorporating the enhancement of many village greens through tree planting.
- Scolton Country Park – enhanced the wooded site through the Better Woodland Wales grant for biodiversity, creating public access and introducing 5 one-acre (roughly half-hectare) coppice compartments.
- Mount Woodland, Milford Haven – supported the community association to manage the 18-acre (7-hectare) woodland site and gain funding to provide community access and deliver learning outcomes for NEETs (young people Not in Employment, Education or Training).
- Tidy Towns, county-wide – delivered many community enhancements through this PCC scheme, including the establishment of community gardens and community tree planting.
- Withybush Woods, Haverfordwest – delivering a historical enhancement, which creates better public access and leisure/recreational opportunities together with biodiversity gain. The latter included de-silting the main pond with further management of European protected species, along with community tree and wildflower bulb planting.
- Milton Marsh, Milton – actively managing and working with the community to enhance this special community nature reserve, including tree planting.
- Railway Terrace, Neyland – supported the community to access funding for this site to establish a wildflower meadow while eradicating invasive plants.

Regeneration

- The Economic Recovery & Regeneration Strategy for Pembrokeshire, 2020 to 2030, was presented to PCC Cabinet on 14 September 2020. The strategy maps out what is intended in response to COVID-19 and post Brexit. It includes working with PCC's partners to deliver the next generation of clean, green engineering jobs focused around the Milford Haven Waterway; carbon-neutral building methods linked to carbon-offsetting projects; and using the opportunity created by COVID-19 and enhanced connectivity to benefit from agile working and reduced travel.
- Carbon reduction is at the heart of the £1.3 billion Swansea Bay City Deal, which is being delivered by the four Swansea Bay City Region local authorities, including Pembrokeshire, with the area's two regional health boards and two regional universities.
- Among the projects forming part of the City Deal programme of investment is a pan-region 'Homes as Power Stations' initiative. Under this project, it is proposed to retrofit 7,500 homes with state-of-the-art energy-efficiency technology and build 3,500 new, highly energy-efficient homes over a five-year period. As well as helping the region to cut its carbon emissions, Homes as Power Stations will also tackle fuel poverty and meet the need for more housing while benefitting/creating low-carbon supply-chain businesses throughout Pembrokeshire and South West Wales.
- Also due to be part-funded by the City Deal is the Pembroke Dock Marine project, which will considerably boost the region's 'blue economy' through major investment in the advancement of marine energy. Made up of elements including a Marine Energy Test Area and a Pembrokeshire Demonstration Zone for marine-energy developers to trial, de-risk and commercialise their devices, this project will also include infrastructure upgrades at Pembroke Dock Port and a Marine Energy Engineering Centre of Excellence to which industry and academia can co-locate. This will place South West Wales at the forefront of a growing global industry.
- Great potential exists in the Celtic Sea for the floating offshore-wind industry. The Council is working with a number of floating offshore-wind developers to establish a base and supply chain in the county for this important renewable-energy source. A recent Offshore Wind Industry Council and Offshore Renewable Energy Catapult study, Offshore Wind and Hydrogen, shows how this source could also help to establish a hydrogen and renewable-energy economy.
- Led by PCC, Milford Haven: Energy Kingdom (MH:EK) is a two-year £4.5 million project, completing in 2022, exploring what a decarbonised smart local-energy system could look like for Milford Haven, Pembroke and Pembroke Dock. The project partners are:
  - PCC;
  - The Port of Milford Haven;
  - Offshore Renewable Energy Catapult;
  - Riversimple; Wales & West Utilities;
  - Arup; and
  - Energy Systems Catapult.

  Project supporters and collaborators are RWE, Simply Blue Energy, Welsh Government Energy Service and Community Energy Pembrokeshire. The project will explore the potential of hydrogen as part of a multi-vector approach to decarbonisation. If successful, it has the potential to lead the way and become the first of many Smart

Local Energy Systems supporting the UK and its local communities in reaching the government's target of net zero greenhouse gas emissions by 2050.

- The Council is a non-funded collaborator on the South Wales Industrial Cluster (SWIC) Roadmap project, which will seek to identify the best options for cost-effective decarbonisation of industry in South Wales – including the industrial cluster on the Milford Haven Waterway. The project will look at the infrastructure required for the development of the hydrogen economy; for large scale carbon capture, utilisation and storage (CCUS) and transport; as well as on-site strategic opportunities specific to each industry.
- Bush Farm Biomass Boiler, Pembroke – Greenlinks Community Interest Company was supported to develop successful funding applications to refurbish farm buildings, which included the installation of a biomass boiler.
- PCC is exploring facilitating a move to a circular economy, whereby waste is avoided and the things that we use are kept in use as long as possible. The Council is considering providing a materials-reuse facility to coordinate the collection, storage and reuse (including transport) of excess materials from PCC projects and to support community organisations to establish workshops/resources to mend, repair, upcycle and extract materials from items destined for waste.

Coastal Protection, Flooding and Drainage

- All coast-protection and flood-alleviation schemes undertaken by the Council are designed to include climate-change allowances in accordance with Welsh Government guidelines.
- Surface-water drainage systems are also designed to cater for a 1-in-100-year rainfall event plus 30% allowance for climate change.
- Via the planning process, PCC oversees Schedule 3 under the Flood & Water Management Act 2010, which came into effect in Wales on 7 January 2019 and requires new developments to include Sustainable Drainage Systems (SuDS) features. This may require on-site provision of rills, leats, ponds, etc. for new developments.
- Flood-risk areas are identified in the emerging LDP 2. This local plan identifies areas where coastal change may occur and provides a policy on this: GN 36. The LDP 2 evidence base includes a Strategic Flood Consequences Assessment for Carmarthenshire and Pembrokeshire. The primary source for flood-risk mapping remains the Natural Resources Wales (NRW) website.

Transportation and Highways

- In recent years, PCC has constructed over 11 km of footways and 76 km of shared-use paths (walking and cycling) as part of active-travel development in the ten main settlements around the County.
- As part of the Council's statutory duties under the Active Travel Act 2014, it has developed an 'Integrated Network Map' (INM) for Pembrokeshire that sets out its long-term aspirations for active-travel route development for the next 15 years. Around 170 routes are identified on the INM for improvement.
- In this financial year, PCC has succeeded in obtaining over £1 million in WG transport-grant funding to enhance active-travel provision in Pembroke Dock and Narberth.
- Web information promoting 20 cycle routes across the County has been developed, with additional routes and promotional information to be added this year.
- Pembrokeshire has a good track record of obtaining WG Safe Routes in Communities funding. It has secured over £300,000 in this financial year for developing safe walking and cycling routes in the vicinity of Lamphey, and over £7 million in grants since the inception of the scheme.
- Over 1,809,000 passenger journeys to schools and college are provided every academic year by PCC.
- Over 1,800 pupils receive Safe School Transport training every academic year to encourage and promote the use of school buses.
- The Council supports 22 local bus services, which provide over 970,000 passenger journeys annually.
- There are 13 'Dial-a-Ride' services operating in Pembrokeshire, which provide over 26,000 passenger journeys a year.
- 'My Train Wales' is a project developed by PCC and funded by Great Western Railway, which promotes rail travel and track safety to primary- and secondary-school pupils. Each year, over 7,500 pupils across the region benefit from this promotional initiative.

Waste and Environmental Services

- In March 2018, the Cabinet agreed that the Authority would move to a much-improved recycling service. The changes came into effect in autumn 2019. Householders can now recycle a greater range of plastic as well as paper, cardboard, glass, cans and food. Recycling collections take place every week, and households will be provided with free boxes and bags in which to collect the items.

- Cabinet also approved a move to three-weekly bin-bag collections, on the basis that householders will need to place fewer items in refuse bags thanks to the increased recycling opportunities.
- Cabinet also approved a fortnightly collection service for bulky, absorbent hygiene products, including discreet collections where requested.
- The Waste and Recycling Team, PCC Eco Champions project and the Waste and Recycling Campaign Team produced 'The Wonder of You' public video to explain and promote the new waste and recycling service.
- A feasibility study is being carried out to locate a central bulking transfer facility in Pembrokeshire, where lorries will unload items before they are dispatched for recycling. This could present an opportunity for social-enterprise development along with local employment.
- The Council's waste plans are driven by relevant legislation, which sets targets for Wales. The Welsh Government has published Towards Zero Waste, the new Waste Strategy for Wales, which forms part of a suite of documents setting out how Wales will comply with legislation. Towards Zero Waste is the overarching waste strategy for Wales, and identifies high-level principles, policies and targets.
- The Pembrokeshire Eco Champion Project is funded by the Welsh Government Leader Programme via the Arwain Sir Benfro local action group and match-funded by PCC. It aims to celebrate and support the work of active and aspiring eco champions in all parts of Pembrokeshire, and to seek out the people who are considered or willing to be champions in their local area to share good practice; disseminate useful, inspiring information; and encourage others to 'do their bit' by living more responsibly, reducing waste and ensuring that Pembrokeshire remains a clean and 'green' place in which to live. A primary initial focus for the project was to encourage residents to embrace the rollout of the Council's enhanced recycling and waste separation in 2019.

Procurement

- PCC is represented in regional procurement networks, and engages and consults with various groups such as WRAP Cymru and the Welsh Local Government Association. It does so to ensure that climate-change considerations are incorporated within strategic procurement documentation and associated best-practice guidance in order that all specifications, tender documents and award criteria address climate-emergency commitments.
- The Council has engaged with WRAP Cymru and requested a spending review to address better use of resources in its own current procurement portfolio. The project focuses on how the standard of reuse (RU) and recycled-content (RC) materials (plastic, textiles paper and card) can improve in future procurement exercises. The project considers how future changes are assessed, tested and tasked with continued improvement, and how to influence consistent application across the different departments and supply chains involved. The principles applied during the review follow those of a circular economy and the waste hierarchy. Approaches aim to reduce (buy less), reuse (no single-use items), recycle (collect and sell), recover and repurpose into newly designed goods. It is recognised that when considering how to buy appropriately for the economic, environmental and social well-being goals of Wales' Well-being of Future Generations Act, it is critical that new thought paths are applied, upfront, at the procurement-design phase and product-design stages. This approach will require timely tracking of re-procurement timelines and robust contract-management processes.
- PCC carries out a Sustainable Risk Assessment (SRA) on all tenders over the value of £25,000, which incorporates environmental, social and economic issues.
- The Council sits on the Welsh Government National Procurement Service (NPS) Energy Sub Group, shaping the NPS energy-procurement strategy.
- PCC and the majority of Welsh local authorities already source 100% of their electricity needs from certified renewable generation sources (50% of that renewable power was sourced from within Wales in 2018/19).
- The NPS authorities are part of the seventh-largest purchase (after the 'Big 6') of electricity and gas in UK markets, taking advantage of the Crown Commercial Service's professional energy-trading desks.
- The NPS is actively seeking low-carbon gas sources – e.g. bio methane from Anaerobic Digestion (AD) – and monitoring the hydrogen-gas agenda.
- PCC sits on a local-government advisory group working with Dŵr Cymru Welsh Water to improve DCWW's service to the public sector.
- The Energy / Procurement and Finance teams all provide advice to Council energy-bill payers, and offer a dispute-resolution service.

Education

The Council runs the successful Sustainable Schools Award Scheme (SSAS). The scheme was set up in 2003 to help schools embed Education for Sustainable Development and Global Citizenship (ESDGC), in both teaching and learning and the sustainable management of Pembrokeshire's schools. PCC is seeking to ensure that the SSAS

aligns with the objective in WG's 'Prosperity for All: A Low Carbon Wales' for 'working with partners to include more about sustainability and decarbonisation in the new curriculum'.

Finance

- PCC is part of the £2.4 billion Dyfed Pension Fund.
- The fund is a long-term investor, responsible for looking after the interests of beneficiaries over many decades into the future, and has long been concerned about climate- and carbon-related risks to the underlying investment portfolios of member funds. It takes the approach of engaging actively and productively with companies in the sector through its participation in the Local Authority Pension Fund Forum (LAPFF). LAPFF considers that companies should report on their approach to carbon management in the context of how they are factoring climate change into their business strategy. When engaging, the forum encourages companies to align their business models with a 2°C scenario in order to push for an orderly transition to a low-carbon economy. LAPFF is a member of the Ceres Investor Network on Climate Risk and Sustainability, participates in the Climate Action 100+ initiative and is in partnership with the Climate Majority Project.
- Also, via the fund's investment managers, LAPFF votes on resolutions at global AGMs, seeking transparency and disclosure of climate risks and setting emission-reduction targets. In this manner, the fund's view is directly communicated to individual boards.
- The Dyfed Pension Fund has an increasing level of investment in renewable and low-carbon energy production via pooled funds. It is also interested in investment opportunities afforded by a low-carbon future that increase asset diversification and provide long-term returns. The fund will continue to make such investments where the risk/return profile fits its investment strategy. It also has investments in the BlackRock UK Strategic Alternative Income Fund, some of the core strategies of which are in the renewable-energy sector and a number of different sectors that have a direct impact on local communities – including healthcare and social housing. During 2019/20, the Pension Committee will also be considering investment in other low-carbon tracker funds.
- The fund has a comprehensive Investment Strategy Statement, which is currently being reviewed.
- PCC welcomes the recent open letter from the Future Generations Commissioner for Wales, and engagement with others regarding divestment.

Information and Communications Technology (ICT)

- The Council continues to introduce ICT good practice to actively help reduce carbon emissions, including:
  - reducing energy consumption at its data centres and across its network through the virtualisation and rationalisation of hardware and the adoption of energy-efficient servers and ICT infrastructure;
  - facilitating a reduction in staff travel through the implementation of agile working practices across the Authority, including the use of laptops and online video-conference meetings and calls (Skype for Business, MS Teams, etc.);
  - reducing printing across the Authority by facilitating the adoption of paperless working through better use of technology; and
  - applying centrally administered, powered management systems to ensure that all devices such as laptops and PCs are powered-down overnight and when not in use during the day.

Civil Contingencies and Emergency Planning

- PCC's civil-contingency and emergency-planning role aims to help mitigate the effects of climate change by writing and testing contingency plans for the various risks involved. These risks include:
  - more extreme weather events causing severe fluvial flooding, such as Storm Callum in 2018;
  - rising sea levels causing an increase in coastal flooding; and
  - hotter, dryer summers causing water shortages, an increase in 'wild fires' and effects on the health of the population (especially the elderly).
- The 'UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Wales' summarises the Wales-specific evidence included in the 'UK Climate Change Risk Assessment Evidence Report'.
- The Council is a member of the Dyfed-Powys Local Resilience Forum (LRF), whose members include the emergency services, health bodies, other local authorities, government agencies and utility companies. Dyfed-Powys LRF members work together to ensure that arrangements are in place to help mitigate the effects of any emergencies, including those caused by climate change. The role of PCC during emergencies includes providing support for the emergency services, support and care for the local and wider community and coordination of the

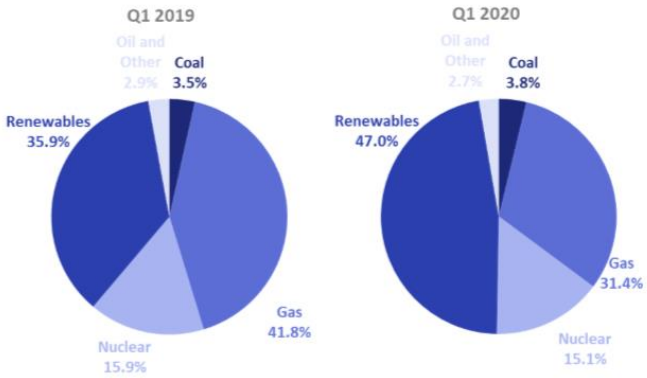
response by organisations other than the emergency services. As time goes on, and the emphasis switches to recovery, the Council takes a leading role in rehabilitating the community and restoring the environment. The LRF produces the Dyfed Powys Community Risk Register, which can be viewed in the 'downloads' section of the LRF website.

The Future Role of Renewable Energy, Hydrogen and Major Infrastructure Changes

While recommending actions that PCC can take to decarbonise, it has to be recognised that economics, politics and policy, and popular action sometimes cause major future dynamic changes to 'business as usual'. Furthermore, they do so at a local, national and global level, which can lead to organisational and regional decarbonisation 'by default'.

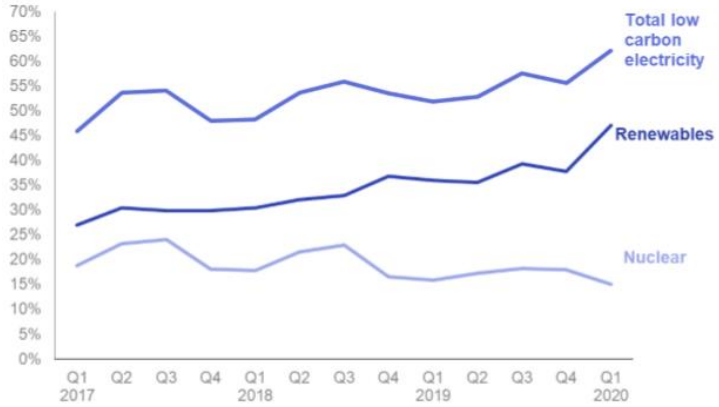
An example of this is the once-unthinkable upsurge in renewable-electricity generation capacity in Wales, the UK and globally from virtually nil ten years ago to a point at which, in January to March 2020, renewable-electricity generation reached record levels – up 30% compared with Quarter 1 2019, to 40.8 terawatt hours (TWh). This was a 47.0% share of electricity generation, the highest quarterly value in the UK Government's published data series. This quarter also saw the lowest share of generation coming from fossil fuels, at 35.4%. This is the first time that the fossil-fuel share has dropped below 40% of total generation, continuing the ongoing trend away from such sources. Total fossil-fuel generation in Quarter 1 2020 was 30.8 TWh, which was the lowest value for any Quarter 1 and the second-lowest quarterly value in the published data series.

Chart 1. Shares of electricity generation



This record electricity generation from renewable sources also led to an increase in the share of generation from low-carbon sources, up to a record high of 62.1%. This was despite nuclear generation falling 5.8% compared with Quarter 1 2019 to 13.1 TWh.

Chart 2. Low-carbon electricity's share of generation



While electricity has decarbonised rapidly, and continues to do so, industrial processes, heating and transport have proven harder issues to tackle. As part of the commitment for the UK to reach net zero-carbon status by 2050, the UK Government is actively pursuing a greater rollout of renewable energy. It is also investigating the role of hydrogen, which has the potential to provide 'whole energy system' decarbonisation because it can act as a zero-emissions solution as gas directly for industrial processes, heating, hot water and cooking; as a fuel source for electricity generation; as a battery-storage medium, which can aid grid balancing; and as a transport fuel.

The recent APPG on Hydrogen Report makes the statement that *'we believe that hydrogen is the solution to decarbonisation in industry, power, heat and transport. It has the potential to create and sustain hundreds of thousands of high-quality jobs across the country, and aid in the Government's plans to "level-up"'* and that *'Hydrogen will play a key role in shaping our future economy and our ability to meet our net-zero targets, the only question that remains, is when.'*

Hydrogen and renewable electricity have excellent synergies, in that renewable electricity can drive electrolysis to produce hydrogen. The Offshore Wind and Hydrogen 'Solving the Integration Challenge' Report examines the potential for hydrogen to play a key role in providing the flexibility, and short- and long-term energy balancing required for integrating high percentages of offshore wind into the UK energy system and achieving Britain's net-zero climate-change targets. The report highlights the fact that the UK has the right level of offshore wind-capacity potential – and a strong industrial base, combined with world-leading academic research – to develop a sustainable, low-cost, 'green' hydrogen industry – one that produces green hydrogen without CO_2 emissions from electrolysis of water. Pembrokeshire is incredibly well placed to be at the forefront of this renewable-energy and hydrogen sector, with huge potential for floating offshore wind generation in the Celtic Sea, a strong industrial base and world-leading existing energy infrastructure around the Haven Waterway.

The Energy Networks Association and Navigant have produced a report, Pathways to Net-Zero: Decarbonising the Gas Networks in Great Britain, which concludes that a balanced combination of low-carbon gases and electricity is the optimal way to decarbonise the UK energy system and reach net zero emissions by 2050.

On 25 June 2020, the Committee on Climate Change (CCC) produced a report to Parliament that assesses progress in reducing UK emissions over the past year. This year, the report includes new advice to the UK Government on securing a green and resilient recovery following the COVID-19 pandemic. It highlights five clear investment priorities for the months ahead:

(1) Low-carbon retrofits and buildings that are fit for the future.
(2) Tree planting, peatland restoration and green infrastructure.
(3) Energy networks must be strengthened.
(4) Infrastructure to make it easy for people to walk, cycle, and work remotely.
(5) Moving towards a circular economy.

The report also finds opportunities to support the transition and the recovery by investing in the UK's workforce, and in lower-carbon behaviours and innovation. Key areas include:

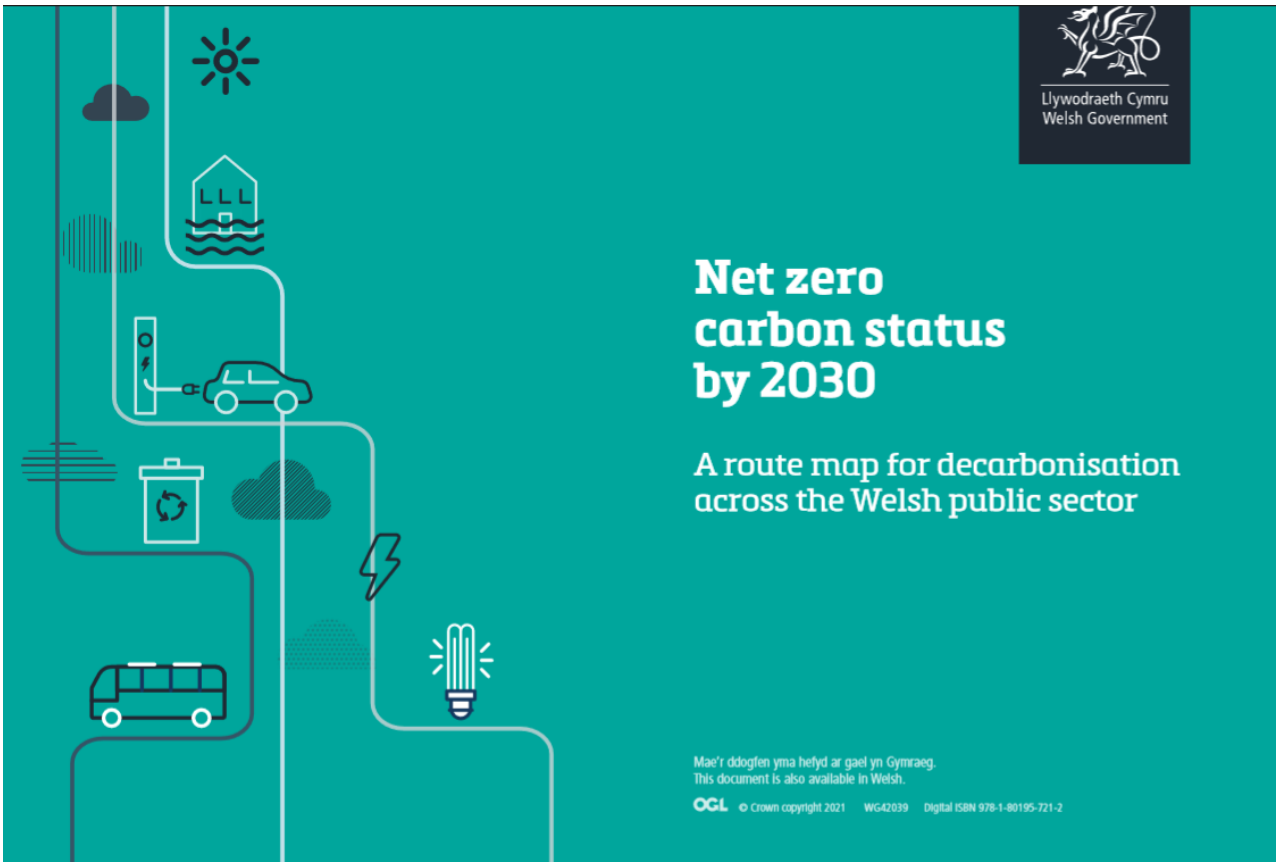
- reskilling and retraining programmes;
- leading a move towards positive behaviours; and
- targeted science and innovation funding.

APPENDIX 4

Welsh Government Public-sector Outline Decarbonisation Route Map

[Route-map-for-decarbonisation-across-the-welsh-public-sector.pdf]

The Welsh Government has produced an outline decarbonisation route map for the public sector. It is subject to final alteration, but the extracts below outline the direction that the WG is taking. The outline route map aligns very well with this proposed Action Plan, showing that while we might not know exactly which actions we need to take right now we can begin to 'move up a gear', be 'well on our way' and then be ready for 'achieving our goals 2026 to 2030'. This Action Plan is intended to take PCC on to the beginning of this journey.



A Thematic approach

Behaviours		Standards		Innovation	
Society	**Individual**	**System governance**	**Use of resources**	**Models of service delivery**	**Technology**
A compassionate society living in a high quality environment with reduced inequalities.	Values are redefined to encompass well-being linked to an acceptance of finite resources.	Well-being goals drive policy which supports individuals, society and organisations to behave in a sustainable, fair and health conscious way.	We live with the resources that the environment can support, instead of the 2.5 planets that we are currently using.	Models of zero carbon service delivery where citizens have control over their well-being.	Technology is an enabler of positive societal and environmental change.

The Routemap: a strategic framework for change

	Behaviours		Standards		Innovation	
	Society	**Individual**	**System governance**	**Use of resources**	**Models of service delivery**	**Technology**
Achieving our goal 2026–2030	**We embed** value over cost. By doing so, society understands, accepts and expects that sustainability and climate action is integral to public services.	**Staff and citizens demand** zero tolerance of unsustainable behaviour as it is socially unacceptable.	**Self regulate** and feedback processes across the public sector. Sustainability is part of life.	**Value** all resources including people's time and the natural environment. Account and profile all resources for a no waste approach.	**Tailor** citizen-centred, low carbon services. The public sector, society and the individual work together to reduce inequalities & improve well-being.	**Require and expect** low carbon technologies to be incorporated in all public sector services and products.
Well on our way 2022–2026	**We integrate** action on climate change into our public facing engagement. We show how we appreciate the value of low carbon products, services and places.	**Staff and citizens expect** to be able to make choices based on sustainability and well-being criteria when considering services and products.	**Account** for climate change future impacts in all decision making processes. Life cycle costing is the norm in the public sector.	**Model** business decisions so entire resource impact is accounted for. All resources need to include full life cycle carbon costings.	**Collaborate** with cross sector partners to prevent disadvantage, promote well-being and develop sustainable joint service plans.	**Enable and support** technology to allow the empowerment, equality and well-being of individuals.
Moving up a gear 2021–2022	**We engage** with the climate change debate. The public sector explains its case for taking sustainability seriously and considers how it can impact on the wider society.	**Staff and citizens understand** what you can do. You know you should act. You know you can make a difference.	**Agree** on responsibilities, mechanisms and measures including legislation, regulation and public reporting of progress.	**Research** how to use all types of resources better to enhance health and minimise waste. Identify, prioritise and address gaps in knowledge.	**Explore** sustainable models. Increase investment to prevent disadvantage and improve well-being. Optimise benefit from nature.	**Adopt and invest** in sustainable technologies. Reduce the risk of investment in new technology. Welcome innovation.

The journey to net zero: Buildings

Achieving our goal 2026–2030

All new public sector buildings are built to net zero standard, including supply chain impacts.

All public buildings are supplied with low carbon heat by 2030 and generate their own electricity where feasible.

The focus is no longer on buildings but healthy environments to live, work and visit.

Well on our way 2022–2026

Firm proposals & business cases are in place for hard to decarbonise building types (e.g. complex hospitals) & shared spaces.

Transition to all new schools, colleges and offices built to net zero (and associated reduction in supply chain impacts). All remaining existing buildings will be highly energy efficient OR scheduled for replacement & renewable heat schemes will be rolled out.

Moving up a gear 2021–2022

The climate impacts of our built estates are well understood.

Our construction programmes include mandatory net zero objectives.

Develop plan for hard to decarbonise building types (e.g. complex hospitals) and campuses (e.g. universities)

Scoping for Low Carbon Heat pilot projects and significant progress on remaining energy efficiency opportunities.

The journey to net zero: Mobility and transport

Achieving our goal 2026–2030

Citizen-centred models of service delivery reduces the need for travel by staff, visitors and service users.

Commuting and business travel takes place using Wales' integrated public transport system is ultra-low emission, including our rail services. This is assisted by our aim to reduce the carbon footprint of buses, taxis and private hire vehicles to zero by 2028.

Where practicably possible, all new heavy goods vehicles in the public fleet are ultra low emission by 2030.

Well on our way 2022–2026

Continued flexible working, use of local hubs and shared facilities, active travel and greater use of public transport significantly reduces car commutes and business travel in our working lives post-Covid pandemic.

All new cars and light goods vehicles in the public sector fleet are ultra low emission by 2025.

Moving up a gear 2021–2022

We will continue to work flexibly and make greater use of active travel.

We will understand the nature and use of our fleet, future patterns of usage, and a feasible technological pathway for an ultra-low emission transformation.

We will accelerate the roll-out of EV charging infrastructure and our staff will be offered the opportunity to test ultra-low emission vehicles.

We commit to fleet transformation plans and there is a considerable upscaling of ULEV uptake.

The journey to net zero: Procurement

Achieving our goal 2026–2030

The public sector has nurtured a productive, near zero carbon Welsh supply chain.

Suppliers are incentivised through proportionate evaluation criteria to proactively seek further opportunities to reduce climate impacts.

Staff are empowered to challenge the status quo – requesting zero carbon alternatives is routine and use of alternative business models is fully supported.

Well on our way 2022–2026

By applying the tools developed in the Getting Started phase, and the principles of a Circular Economy, we are rapidly reducing the carbon impact of our goods and services in line with our interim targets.

Targeted support and skills development within the supply chain to increase the proportion of Welsh suppliers who can deliver the required goods and services and are, therefore, eligible for contracts.

All purchasing activities have a robust carbon reduction phase built in at the earliest stage and throughout.

Moving up a gear 2021–2022

We gain a good understanding of our estimated £6bn / 3 million tonnes CO2e per annum procured goods and services, and its emissions profile and supplier base.

Development of guidance, tools and training that will be targeted at procurement professionals to support the reduction of carbon throughout the procurement lifecycle.

Suppliers are sent a strong signal regarding future low carbon requirements and staff are trained.

The journey to net zero: Land use

Achieving our goal 2026–2030

Carbon sequestered in our land assets more than offsets any remaining emissions and, where possible, will go further to maximise sequestration potential.

Initiatives to ensure communities are connected to green space have matured, and it is routine to integrate beneficial use of natural resources into our public services.

Well on our way 2022–2026

Use of natural habitats for carbon sequestration and citizen well-being is integrated into planning public spaces and service delivery.

Acquisition of additional land to connect existing habitats, create woodland and manage natural regeneration and roll-out of woodland creation and habitat restoration projects at scale.

All purchasing activities have a robust carbon reduction phase built in at the earliest stage and throughout.

Moving up a gear 2021–2022

We develop a common understand of the current status and sequestration potential of land under public ownership and set out an agreed level of expectation and ambition.

We will connect people with nature by delivering pilot projects on public land around woodland creation and habitat restoration.

Carbon sequestration is seen by Ministers and Public Sector leaders as a valid core purpose for use of public land.

Supporting the journey to net zero: Governance and energy planning

Achieving our goal 2026–2030

The public sector are now delivering a range of projects across heat, power and transport to decarbonise regions. These projects are delivered both independently and in partnership, but all are working to a single vision and plan for the energy system of the region.

Well on our way 2022–2026

We deliver the first phase of local area energy plans, which indicate priority energy interventions to meet our power, heat and transport needs and how they can contribute to making places people want to live and work.

Renewable deployment is now part of a wider energy and decarbonisation strategy.

The public sector is delivering its first tranche of emissions reduction based on the emissions baseline.

Moving up a gear 2021–2022

Our energy activities are aligned to the priorities of the regional energy strategies, managed by cross sector governance arrangements. We develop local area energy plans which identify the changes needed to the local energy system, to decarbonise heat and local transport and realise opportunities for local renewable energy production.

Accelerate renewable deployment on public land with priority to where the development can deliver wider benefit, such as local ownership and reduced bills for Welsh business or communities.

The public sector baselines emissions and creates a plan for eliminating.

APPENDIX 5

Glossary of Terms

Units of measurement

A carbon footprint is measured in **tonnes of carbon dioxide equivalent** (**tCO_2e**). The carbon dioxide equivalent (CO_2e) allows the different greenhouse gases to be compared on a like-for-like basis relative to one unit of CO_2. CO_2e is calculated by multiplying the emissions of each of the six greenhouse gases by its 100-year global-warming potential.

A carbon footprint considers all six of the Kyoto Protocol greenhouse gases: Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF_6).

Source - https://www.carbontrust.com/resources/guides/carbon-footprinting-and-reporting/carbon-footprinting/

A **kilowatt** (kW) is simply 1,000 watts, which is a measure of power. So, for example, a 10,000 watt electric shower could also be called a 10 kilowatt shower.

A **megawatt** (MW) is simply 1,000 kilowatts, which is a measure of power. A **gigawatt** (GW) is 1,000 megawatts, and a **terawatt** (TW) is 1,000 gigawatts

A **kilowatt hour** (kWh) is a measure of energy – specifically, a measure of how much energy is being used. It doesn't mean the number of kilowatts used per hour. It is simply a unit of measurement that equals the amount of energy you would use to keep a 1,000 watt appliance running for an hour – for example:

- One 100 watt light bulb would take ten hours to rack up 1 kWh of energy.
- One 2,000 watt appliance would use 1 kWh in just half an hour.
- One 50 watt item could stay on for 20 hours before it used 1 kWh.

Source - https://www.ovoenergy.com/guides/energy-guides/what-is-a-kwh-kw-and-kwh-explained.html

A **megawatt hour** (MWh) is 1000 kWh.

Explanations

Terminology related to climate change can be difficult to understand – especially for those with infrequent contact with the topic. Below are explanations for some commonly used terms:

Carbon Accounting – carbon accounting covers a wide range of varying practices, and means different things to different groups of people. However, it can generally be split into two categories:

- physical carbon accounting, which quantifies physical amounts of greenhouse gas emissions to the atmosphere; and
- financial carbon accounting, which assigns carbon a financial market value.

Physical carbon accounting can be used to help companies and countries work out how much carbon they are emitting into the atmosphere; the result is known as a 'greenhouse gas inventory'. Once it has been established how much carbon is being emitted, reduction targets can be set. This method is also important for helping to assign responsibility to different parties for their associated carbon emissions.

Carbon accounting provides the tools to not only quantify and measure carbon emissions but also to help make informed decisions about mitigation strategies, through asking question such as:

- How much carbon is being emitted?

- Who is responsible for these emissions?
- Which methods should we employ to achieve the greatest carbon reductions?
- Are there strategies or policies that appear 'green' but which actually increase our carbon emissions?

Carbon accounting can help to answer all these questions, but it can be a complex process.

Source – https://www.ed.ac.uk/sustainability/what-we-do/climate-change/case-studies/climate-research/carbon-accounting

Net Zero Carbon – it is clear from the science that the amount of CO_2 in the atmosphere resulting from human activity largely determines the extent of global warming. This means that to prevent catastrophic climate change, CO_2 emissions need to be reduced to zero. The science led to governments worldwide deciding, in the Paris Agreement, to achieve a balance between emissions and the removal of greenhouses gases. 'Net zero' refers to achieving an overall balance between emissions produced and emissions taken out of the atmosphere. If we imagine a bathtub with the taps turned on, the approach to achieving such a balance can either involve turning down the taps or draining an equal amount of water down the plughole. The former approach equates to reducing carbon emissions; the latter equates to removing emissions from the atmosphere, including storage for the emissions such as 'carbon sinks' – i.e. anything that absorbs more carbon than it releases as carbon dioxide. (European forests are currently a net carbon sink, as they take in more carbon than they emit.)

Source - http://www.lse.ac.uk/GranthamInstitute/news/what-is-net-zero/

Carbon Neutral – carbon neutrality means achieving annual zero net anthropogenic (human-caused or -influenced) CO_2 emissions by a certain date. By definition, carbon neutrality requires every tonne of anthropogenic CO_2 emitted to be compensated for by an equivalent amount of CO_2 removed (e.g. via carbon offsetting).

Source – https://www.wri.org/blog/2015/12/cop21-glossary-terms-guiding-long-term-emissions-reduction-goal

- The Council has committed to becoming a 'Net Zero Carbon' local authority while the Welsh Government has an ambition for a 'Carbon Neutral' Welsh public sector. Within the confines of this document, both these terms are inter-changeable.

Carbon Offsetting – put simply, offsetting refers to securing carbon credits equivalent to your carbon impact. This means compensating for every tonne of CO_2 emitted by ensuring there is one tonne less in the atmosphere. Because one unit of CO_2 has the same climate impact wherever it is emitted, the benefit is the same wherever it is reduced or avoided. Achieving verified carbon reductions could include protecting rainforests in Sierra Leone or, potentially, local tree planting here in Pembrokeshire.

Source - https://climatecare.org/carbon-offsetting/

Hyperlinks, where the text appears underlined, are provided throughout this document. They direct the reader to further web-based information.

APPENDIX 6

List of Abbreviations

ASHP	Air-Source Heat Pump
BEV	Battery Electric Vehicle
CCUS	Carbon Capture, Utilisation and Storage
CNG	Compressed Natural Gas
EPC	Energy Performance Certificate
EV	Electric Vehicle
FiT	Feed-in-Tariff
HEV	Hybrid Electric Vehicle
HFCEV	Hydrogen Fuel Cell Electric Vehicle
HRA	Housing Revenue Account
IWI	Internal Wall Insulation
LED	Light-Emitting Diode
LPG	Liquid Petroleum Gas
PHEV	Plug-in Hybrid Electric Vehicle
PSB	Public Services Board
SAC	Special Area of Conservation
SHL	Social Housing Landlord
SRG	Single Revenue Grant
ULEV	Ultra-Low-Emission Vehicle
WGES	Welsh Government Energy Service