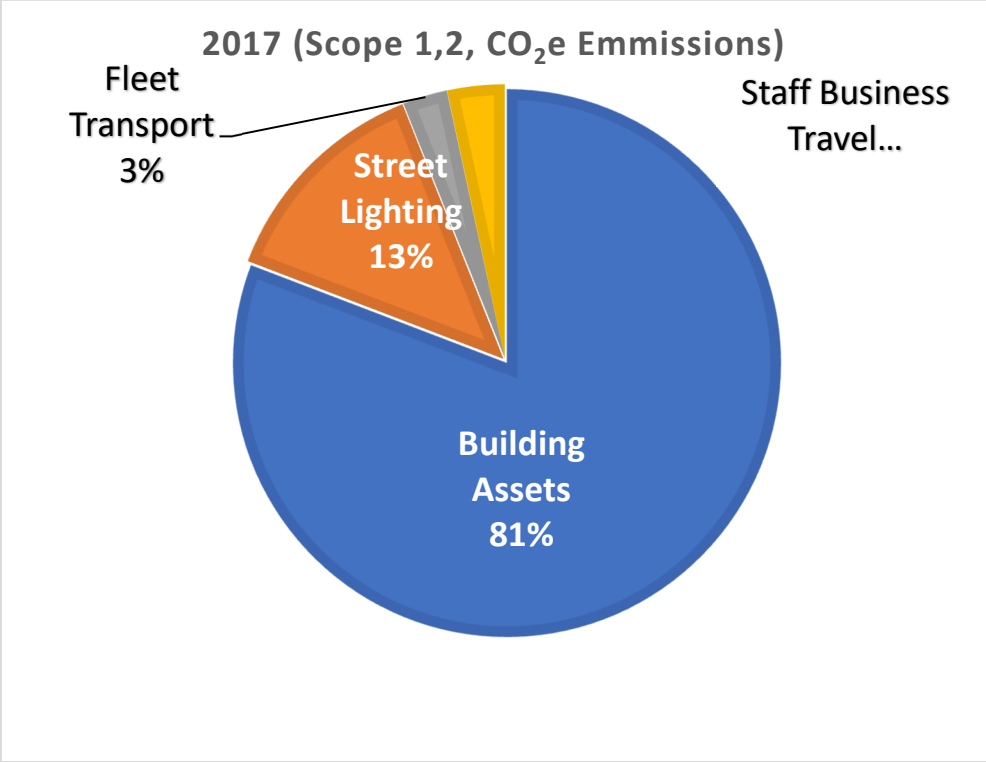
Shropshire Council

Towards Zero Carbon

Low Carbon Projects

Shropshire Council Carbon Footprint (Scope 1,2)

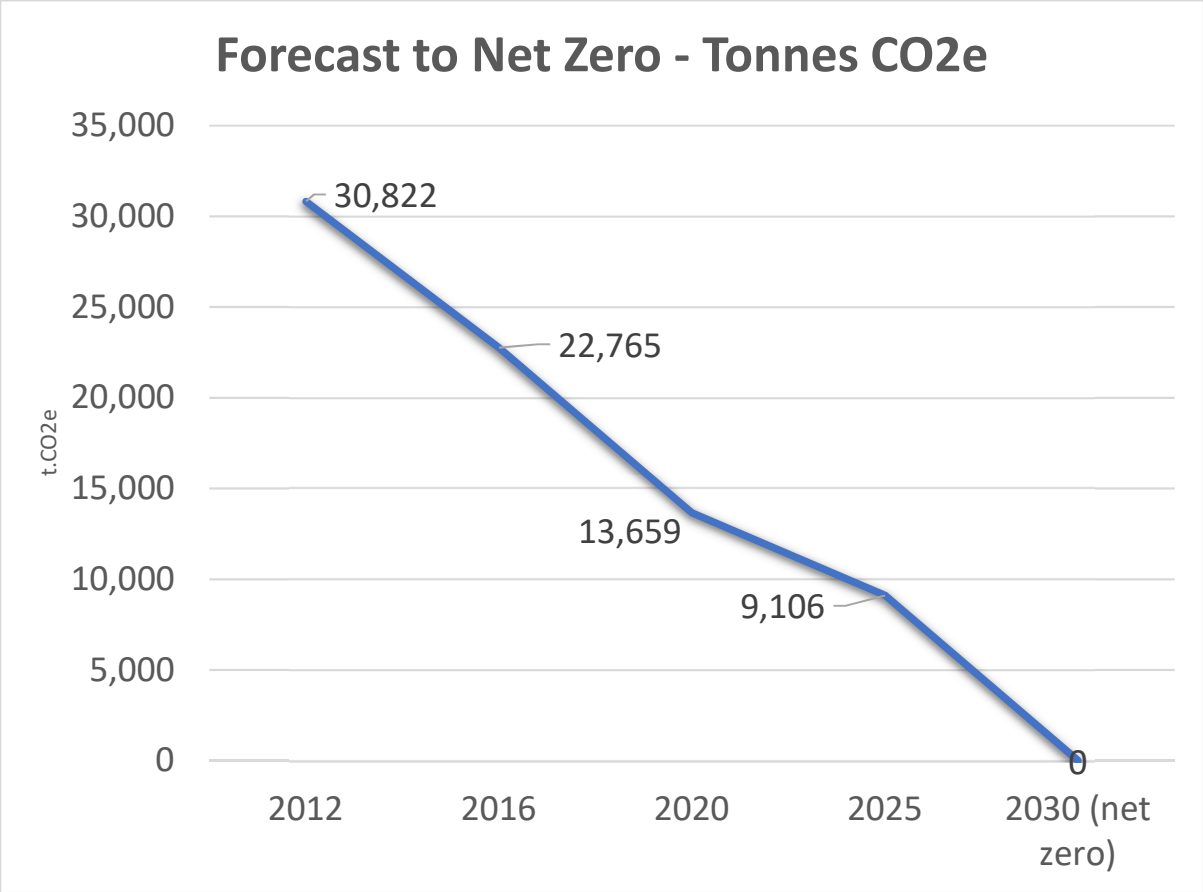
The current picture of Shropshire council carbon footprint indicates mainly scope 1(direct) and 2 (indirect) emissions only and we are starting to assess scope 3 (3rd supply chain) to obtain a more complete picture of our organisational carbon footprint. This is except for staff travel which is scope 3.



Year	Total (tCO2e)	Building Assets (Scope1,2)	Street Lighting (Scope2)	Fleet Transport (Scope1)	Business Travel (scope 3)
2008 Baseline	57,575	38,991	6,000	11,889	695
2012/13	30,822	23,909	4,952	1066	895
2016/17	22,765	18,396	3,000	597	771
2020	13,659	11,038	1,800	358	463
2025	9,106	7,358	1,200	239	308
2030 (net-zero)	0	0	0	0	0

Achieving Net Zero

- The best available data suggests that Shropshire Council's own carbon emissions were 23,000 tonnes in 2017, or 1.3% of the Shropshire total;
- We have indirect influence over a significantly greater level of emissions; **1.75m tonnes net CO2 county level.**
- Our emissions have reduced by 26% from 2012. (scope 1,2)
- Part of this improvement attributed to the transfer of assets such as schools and council housing; which are classed Scope 3



Carbon Saving and Achievements So Far…

Energy and Water Monitoring

Shropshire Council began its Carbon Management Programme in 2010 and has been implementing energy saving measures since the early 2000s. Reporting obligations were done in conjunction with the CRC (Carbon Reduction Commitments) Energy Efficiency Scheme and Carbon Trust recommendations. These drivers established a protocol for actively monitoring energy, water and the measuring resulting carbon emissions. This works well and is done consistently using Energy monitoring software.

Tables 1, 2, below show total consumption across corporate buildings. Appendix B details the assumptions used. Financial years at four-year interval: 2012 and 2016.

Table 1 2012/13 Building Consumption and Running Costs (all sites)

FY2012/13	**(kWh)**	**Cost (£)**	**kgCO_2e**
Electric	31,651,907	£3,933,999.87	15,710,741
Gas	35,359,098	£1,466,508.87	6,491,930
Oil	6,056,476	£424,526.23	1,619,502
Biomass	40,980	£4,332.57	520
Water	211,567 (m^3)	£719,742.38	72,800
TOTAL	**73 GWh**	**£6.55m**	**23,909**

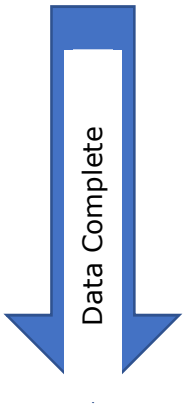
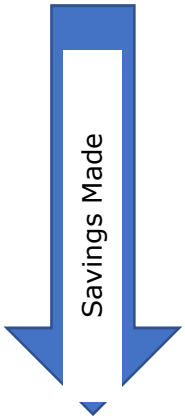


Table 2 2016/17 Building Consumption and Running Costs (all sites)

FY2016/17	**(kWh)**	**Cost (£)**	**kgCO_2e**
Electric	31,071,785	£3,958,133.61	11,944,926
Gas	30,567,833	£911,268.07	5,629,494
Oil	2,864,149	£130,292.60	767,282
Biomass	78,567	£4,475.89	998
Water	153,823 (m^3)	£586,774.89	52,915
TOTAL	**65 GWh**	**£5.59m**	**18,396**



Corporate Landlord Building Savings (Energy monitoring)

Energy Monitoring and DEC Reports

Display Energy Certificate (DEC) data, indicate that 70% of Shropshire Council building energy use is associated with sites with A to D ratings and 30% in buildings performing worse than typical (E to G). Dramatic improvements in energy performance are possible through a combination of operational improvements and up to date building retrofit methods.

Comparing the 16/17 and 12/13 datasets, implied savings are due to a vigilant, rigorous energy and water monitoring programme (Table 3).

Table 3 Savings by Fuel and Revenue Type over a 4-year period

Savings 2012-2017	**kWh**	**£**	
Electric	580,122	-£24,134 *	
Gas	4,791,265	£555,240.80	
Oil	3,192,327	£294,233.63	
Water	57,744 (m^3)	£132,967.49	
Total	**8,621,458**	**£958,308**	

*Energy saving made but cost went up due to tariff/commodity increases (£/kWh).

Total Energy	GWh	Cost (£)	$kgCO_2e$
FY2012/13	73	£6.55m	23,909
FY2016/17	65	£5.59m	18,396
Savings over 5 years	**~9GWh**	**~£1m**	**5,513 t.CO_2e**

SEPuBu (Sustainable Energy for Public Buildings)

Introduction

SEPuBu is a European Regional Development Fund (ERDF) project which provides grant funding to public buildings to install eligible energy efficiency measures. The project funds, advises, fits and showcases the installation of low-carbon technologies in circa 27 public buildings across the Marches participatory local authorities. The focus is on whole building retrofit using near to market measures. Match funding is provided by the public-sector applicants, with grants from ERDF.

The programme is managed by Herefordshire Council across the Marches. As a delivery partner, Shropshire Council signed a SEPuBu partnership agreement in July 2017. The agreement detailed a commitment to provide capital match funding at a maximum of 40% for each project that will meet the agreed programme objectives and outputs between March 2017 and February 2020.

https://www.herefordshire.gov.uk/info/200139/community/393/community_funding_advice_and_business_grants/10

Technologies

The technology interventions should include a minimum but not limited to:

- Energy control systems.
- Lighting including movement and/or light sensors.
- Variable speed drives & compressors.
- Systems offering better use of heat.
- Renewable energy technologies.
- Energy storage.
- Solid wall insulation.
- Triple or Quadruple glazing.
- Voltage optimisation & power factor correction.

Method

Annual savings are prioritised based on building energy cost performance (£/m2):

Building Priority / Performance	**Building Energy Cost (£/m^2)**
High Priority / Very Poor Performance	£30 -> £65 /m2
Medium Priority / Medium Performance	£10 -> £30 /m2
Low Priority / Good Energy Performance	£5 -> £10 / m2

Assumptions

Electric rate of 13.33p/kWh, carbon factor of 0.307 kgCO_2e / kWh for UK grid sourced electricity and 0.204 kgCO_2e / kWh for grid sourced gas (DBEIS, 2018).

For individual project details please consult the Senior Commissioning Officer.

Estimated Savings

The efficiency savings are based on a combination of three of the following measures:

1. **Electrical Efficiency Measures (3 of following):**
   LED's & sensors, Solar photovoltaics, voltage optimization, Variable Speed Drives.
2. **Thermal Efficiency Measures (3 of following):**
   Solid wall Insulation, Secondary Glazing, BMS (improved boiler controls)

	Savings (£)	Saving (kWh)	Saving (kg CO2e)
High Priority Builds	£74,577	767,413	203,469
Medium Priority	£28,791	306,309	80,077
Low Priority	£8,832	104,782	26,208

Phase 1 Project Works (to complete end Feb 2020)

6 buildings have been targeted with interventions in Phase 1 by the end of February 2020. During Phase 1 interventions addressed were typically LED lighting, solar PV and one heating intervention at Severn Valley Country Park: Air to Air Source Heat Pump.

Corporate Landlord Building	Energy (£/m2)	Electric (£ p.a.)	Intervention	Anticipated Saving (£ p.a.)	Saving (t.CO2e p.a.)
Shrewsbury Market Hall	~£80/m2	£14,194	LED lighting & Solar PV	£5,894	16
Greenacres Rural Farm	~£40/m2	£6,595	Solar PV	£6,206	16
Theatre Severn Shrewsbury	£21.38	£109,667	LED lighting & controls	£10,581	28
Severn Valley Country Park	£21.28	£4,291	LED lighting & controls, ASHP	£2,133	6
Shropshire Archives	£8.38	£9,986	LED lighting & controls	£2,091	6
Bridgnorth Library	£12.86	£7,588	LED lighting & controls	£1,442	4
		£152,321		**£28,347**	**76**

Total Projected Annual Savings

This top-level benchmark calculation depends on the scope of works commissioned:

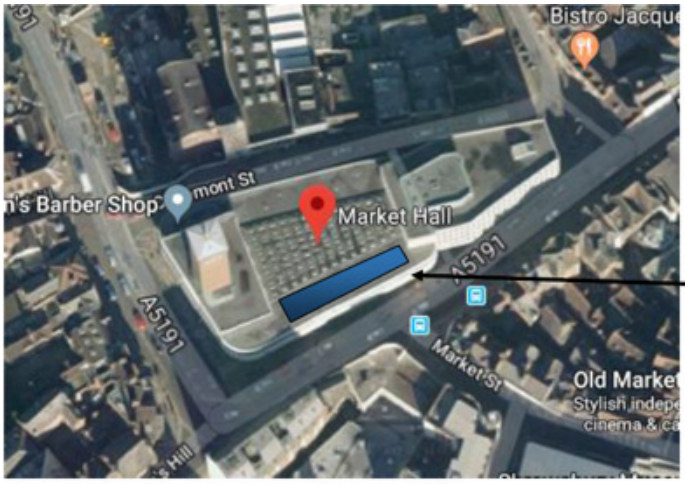
Anticipated Total Annual Savings (Phase 1 and 2):

	Saving (£)	Carbon Savings
All Buildings	**£105,652 p.a.**	**261t CO_2e p.a.**

Payback Period = Total Investment / Annual Savings = < 5 years (all projects)

Shrewsbury Market Hall

The Market Hall is public space retail; 22kW solar array to help offset the summer ventilation system requirements. The additional efficiency measure of LED lighting replacements will reduce their load in conjunction with the onsite generation.



www.googleearth.com accessed January 2018

Key facts

Location: Claremont Street, Shrewsbury

Grant recipient: Shropshire Council

Purpose: 1970's built Market Hall including public realm facilities- free access to general public during opening hours

Solar PV: Solar panel electricity systems, also known as photovoltaics (PV), convert the sun's energy to generate electricity

LED Lighting: Light emitting diodes, also known as LED technologies, offer better working conditions through optimised luminaries, flexible lighting control and improved use of daylight.

Energy efficiency measures: LED and Solar PV

22.14 kWp roof mounted system; ballast fixing system

82 JA Solar Holdings Co. Ltd, 270W solar poly-crystalline panels

Various luminaries and control systems fitted throughout the market. 159 lights replaced with LED equivalents

Predicted energy generation (PV): 15,783 kWh

Decrease of annual primary energy consumption (Lighting): 28,535 kWh

Anticipated cost saving = £5,894

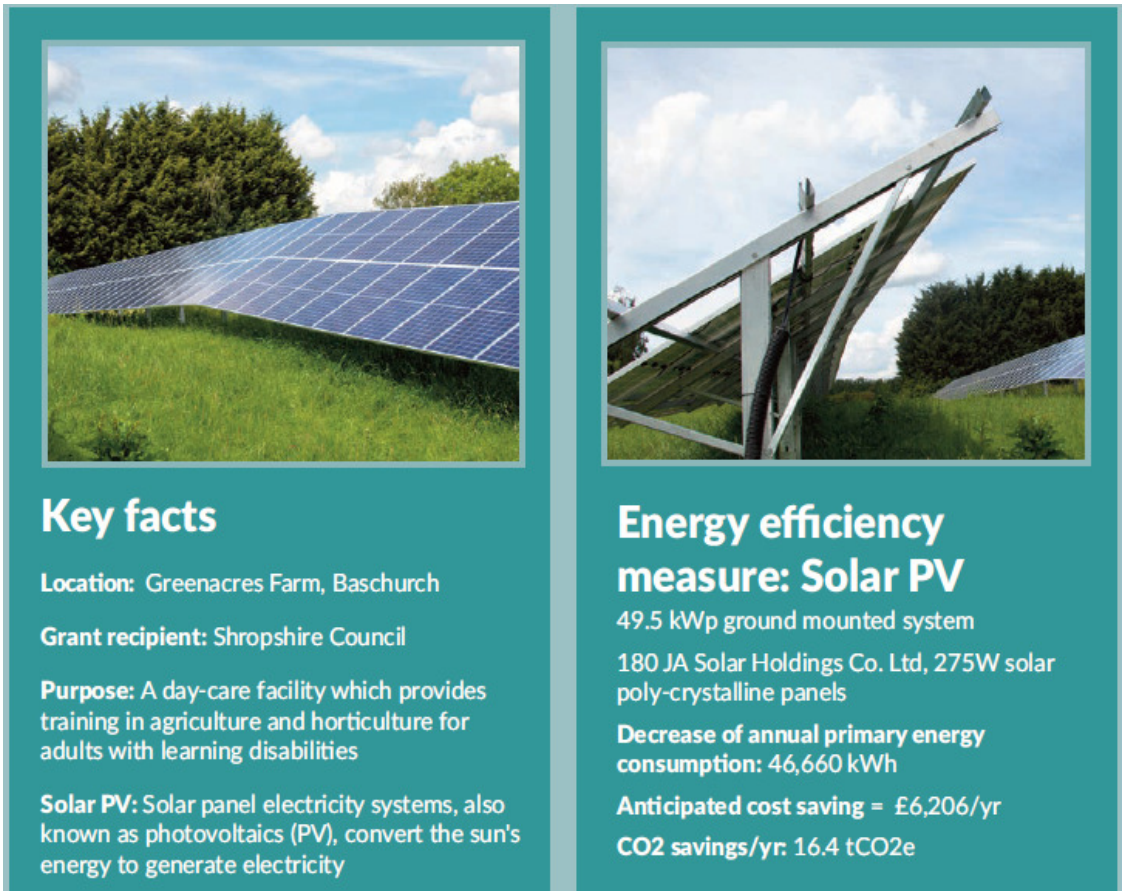
CO2 savings/yr: 15.6 tCO2e

Greenacres Rural Unit

At Greenacres farm, the 50kW solar array has been installed to offset the energy requirement and assist with future irrigation through the summer months.

In the future using additional sustainability interventions such as stored rain water harvesting to save additional costs instead of mains water: Using excess generation from the PV to store in hot water storage for on-site consumption or battery storage would be viable and beneficial to this site to reduce energy costs.

These are all important consideration in a changing climate and good publicity for Shropshire Council to since the service area is social care for vulnerable adults.



LED Street Lighting Programme - Highways

Shropshire Council is planning to convert almost 16,000 streetlights to LED lighting over the next three years – saving the council more than £1.2m a year in reduced energy and maintenance costs once the conversion is complete and saving almost 3,000 tonnes of CO2 every year. Since 2013, the council has converted over 3300 street lights from conventional 'sodium discharge' lighting to LED lighting. Subject to securing the Salix funding and Cabinet approval, work would be carried out to convert the remaining 15,783 lights. Initial analysis suggests the work could deliver annual savings of 5,675,552kWh, an energy cost reduction of £805,000 per year, plus a reduction in CO2 emissions of 2,911 tonnes a year. Savings in operational and maintenance costs would provide a further £366,000 of additional savings per year.

Other Technologies and Traffic Control

The work would also see the lights fitted with central management system (CMS) controls which enable dimming, part-night lighting and fault identification, leading to further savings and greater functionality.

The provision of CMS, together with LED technology, will allow the extension of dimming options between certain hours to also incorporate variable dimming levels which would be commensurate with the volumes of both vehicular and pedestrian traffic, to a far higher degree than currently possible.

Salix Finance Ltd provides interest-free Government funding to the public sector to improve their energy efficiency, reduce carbon emissions and lower energy bills.

Table 4 Summary Table of Street Light Savings Since 2012

Period	Technology	Capital (SALIX)	Energy Saving (kWh p.a.)	Saving (£ p.a.)	GHG Saving ($t.CO_2e$ p.a.)
2019-2021	16,000 LED + Dimming, CMS	£8.5m	5,675,552	£1.2m	2,911t

Renewable Energy (County Performance)

- Shropshire corporate sites moved entirely to 'Pure Green' electricity from 1st September 2019; this will greatly reduce our buildings carbon footprint.
- Energy In 2019, Government data shows that Shropshire was ranked **5th** nationally for installed renewable energy capacity;
- Shropshire is home to the largest amount of installed capacity of anaerobic digestion (AD), ~16 MW or over 5% of the total UK installed capacity.

Solar Photovoltaics (PV) – Shropshire Council Properties Only

Solar generation is a good news story for Shropshire Council. Growing year on year since 2012, there are now 41 solar arrays installed across 28 sites. With a peak capacity of 1MW aggregated across all sites, **5 GWh** of energy has been generated since the first installation. The total carbon dioxide emissions avoided since installation is nearly 3,000 tonnes. The carbon dioxide (CO_2) is saved by not using electricity from power stations, which burn fossil fuels.

Solar Photo Voltaic (PV) is a proven and reliable method to generate electricity whilst producing zero emissions and zero noise. The annual predictability of solar ensures generation can be forecasted. Reduced manufacturing costs have lowered the cost of energy. With increased energy costs, and climate change agenda, on-site generation will be a future norm where building or land capacity allows.

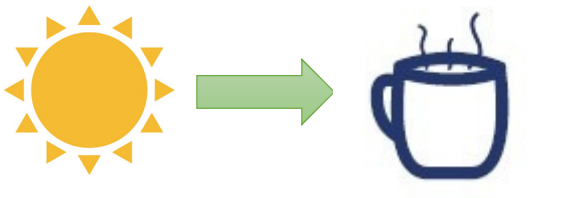
5 million kWh Generated (5GWh)

Over 3,000 tonnes CO_2e saved (over 5 years)

The total generated is enough to boil water for 250 million cups of tea…!

From sunshine into tea!

Power 1,500 homes a year!



Since 2012 the financial benefits to the Council have been **£1.36m.** Based on savings on the average electricity tariff (p/kWh) and the feed-in-tariff.

Table 5 Solar Energy and Financial Benefits

	Energy (MWh)	Savings	FiT Income	Total
2012	**460**	**£44,197.02**	**£82,942.84**	£127,140
2013	603	£61,257.08	£115,751.46	£177,009
2014	616	£65,572.81	£120,639.35	£186,212
2015	626	£64,659.90	£121,532.41	£186,192
2016	841	£86,906.18	£138,752.74	£225,659
2017	755	£89,348.56	£128,964.65	£218,313
2018	804	£100,507.83	£140,819.38	£241,327
TOTAL	**4,705**	**£512,449**	**£849,403**	**£1,361,852**

Sustainable Transport and Active Travel

SCPC

Shropshire Council Pool Cycles (SCPC) have been restored and relaunched. Colleagues have sacrificed lunchtimes to help repair them. They allow staff to take daytime trips into town, to meetings or simply for a nice lunchtime ride. There are ten Giant cycles based at Shirehall (5 gents and 5 ladies) and a further 10 at the Highways Depot Longden Road. The keys for locks are held at the North Entrance and lockers on the way out (close to the roller doors) contain spare tubes, pumps and helmets for staff to use.

Figure 1 Shropshire Council Pool Cycles

There are 20 pool cycles altogether (10 Shirehall and 10 Transport Depot). There are around 5 regular users so far. Uptake is expected to improve with publicity. There has been interest for SCPC at office sites for these throughout Shrewsbury and the potential for a future trial and conversion to electric cycles (aka e-bikes or Pedelec's). Conversion kits are available to do this.

E-Bikes

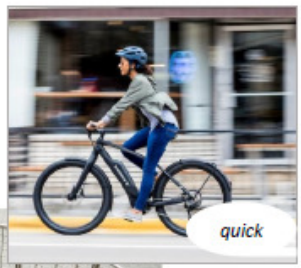
We held a successful event as below and as result achieved a positive good news story on the BBC Midlands Today and Shropshire Radio. With staff trying out the e-bikes on a test circuit, and several follow up enquiries for e-bikes. Our own HR Cycle to Work Scheme. and Sustran's (Sustainable Transport National Cycle Network also attended). Following this success, we will host an e-bike stall at the ***Tech Severn*** Event this year, together with other low carbon technologies.

Could this be your best 10 minute break of the year?

Test ride an e-bike at Shirehall !

- up to 20 **e-bikes**, hybrid, folding and regular bikes **for you to try**
- five stalls, three gazebos and a riding zone
- Cycle2Work tax free scheme information
- free health check on your existing bike.

Don't miss this opportunity...
Wednesday 22 May, 12 till 2pm
forecourt of Shirehall.



For more information contact sam.kirby-bray@shropshire.gov.uk or sustainabletransportshropshire@hotmail.com

Resource Managment

Veolia has provided favourable carbon emission data based on Shropshire Council's Municipal waste contract (Table 6).

Municipal Waste

The carbon footprint for domestic municipal waste has improved by removing waste from landfill and enhanced recycling processes, kerbside collections and the generation of energy from waste (Veolia UK, 2018a) 2009 to 2016:

	Climate change (GWP100a) (kg CO2 eq.)
Collection	529,247
Transportation	3,953,682
Intermediate facilities	955,410
Recycling	-26,151,295
Treatment & recovery	-4,128,199
Landfill	922,208
Total	-23,918,947

Table 6 Emissions Savings: Municipal Waste Shropshire

23,919 tonnes CO_2e

*

Landfill Emission Assumptions

* Green House Gas (GHG) emissions defined CO_2e (UK DBEIS - Department of Energy and Industrial Strategy) regional data sets (UK Government, 2017) and targets. Landfill waste GHG emissions = 588.9 kg CO_2e per tonne. (UK Government GHG Conversion Factors for Company Reporting, 2017).

Energy Recovery Facility (ERF) Battlefield, Shrewsbury

Figure 2 Veolia Energy Recovery Facility: Shrewsbury.

Table 7 Veolia Achievements (2018)

Measurable	Annual Benefits
Electricity produced	10,000 homes a year!
Household waste	reduce to 5%instead of landfilling 65% of household waste 2005/6
Waste processed	Shropshire produced 162,000 tonnes of municipal waste in 2017-18; 67,000 tonnes or 41% was processed through energy recovery. (https://www.shropshire.gov.uk/media/7231/amr-2017-18.pdf). In 2018/19 we processed 166,734 tonnes of municipal waste, of which 68,389t was sent through the ERF (about 41%) and 3,299t landfilled (less than 2%).
Avoided GHG	The Greenhouse gas diversion report for 2018/19 shows a saving of 22,240 carbon equivalent tonnes for Shropshire. 96,000 tonnes *CO_2e p.a. (including other local authority contracts).*

Commercial Waste Contract and Dry Mixed Recycling (DMR)

The commercial waste contract shows opportunity for improvement, this will be achieved in conjunction with Veolia targeting office staff and selected corporate landlord buildings with an awareness raising campaign.

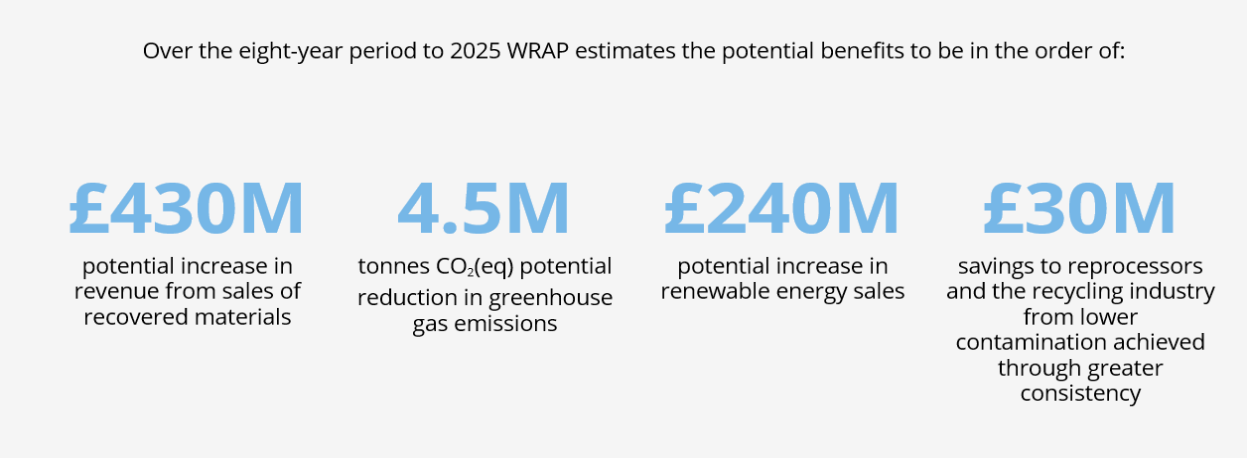


Figure 3 UK Waste Resource Action Plan (WRAP, 2018)

Shirehall Waste and DMR (Dry Mixed Recycling)

Table 8 shows Facilities Management (FM) Shirehall commodity costs. DMR is currently just over 40% with scope for improvement. Kitchen waste has increased significantly (an additional £1k p.a.). Paper towels (both supply and disposal cost since non-recyclable). Efficient hand dryers may be a cost-effective alternative.

Table 8 Shirehall Commodity/Service Costs (Facilities Management, 2017)

Year	General	DMR	Confidential Paper	Kitchen waste	Paper Towels	Toilet Paper	Soap
2016	£5,421.96	£3,119.18	£1,320.00	£276.50	£14,779.80	£5,722.34	£216.00
2017	£6,507.84	£4,295.04	£1,440.00	£1,357.12	£14,527.26	£8,527.69	£396.00

Table 9 The DMR Business Case (Veolia per bin pick-up)

Bin Type	Veolia Code	Capacity	Pick-up (£)
DMR	150106 Recyclate - Mixed	EURO 1100 LTR	**£7.14**
General	200301 Non-Hazardous Industrial	EURO 1100 LTR	**£11.35**
General		EURO 660 LTR	**£8.26**

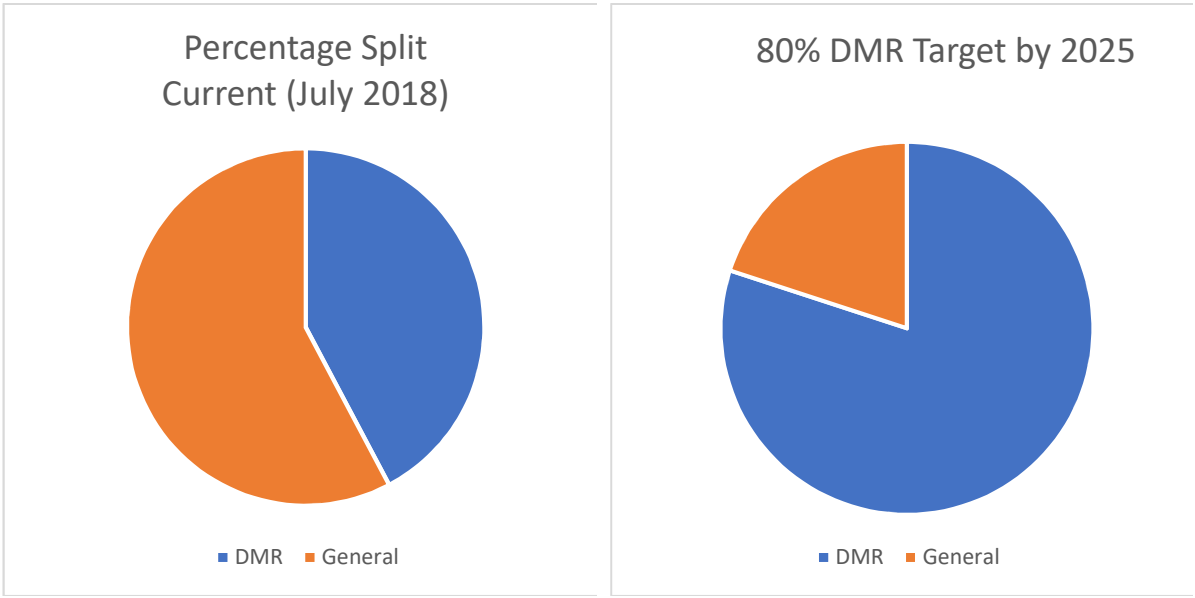


Figure 4 Current DMR Performance and Target (Shirehall, 2018, 2025)

Table 10 Shirehall DMR 2025 Target

	2018 mix	Current Cost	2025 mix	Target Cost
DMR	42%	£3,995	80%	£7,950
General	58%	£8,156	20%	£2,972
Total		**£12,150**		**£10,923**

Shirehall produced 21.50 tonnes of dry mixed recycling in the last year and 29,094kWh electricity was generated at the Veolia ERF last year from the 43.489 tonnes of general waste processed, enough to power 9 homes for a whole year. A Target to increase from 50% - 80% by 2025 (Table 10), will help reduce cost, environmental impact and improve our circular economy. Achieving the target of 80% DMR by 2025 will generate savings of **£1,228 p.a.**

Recycling (DMR) and Re-use (Warp-it) Improvement Strategy

Shropshire Council is relaunching its Dry Mixed Recycling (DMR) services as it looks to increase recycling across the organisation and make savings. The Waste and Resources Action Programme (WRAP) forecast that £30million could be saved by 2025 across the UK. This suggests that Shropshire Council could save **£8,596** at Shirehall alone by 2025 by increasing DMR to 80% based on current potential savings calculations. Pilot Corporate Landlord buildings with high public function and visibility.

For this to be achieved, an effective awareness and engagement campaign is necessary with staff that will educate and make it much easier to recycle. For savings to be achieved, we need the buy in of all staff across all services.

Aims

- Improve waste streams, reduce cost to council and promote sustainability.
- Reduce general waste towards zero and increase recycling streams.
- To increase DMR performance rate across office sites from 40% to 80%.
- To remove all under desk general bins to encourage use of recycling bins.
- To encourage re-use of office equipment and furniture.

Objectives

- Raise staff awareness of the DMR and Re-use campaign events.
- Make it clearer to staff how to recycle in the workplace.
- To communicate to staff the removal of office bins to minimise backlash.
- Re-establish a Green Champions scheme to facilitate the above.

Key Messages

- As a Council, we are working to increase DMR recycling to 80% by 2020, but we need your (the staff) support to **make it happen**.
- Set a target (to be agreed) for zero single use plastics) by 2030.
- Demonstrate measurable financial and environmental savings

Audience

- All staff: area managers, directors and officers– voluntary attendance.
- Front line staff: Facilities Management, cleaners, Shire services team.

Internal Channels

- TV's in public areas of Shirehall.
- Computer / laptop lock screens, Staff Newsletter, Intranet, Email.
- Bins themselves (stickers), Staff Noticeboards, Yammer.

Warp-it

What's it all about?

- Warp-it (Waste Action Reuse Portal) is a marketplace to encourage peer to peer trades - stops staff buying items the organisation already has.
- The system knows who wants surplus assets, reducing the need for storage.

https://www.warp-it.co.uk/

Reuse Office Equipment

An online reuse platform makes it easy to get, give and loan surplus stationery, furniture and other equipment within organisation, and external parties.

· Procurement tool: stops staff buying items that are already surplus.

· Waste reduction tool; new owners for items that may have been skipped.

Key Benefits

- Better management of assets coming out of buildings.
- Find homes for assets prior to building clearance (See here).
- Reduce waste cost finding homes for scrapped assets.
- Catalogue furniture office assets – use of stickers.
- Create wish lists, requirements for stationery, furniture.
- Reduce procurement costs across the budgets.
- Link up with other public organisations e.g. NHS Trusts. (See here).
- Connect, support schools and '3rd sector'.
- Incremental improvements to automate a repurposing process.

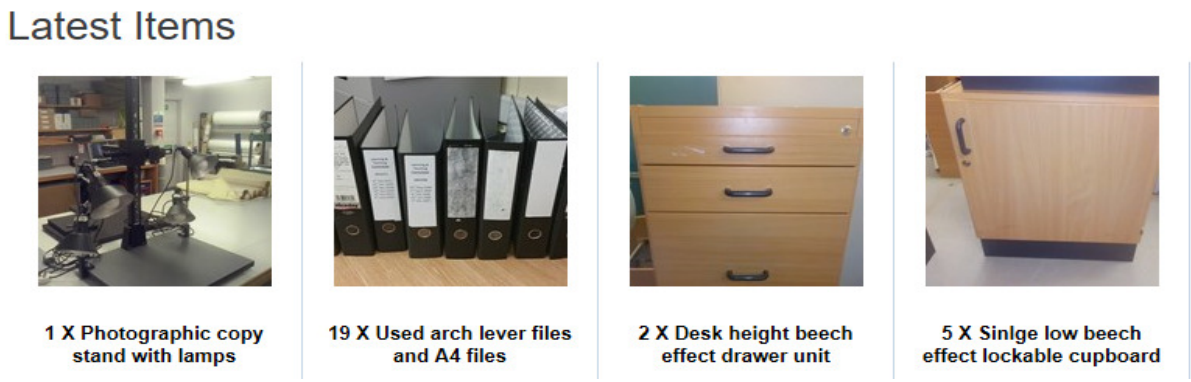


Figure 5 Shropshire Council Items Listed

Warp-it has exceeded our expectations (Table 11): a target of £25k in the first year. **We are now aiming for £100k transactions in the first 5 years** (based on the methodology of savings from procurement and disposal costs).

Table 11 Key Performance Metrics for Shropshire Council (first 12 months)

So far, we have 210 members on the system and they've managed to save:

- £36,120 (in procurement and disposal costs)
- 7,224 kg in waste avoided
- 16,028 kg CO2 in greenhouse gas emissions avoided
- 21 trees equivalent

The next step is to move to a more ambitious goal and save **£50k by 2021!**

This is a great performance and our next step is to sign up our first external partner; including SaTH (Shrewsbury and Telford Hospital Trust who originally pitched the idea to myself), The Ministry of Justice and schools/academies in the Local Authority Area. These schools will then be able to carry our peer "trades" as a distribution network across the whole West Midlands Area.

UK wide the savings by re-use via Warp-it are as follows:

Figure 6 Warp-it Performance Metrics – UK Wide

Figure 7 The Warp-it Team