



Shropshire Council

Towards Zero Carbon

Low Carbon Projects

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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 ₂ e
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

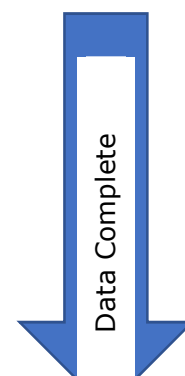
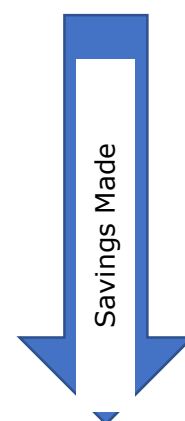


Table 2 2016/17 Building Consumption and Running Costs (all sites)

FY2016/17	(kWh)	Cost (£)	kgCO ₂ e
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

Based on Display Energy Certificate (DEC) data, 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 ₂ e
FY2012/13	73	£6.55m	23,909
FY2016/17	65	£5.59m	18,396
Savings	~9GWh	~£1m	5.5 t.CO ₂ e

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.

As a retrofit programme for public buildings to improve energy efficiency, projects receive 60% funding from ERDF, with 40% funded by Shropshire Council. Short payback periods are achieved by installing multiple interventions such as solar PV and energy efficient LED luminaries. SEPuBu provides an excellent opportunity to establish a rolling programme of improvements, identifying buildings and projects that can make a ROI even without ERDF funding. SEPuBu will reduce revenue spend and improve assets via efficiency interventions, creating exemplars to demonstrate retrofitting public buildings of a variety of ages and condition.

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

Method

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

Building Priority / Performance	Building Energy Cost (£/m ²)
Very Poor Energy Performance	£15 -> £65 /m ²
Poor Energy Performance	£10 -> £15 /m ²
Medium Energy Performance	£5 → £10 / m ²

Recommended Efficiency Measures and 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 CO ₂ e)
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

SEPuBu 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.

Total Estimated Annual Savings

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

	Saving (£)	Saving (kWh)	GHG (kgCO ₂ e p.a.)
All Buildings	<u>£50-£150k</u> p.a.	<u>~500kWh-</u> <u>1MWh</u>	<u>100-200t CO₂e p.a.)</u>

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

Assumptions

Electric rate of 13.33p/kWh, carbon factor of 0.307 kgCO₂e / kWh for UK grid sourced electricity and 0.204 kgCO₂e / kWh for grid sourced gas (DBEIS, 2018).

For individual project details please consult the Senior Commissioning Officer.

Pilot Sites

Two pilot sites were selected based on energy performance (cost/m²), strategic factors: 1) Urban 2) Rural setting with very different service area requirements.

Corporate Landlord Building	Current Energy £/m ²	Electric Cost (£ p.a.)	Intervention Measure	Est. Saving (£ p.a.)	Saving (t.CO ₂ e p.a.)
Shrewsbury Market Hall 1) Urban Project	£80/m ² (scope=186m ²)	£15- £20k	Solar PV 22kW LED lighting	£5,899	10.3
Greenacres Rural Farm 2) Rural Project	£40/m ² (scope=128m ²)	£5-6k	Solar PV 50kW	£6,220	14.5

These projects act as catalysts to reduce further energy costs with efficiency and renewable energy interventions, demonstrating the capability of what can be achieved in both urban and rural settings.

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.



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.

Solar Photovoltaics (PV)

Solar generation is a good news story for Shropshire Council. Growing year on year since 2012, there are now 37 solar arrays installed across 26 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 over 3000 tonnes. The carbon dioxide (CO₂) is saved by not using electricity from power stations, which burn fossil fuels.

Solar Photo Voltaic (PV) has matured as a technology. It 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 Climate Change Levies and increased energy costs, solar PV will be the future norm



5 million kWh Generated
(5GWh)

Over 3,000 tonnes CO₂e
Saved

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

From sunshine into tea!

OR power 1,500 homes for a year

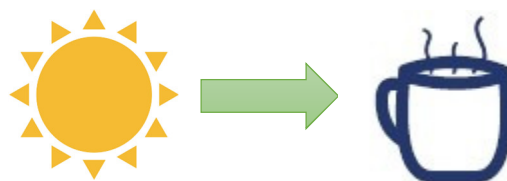


Table 4 Since 2012 across all sites, the financial benefits to the Council have been **£1.36m**. Based on savings on the average electricity tariff (p/kWh) as provided by West Mercia Energy and the feed-in-tariff.

Table 4 Solar Energy and Financial Benefits

	Energy (MWh)	Estimated 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	<u>4,705</u>	<u>£512,449</u>	<u>£849,403</u>	<u>£1,361,852</u>

Waste Management and Recycling

Veolia has provided favourable carbon emission data based on Shropshire Council’s Municipal waste contract (Table 5).

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 CO ₂ 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 5 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 1 Veolia Energy Recovery Facility: Shrewsbury.

Table 6 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 ₂ e 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.

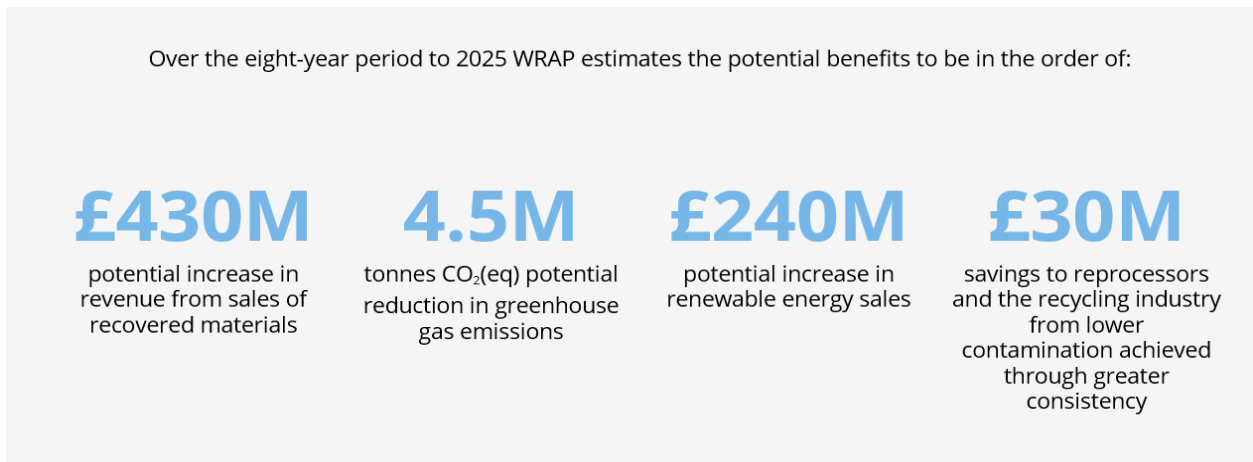


Figure 2 UK Waste Resource Action Plan (WRAP, 2018)

Shirehall Waste and DMR (Dry Mixed Recycling)

Table 7 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 7 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 8 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

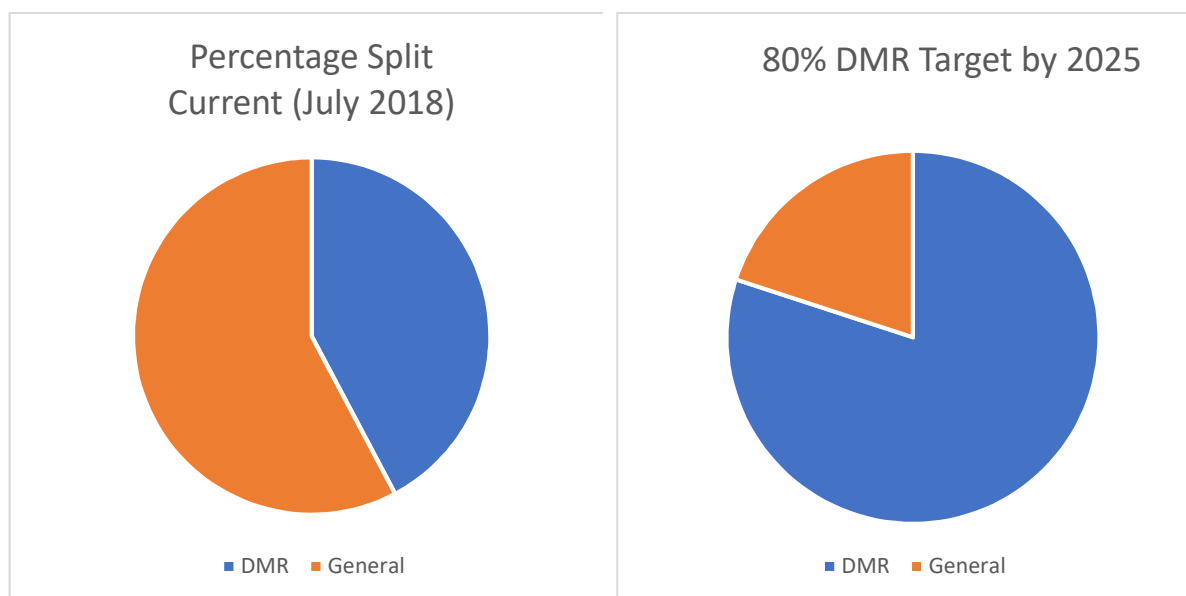


Figure 3 Current DMR Performance and Target (Shirehall, 2018, 2025)

Table 9 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 9), 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.

Latest Items



1 X Photographic copy stand with lamps



19 X Used arch lever files and A4 files



2 X Desk height beech effect drawer unit



5 X Single low beech effect lockable cupboard

Figure 4 Shropshire Council Items Listed

Warp-it has exceeded our expectations (Table 10): 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 10 Key Performance Metrics for Shropshire Council (first 6 months)

Financial Savings (over first 6 months)	£20,235
Waste avoided	3,380 kg
Carbon Savings	8,362 kgCO₂
Trees Equivalent	11



[See More Metrics](#)

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 5 Warp-it Performance Metrics – UK Wide



Figure 6 The Warp-it Team

Staff Pool Cycles and e-Bikes

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.

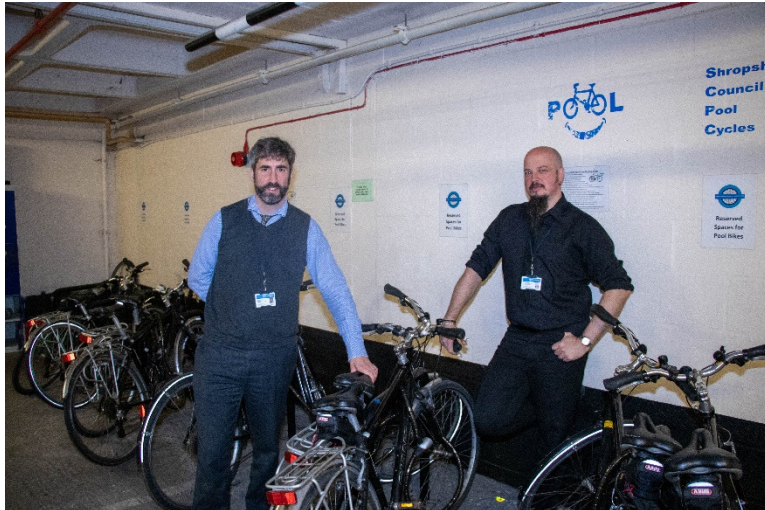


Figure 7 Shropshire Council Pool Cycles

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.

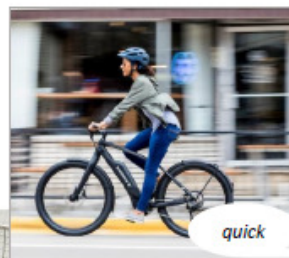
**Could this be your best
10 minute break of the year?**

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