

Welsh ZE Waste and Recycling Vehicle Programme – LA Engagement Workshop –

Session Chair, Vicente Jofré

12th July 2023

ZE Waste and Recycling Vehicle Project



Andrew Bishop, WG
Programme Lead

Aims to
accelerate and
de-risk

Access to
Support



Mark Brown, Programme
Manger

WG net-zero
2030 target

Try before you
buy



Steve Carroll, Support Lead
Peter Speers, Project Manager
Vicente Jofré Matamala, LA Liaison Officer and
Technical Support
Sophie Naylor, Data Analyst

Vehicle Purchase
Grant Support

Shared learning
and
dissemination

Objectives for Day

- **Share** learnings successes and challenges from deploying vehicles
- **Discover** programme tools and insights available for deployment planning
- **Understand** local authority support needs

Agenda

- 13:00 Welcome and Programme Status
 - 13:10 Turning Feedback into Action – Changes to the programme
 - Outcomes of Feedback from Last Workshop
 - 13:25 Local Authority Updates – Vehicle Deployments and Procurement
 - Conwy, Carmarthenshire
-
- 14:05 Break!
-
- 14:15 Programme Support Available
 - Support Discussion
 - 15:00 Close
-

Programme Update

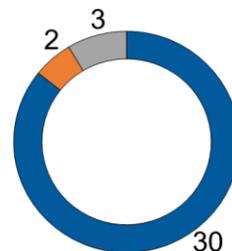


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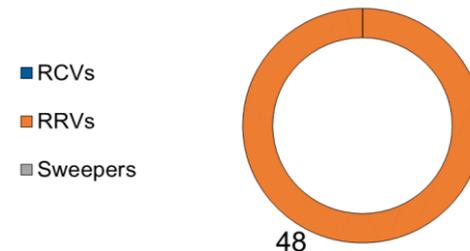
Deployment Status

Local Authority	Deployed	Potential Procurement
Cardiff	12	
Carmarthenshire	3	
Conwy	1	15
Denbighshire	2	3
Flintshire		2
Merthyr Tydfil		3
Neath Port Talbot	2	21
Newport	7	2
Powys	1	
Swansea	3	
Torfaen	2	
Vale of Glamorgan		2
Wrexham	2	

Deployed so far (35)



Potential Procurement (48)



83 Vehicles Delivered or Pending Procurement
13 Different Local Authorities

Deployment Status



26t eRCV

- Providers:
 - Dennis Eagle (26)
 - Electra (3)
 - RVS/E Moss (1)



12t eRRV

- Providers:
 - Romaquip (1) (17)
 - Terberg (1) (31)



eSweeper

- Providers:
 - Bucher (3)

Blue: Deployed
Orange: Potential

Turning Feedback into Action



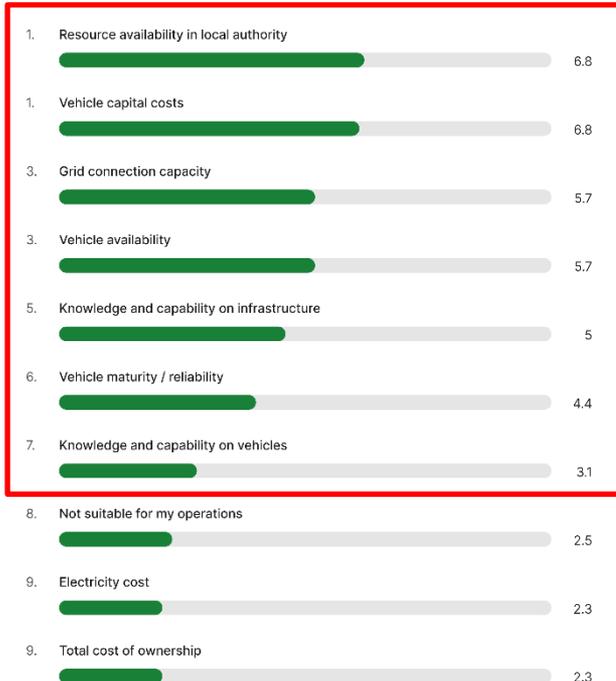
Results of Previous Workshop Surveys



What is the most effective method of Cenex Supporting the transition?

1. *Procurement support.*
2. *1–1 Expert support.*
3. *Information on real life vehicle performance.*
4. *Regular workshops with shared learnings.*

Results of Previous Workshop Surveys



What are your main barriers to ZE waste fleet transition?

5. *Low local authority resource availability.*
6. *Infrastructure limitations.*
7. *Knowledge on vehicles and infrastructure.*

Procurement

- *Checklist to work with LAs purchasing new vehicles this year to discuss issues arising in vehicle & infrastructure procurement and deployment*
- *Ensure that all parties are aware of status before grant award*
- *Additional 1:1 support may be offered to LAs depending on need*

Issue to be Tackled:

1. *Procurement support.*
2. *1–1 Expert support.*
6. *Infrastructure limitations.*
7. *Knowledge on vehicles and infrastructure.*

Focused Workshops

- *Each workshop will have surveys that will feed into the programme and improve it.*
- *All workshops will seek experience sharing (presentations and discussions) from LAs about their relevant experience.*

Issue to be Tackled:

3. *Information on real life vehicle performance.*
4. *Regular workshops with shared learnings.*

Less Data Collection for Existing Vehicles

- *Once a good level of understanding is achieved for a class of vehicle, only automatic data will be collected (e.g., DE 26t eCollect)*
- *Focus will be placed on new vehicles to the programme, to share the operations understanding.*
- *Planned reduction of data collection burden.*

Issue to be Tackled:

3. *Information on real life vehicle performance.*
5. *Low local authority resource availability.*

New Website – Knowledge Hub

- *Up to date programme statistics.*
- *Knowledge Hub:*
 - *Modelling Tools.*
 - *Performance Insights.*
 - *Previous Workshops.*
- *Interactive vehicle catalogue.*

Issue to be Tackled:

- *All of the above, to be accessed on demand.*

To be released by year end 2023

Success so Far

- *Over half of the local authorities have ZE vehicles operating.*
- *Circa 60 Specialist vehicles funded so far.*
- *242 tonnes of WTW CO₂ and 115,100 L of Diesel saved by Q3 FY22/23.*
- *Good understanding of battery electric RCVs and sweepers.*



We seek for your engagement to grow the programme and improve the experience of everyone in the programme.

Local Authority Updates



Cerbyd Ailgylchu Trydan

Rhaglen Ymchwil a Datblygu

Electric Recycling Vehicle Research & Development Programme

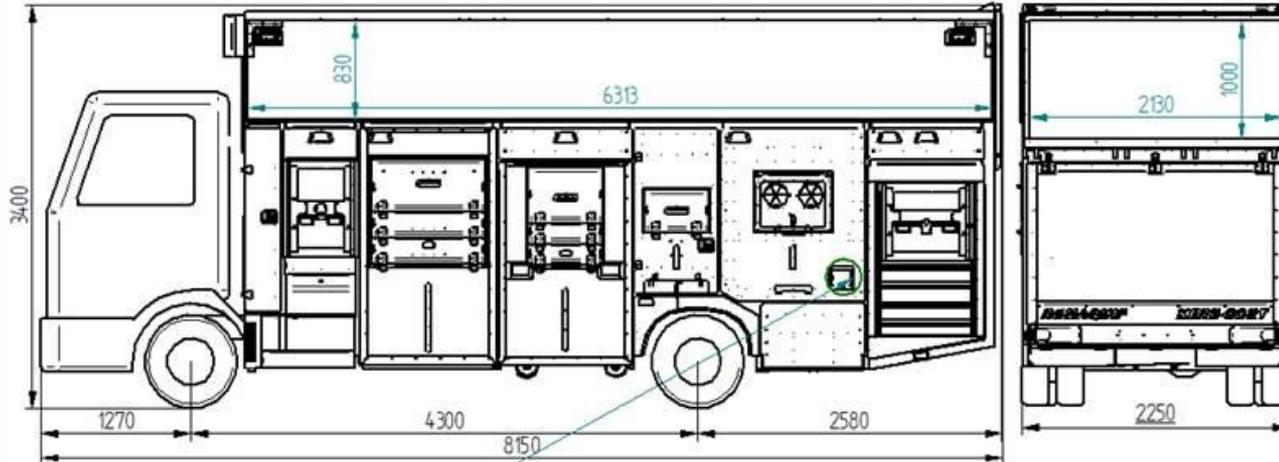


Conwy - Sir flaengar sy'n creu cyfleoedd

Conwy - a progressive County creating opportunity

Romaquip RQ-E Electric RRV

- 4.3m wheelbase 'midi' vehicle 12t GVW
- 180 kWh 600v battery
- 2,600Nm drive motor
- 22kW onboard charger
- 3,000kg payload
- Range 120 miles??



R&D Programme



- June 2022: Vehicle Delivered
- July to December 2022: Romaquip Testing
- January 2023 to present: CCBC testing on live rounds
- Extensive improvements to software – now on version 112.
- Software algorithm controls torque to increase power only when needed while conserving battery.
- Similar improvements to regeneration torque.
- Initial air compressor was oversized.
- Currently testing new settings for onboard charger.

Date	Starting Charge	Miles Travelled	No. of Properties	Weights	End of Round Charge
09/05/2023	100%	60	639	1960Kg 1240KG	39%
10/05/2023	98%	57	570	1540Kg 1080KG	38%
11/05/2023	88%	41	557	2,160Kg 1,060KG	46%
12/05/2023	100%	53	531	Weighbridge down	44%
15/05/2023	100%	62	489	Weighbridge down	29%
18/05/2023	100%	43	557	1580kg 1080kg	54%
25/05/2023	100%	40	557	1880kg 1020kg	60%
26/05/2023	100%	53	531	1200Kg 1720kg	35%
30/05/2023	100%	57	570	2080kg 580kg	35%
02/06/2023	80%	60	531	1,220kg 1,160kg	18%
05/06/2023	100%	59	639	1840kg 840kg	37
07/06/2023	100%	56	570	1860kg 1020kg	47%
08/06/2023	73%	41	557	1,840 kg 1,220 kg	22%
12/06/2023	100%	60	489	1640kg 480kg	39%
14/06/2023	90%		570	1,700 kg 980 kg	30%
15/06/2023	100%	41	557	1,740kg 1,300kg	55%
19/06/2023	100%	60	489	1880kg 1100kg	30%
21/06/2023	89%	57	570	1780 kg 1220kg	29%
28/06/2023	100%	40	455	2,400kg	69%
30/06/2023	100%	67	466	Weighbridge down	29%
05/07/2023	100%		466	2,380kg	60%

Performance

Single day maximums

- Mileage – 119 mi
- Properties - 639
- Payload – 2.42t



Issues with charging and supply network

- Problems with slow charging/not charging
- Worked with Zappi and Romaquip to try to resolve
- Now concluded that problem is instability of supply ie not delivering consistent power across three phases
- Causes on-board charger to derate to single phase or switch off completely
- Working on new configuration settings for onboard charger
- New substation and supply upgrade ordered



**Diolch
Cwestiynau?**

**Thank You
Questions?**

Purchase of 3 x 27t Electric RCVs



Christopher Evans – Operations Efficiency Officer

Yana Thomas – Waste Transformation Project Manager



Procurement

Procurement via YPO framework

Qualification Criteria

1. Vehicle(s) production process to have commenced by **31st March 2022** with a final delivery date of **23rd September 2022**.
2. The vehicle(s) supplied will be required to achieve a load carrying capacity of 10.5t and cover at least 130miles using 80% battery with up to 200 bin lifts undertaken in a working day.
3. The vehicle(s) will have the ability to achieve 85kmph.



Tenders received

- 2 submissions
- 1 failed the evaluation on delivery
- Electra was successful with the tender from the information provided

Incentive

- WG funding
- Carmarthenshire's aim of becoming a Net Zero Carbon Authority by 2030

Vehicles Supplied

Chassis & Body:

- 3x 6x2 Rear Steer Electra eStar LEM 27-350,
*Based on Daimler Econic platform with 315kWh
Battery Pack.*
- Dennis Olympus 23, Beta 2 lip lift

Battery:

- Size: 315KWH
- Chemistry: Lithium Ion Phosphate
- Cooling/heating: Thermally managed
- Life Span: 3000 cycles 80% SOH

Charging

- 2 x 25KWH onboard charger
- AC charge time – 22kwh – 15hours [0-100%]
estimate
- AC charge time – 44kwh – 7.3 hours [0-100%]
estimate



The Area We Serve: Carmarthenshire



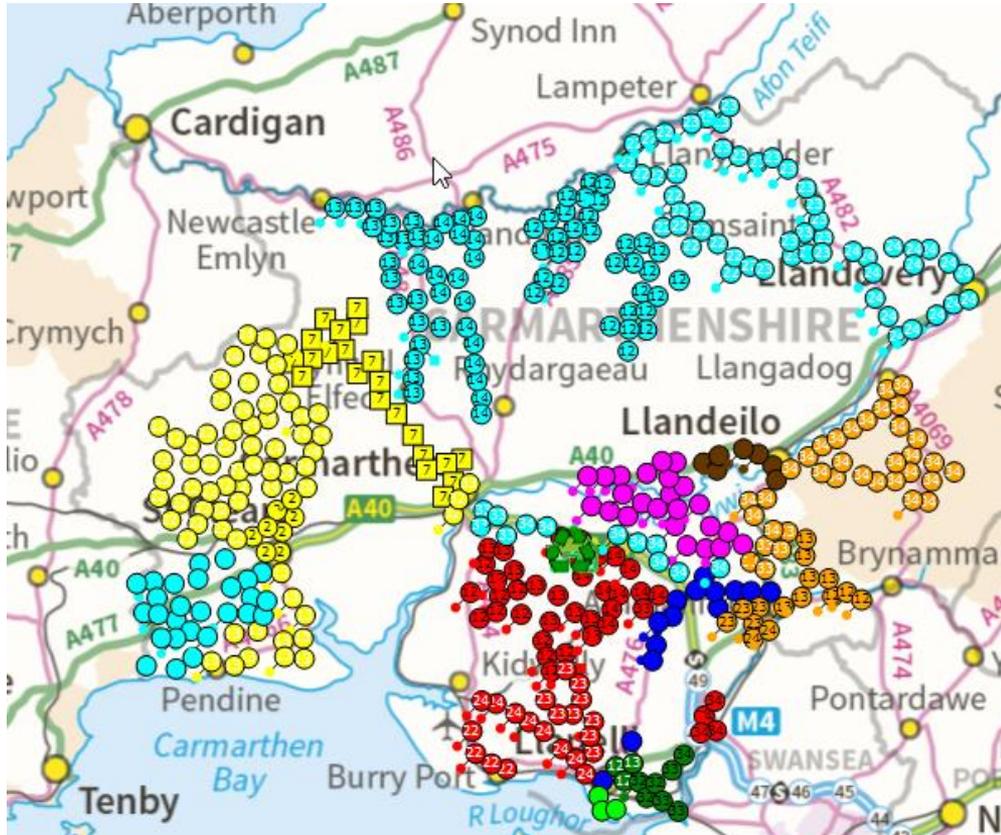
The county is bounded Ceredigion, Powys, Neath Port Talbot, Pembrokeshire and Swansea.

Much of the county is rural, upland and hilly, with the south coast contains more urban settlements.

Carmarthenshire has the 2nd largest Highway Network in Wales.

The county has a population of over 190,000 over 92,000 households

Operational Planning for Electric Vehicle Collection Transition



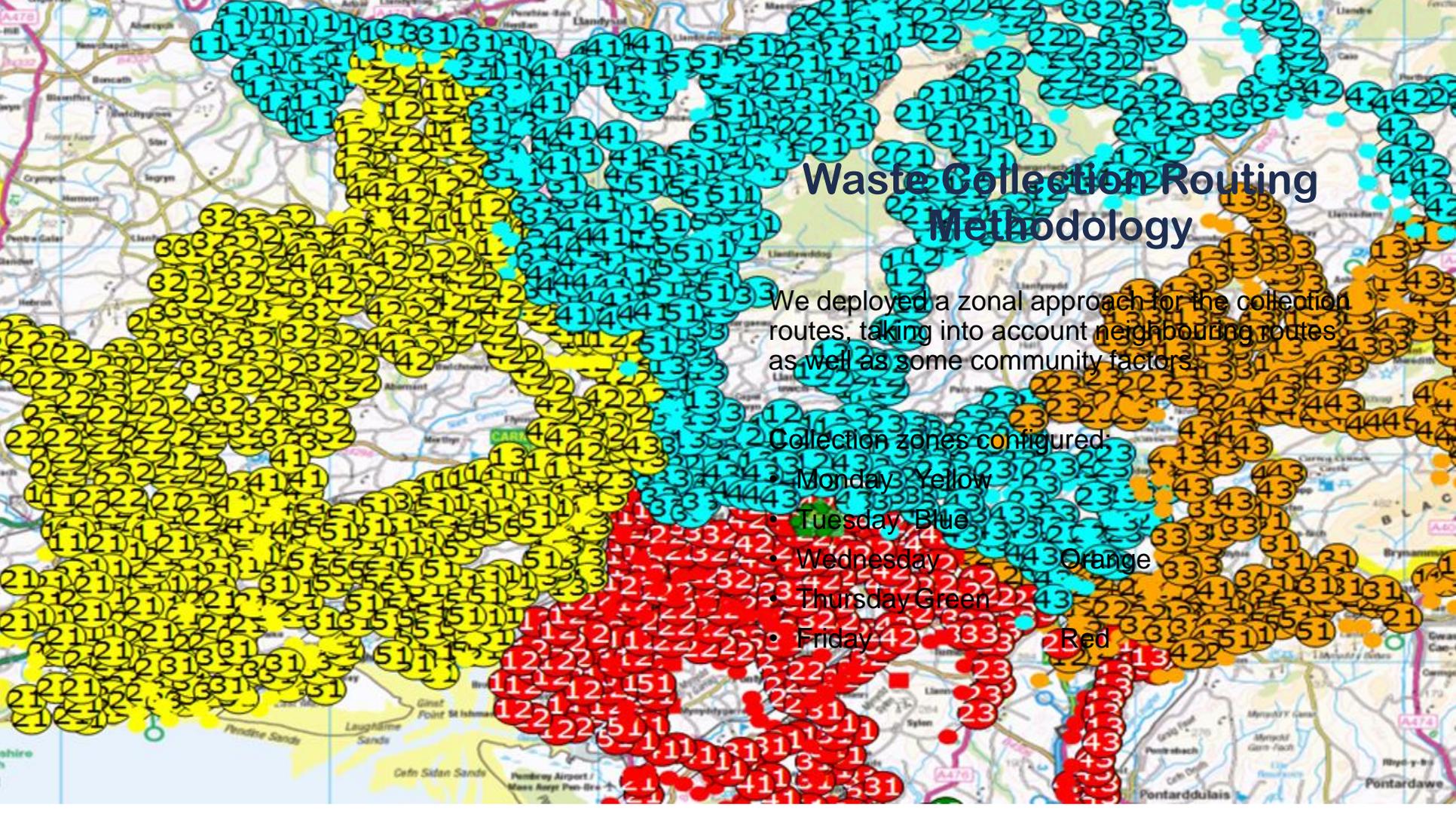
- Ensured electric vehicles were deployed on routes which could be completed, however not designed separately from rest of the service.
- Designed routes which do not exceed 131 miles of planned travel per day.
- Testing of demonstration vehicles was undertaken to get a benchmark of what was achievable in a real-world environment.
- Driver behaviour

Waste Collection Routing Methodology

We deployed a zonal approach for the collection routes, taking into account neighbouring routes as well as some community factors.

Collection zones configured:

- Monday Yellow
- Tuesday Blue
- Wednesday Orange
- Thursday Green
- Friday Red





Charging Infrastructure Depot Site

Depot Chargers (Three)

- Sevadis Maxicharger Pillar with LCD Screen [22kw]

Challenges

- Power to interim depot
- Split charging
- No WIFI to chargers – no alert
- Maintenance and servicing

Feedback & Contingency

Views on the ground

- All crews are impressed/keen to try vehicles
- Most employees are environmentally conscious and are satisfied that we are helping reduce our carbon footprint
- Reduced noise pollution for the driver, loaders and residents
- Smoother more comfortable driving experience also aided by regenerative braking which starts slowing you down when you take your foot off the accelerator.

Contingency

- Due to the delay in receipt of the vehicles we received 3 x 26t diesel
- These remained on site to cover any issues encountered with electric RCV's / chargers

Issues Encountered

While collecting on a steep incline the lorries didn't have enough power to continuously stop start

- Electra had to adjust the power/weight ratio. They wouldn't have been able to foresee this beforehand as they couldn't replicate the Carmarthenshire landscape on their test track

ESP warning light on the dash

- The issue ended up being the electro emittance from the drive motor interfering with the yaw sensor – this in turn was throwing the ESP warning on the dash. This issue had never been seen and it was mighty hard to find, the reasoning this specific vehicle was affected was the bracket that holds the yaw sensor was different from Daimler production and thus positioned the unit in a different place.

3. 2 x vehicles were off the road with compressor issues

- Very first generation 3 vehicles in operation, everything on the vehicles is new compared to past vehicles. New larger battery system although they are the same technology to the smaller packs, they actually follow a completely different start up and operation protocol. Transpires that in real life operation the vehicles had been running hotter than had been able to simulate in the testing phase
- The resolution was to alter the water pumps for this cooling circuit.

4. Charging infrastructure

- Interim depot
- Warning notification
- Infocenter telemetry portal

Diolch

Thank you

Yana Thomas & Chris Evans
Adran yr Amgylchedd
Environment Department

sirgar.llyw.cymru
carmarthenshire.gov.wales



Support Discussion – Next Workshops

To join the Q&A Session please open link in chat.



– Break –



What's Coming Next?

- Knowledge Hub
- New Procurement Support
- Performance Insights
- Modelling Tools

Support Discussion – Programme Website

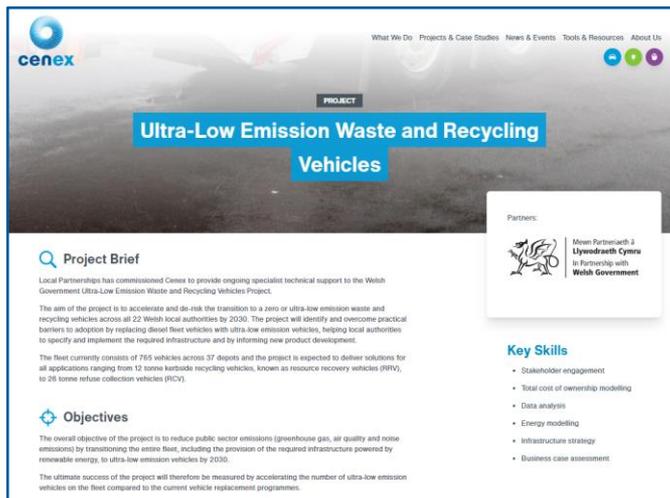
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Programme Support



Knowledge Hub



The screenshot shows a webpage for the 'Ultra-Low Emission Waste and Recycling Vehicles' project. The page features the Cenex logo, navigation links, and a main heading. Below the heading, there is a 'Project Brief' section with a search icon, a 'Partners' section listing 'Mewn Partneriaeth â Llywodraeth Cymru in Partnership with Welsh Government', and a 'Key Skills' section with a list of skills.

Ultra-Low Emission Waste and Recycling Vehicles

Project Brief

Local Partnerships has commissioned Cenex to provide ongoing specialist technical support to the Welsh Government Ultra-Low Emission Waste and Recycling Vehicles Project.

The aim of the project is to accelerate and de-risk the transition to a zero or ultra-low emission waste and recycling vehicles across all 22 Welsh local authorities by 2030. The project will identify and overcome practical barriers to adoption by replacing diesel fleet vehicles with ultra-low emission vehicles, helping local authorities to specify and implement the required infrastructure and by informing new product development.

The fleet currently consists of 765 vehicles across 37 depots and the project is expected to deliver solutions for all applications ranging from 12 tonne kerbside recycling vehicles, known as resource recovery vehicles (RRV), to 26 tonne refuse collection vehicles (RCV).

Objectives

The overall objective of the project is to reduce public sector emissions (greenhouse gas, air quality and noise emissions) by transitioning the entire fleet, including the provision of the required infrastructure powered by renewable energy, to ultra-low emission vehicles by 2030.

The ultimate success of the project will therefore be measured by accelerating the number of ultra-low emission vehicles on the fleet compared to the current vehicle replacement programmes.

Partners:

Mewn Partneriaeth â Llywodraeth Cymru
in Partnership with
Welsh Government

Key Skills

- Stakeholder engagement
- Total cost of ownership modelling
- Data analysis
- Energy modelling
- Infrastructure strategy
- Business case assessment



- Procurement Guidance.
- Vehicle Performance Insights.
- Vehicle Infrastructure Guidance.
- Previous Workshops.

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Project Data Requirements and Vehicle & Infrastructure Procurement



Project Data Requirements

Reporting vehicle operation data to Cenex is a condition of Welsh Government funding.
Cenex uses the data to:

- Provide feedback on the performance of vehicle to the Welsh Government and to Local Authorities participating in the programme.
- Build spreadsheet models to allow Local Authorities to understand how electric vehicles would perform under their specific operating conditions.
- Produce insight reports on the best use of the vehicles to maximise emission savings and operability.

Essential Reporting Requirements

As a minimum the aim is to record the following metrics **for every day of operation for new vehicles in the programme**:

- Daily mileage (miles)
- Daily electricity used (KWh from the vehicle battery. If this is not available, then KWh supplied by the vehicle charger could be used instead)
- Round intensity indicator (e.g., total number of bins lifted, compaction cycles)
- Total amount of waste collected (kg)
- Total operating hours (hours and minutes)



Vehicle and Infrastructure Procurement Checklist

This checklist is used by Cenex to understand the procurement of new zero emission waste and recycling vehicles and supporting recharging infrastructure by Local Authorities under the Welsh Government's ZE Waste and Recycling Programme.

The questions in this checklist cover the entire process from the procurement of the vehicles and infrastructure to in-service operation including:

1. Vehicle Requirements
2. Infrastructure Requirements
3. Data Requirements
4. Vehicle Handover, Acceptance, and Ongoing Support
5. Fleet Transition Plan

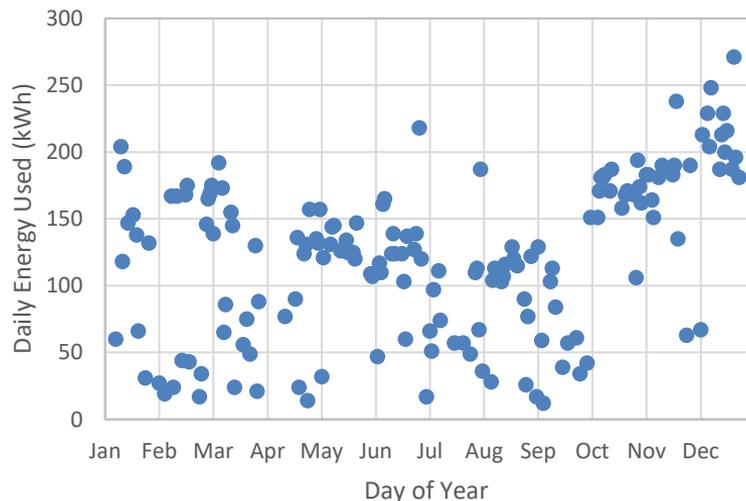
If any further support or advice is required, please contact vicente.jofre@cenex.co.uk

Website documentation being updated to make

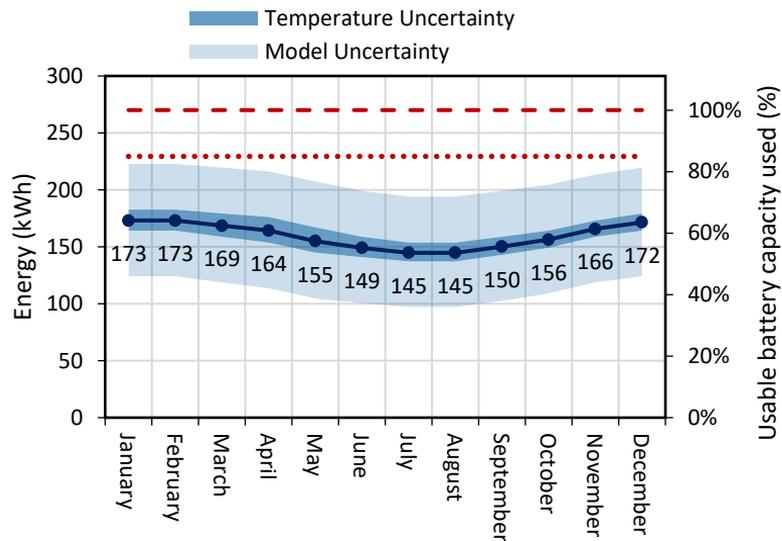
- data provision requirements for vehicles more visible to everyone before procurement, and
- provide enhanced guidance on procurement and deployment considerations for vehicles and infrastructure

Performance Insights and Modelling Tools

Daily Energy Used over 1 Year (1 Vehicle)

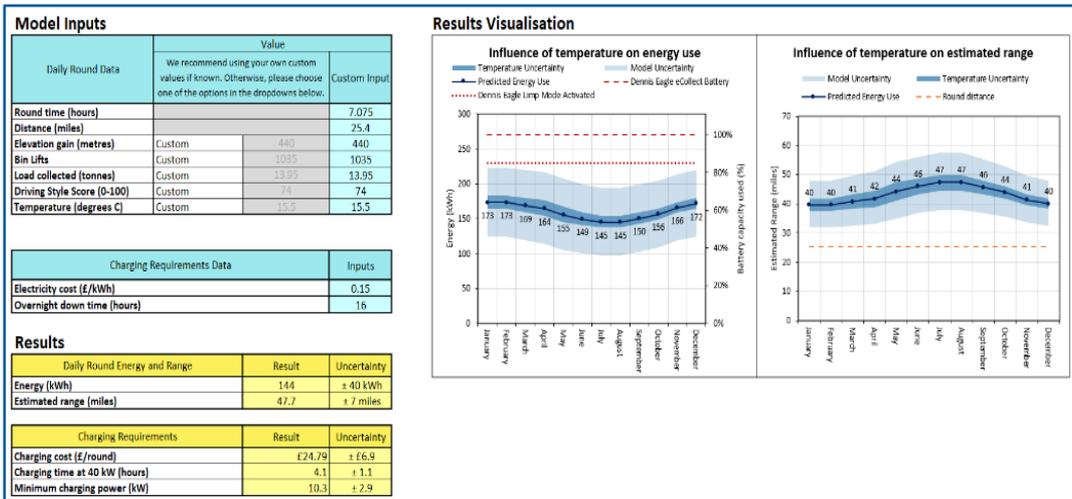


Modelled Daily Energy over Average Year



Using measured data to inform usable insights

Performance Insights and Modelling Tools



Simplify the planning of rounds and energy consumption for fleet/waste managers!

Performance Insights and Modelling Tools

- Model shows differences between some typical rounds measured in different LAs:

Daily Round Data	Local Authority	
	Newport	Powys
Round time (hours)	7.1	6.4
Distance (miles)	25.4	50.3
Elevation gain (metres)	440	1012
Bin Lifts	1035	555
Load collected (tonnes)	13.95	10.23
Route Characteristics	<ul style="list-style-type: none"> Urban route Short distance High collection density 	<ul style="list-style-type: none"> Rural route Longer distance, hillier terrain Low collection density

Thank you for your time!

Contacts for Grant Applications

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Contacts for Planning and Implementation Advice

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Thank you for listening

Steve Carroll

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