

Morrison Busty – Low Carbon Depot

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Where is Morrison Busty Depot

Background

The depot started life as the Morrison Busty Colliery, opened up in the late 1920's but finally closed in 1973.

It was purchased by Derwentside District Council three years later for use as a vehicle depot and for other municipal purposes.

The depot was transferred to Durham County Council on local government reorganisation in 2009.

Location

The depot lies just south of the Annfield Plain roundabout on the A693 bypass and accessed from the A6076 Lanchester Road, which forms its western boundary.

To the south and east is the former Chapman's Well Reclamation Site, now a Local Nature Reserve

The total site area of the depot is 8.65 ha (21.39 acres)



Gratuitous Engine Picture

- Active Pit since the 1920's until closure in the 1970's
- 1500 people employed
- 1450 t of coal extracted each day
- Several colliery buildings remain on site



Services Delivered

Current Depot Uses

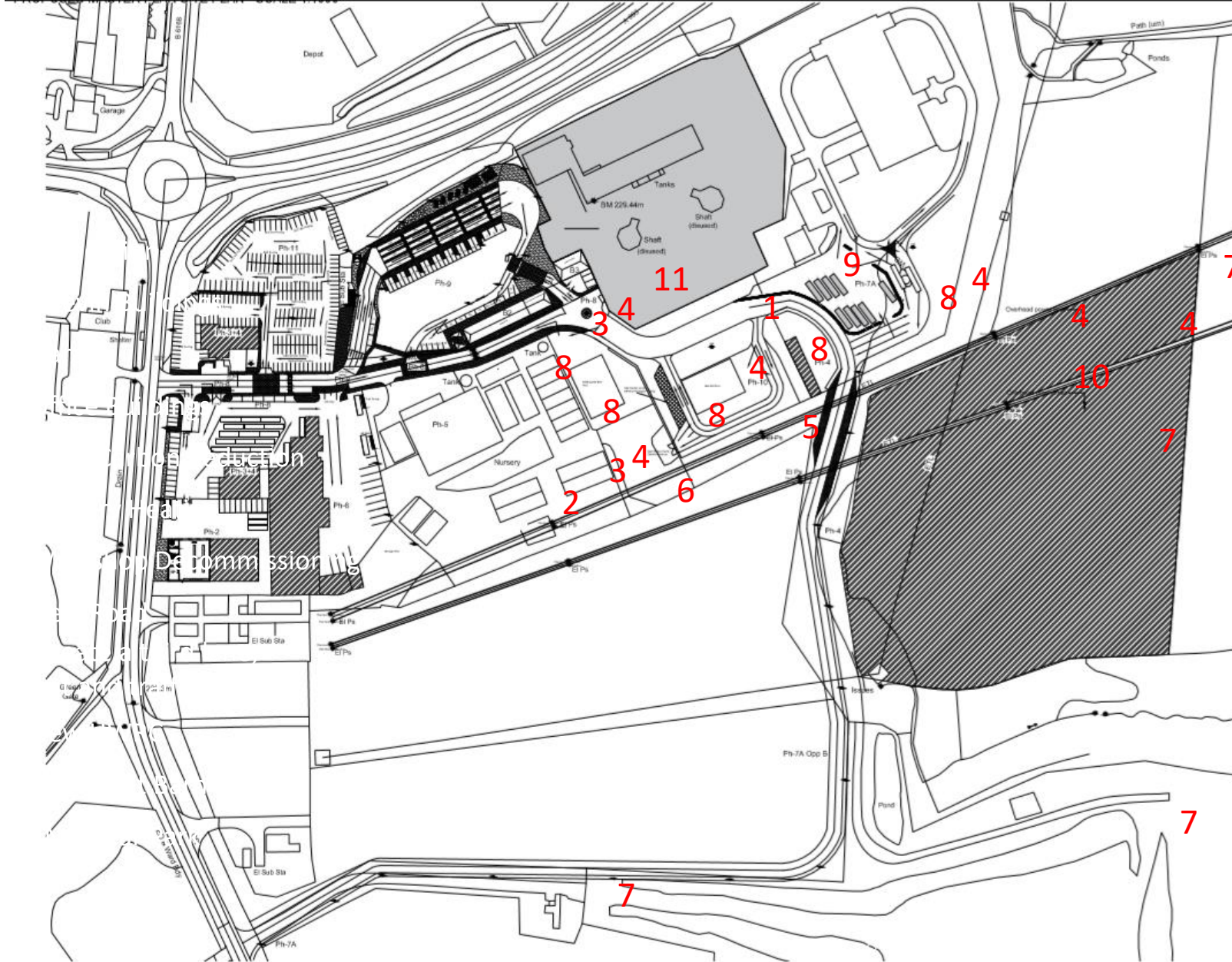
Serving the entire northern part of the county.

General Operations Yard/Buildings:

- Operational offices, reception and welfare facilities,
- Fleet maintenance workshops, MOT Testing Station,
- Road Maintenance vehicles and plant,
- Street Lighting vehicles and equipment,
- Clean and Green vehicles, equipment and materials,
- Household Waste Collection fleet.
- Salt Stores (2)
- Horticultural Nurseries
- Household Waste Recycling Centre (HWRC)
- Waste Transfer Station (WTS)
- Office Building: Care and Connect, Business Support, Full Circle, Household Waste (management), Neighbourhood Wardens, VIP services
- Former Colliery Buildings Area: Clean and Green plant and materials storage, Gritter vehicles.



THE 11-PHASE MASTER PLAN



4
7
4
4
4
4
4





Phase 1 Demolition

Water penetration
Movement caused by
vegetation intrusion
Some buildings kept
because of their
historical significance



ERDF – Low Carbon Depot

The fleet, the buildings and activity at the site are responsible for approximately 1,150 tonnes CO₂ each year, or 2.5% of DCC's emissions.

- Original idea in 2018 for batteries and grid balancing services
- Developed in 2019/20 to focus on whole site decarbonisation
 - 3MW Solar Farm
 - 2MW Battery Storage
 - Smart Grid and Private Wire
 - ASHP Heating
 - Future Proof EV Charging
 - Building Energy Efficiency Works
 - Site Ecological Improvements
- ERDF outline application in 2019
- Full submission in 2020

Aim:

- To reduce emissions by 74%
- Following 50% fleet electrification emissions are modelled to reach 93% decrease



Design Stage

- Carried out a full OJEU compliant procurement exercise to appoint specialist design consultants.
- Submit pre-planning application and obtain planning validation requirements.
- Develop planning validation requirements that include the need to carry Archaeological survey work.
- Procure specialist ecology consultants to carry out the required Great Crested Newt Surveys.
- Procure specialist ecology consultants to carry out the required Bat/Bird Surveys.
- Make contact with Northern Powergrid and the Coal Authority on our legal/wayleave requirements.
- Develop thermal improvement work specification for office buildings.
- Develop internal lighting, heating and control specification for the office buildings.
- Finalise Internal PM and design fees following the D&I commission being raised.
- At Risk design costs: **£307,153**



ERDF Application - Financials

Component	Original Budget (application)	Construction
Solar PV	£3,000,000	£4,986,622
Energy Storage	£2,500,000	
Smart Grid (Private Wire)	£900,000	£444,578
EV charging infrastructure	£226,000	£330,099
ASHP	£290,000	
Building Efficiency	£238,933	£753,942
Site Ecological Improvements	£15,000	£83,000
NPG Works		£66,687
Lighting and Control		£192,470
Construction Prelims		£437,711
Nursery Addition		£198,312
Statutory Fees and Charges		£11,220
Orders		£5,854
Professional Fees	£201,943	£194,845
Design Fees	£215,098	£129,790
Other Fees		£25,360
Risk/Contingency	£1,772,407	£1,171,099
TOTAL	£9,359,381	£8,606,353
ERDF	£5,615,628	£5,005,619
Invest to Save	£3,743,752	£3,433,735
Internal Budget		£167,000



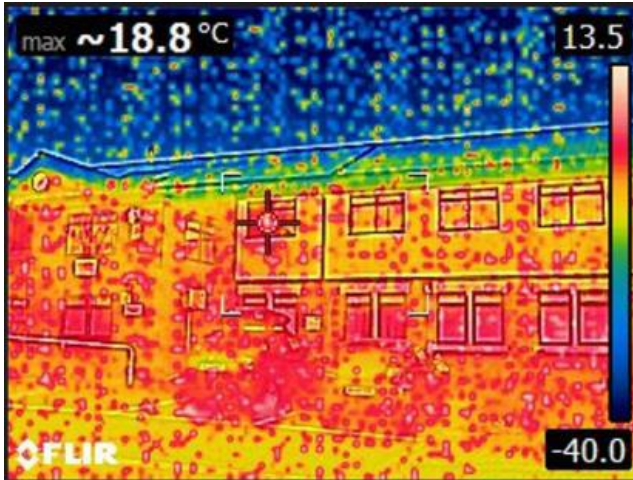
ERDF Carbon saving works & improvements

The Issues – Buildings and Offices

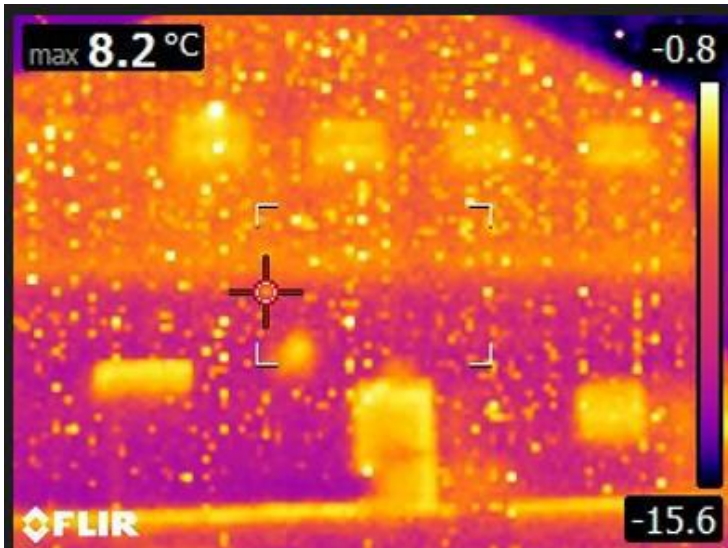
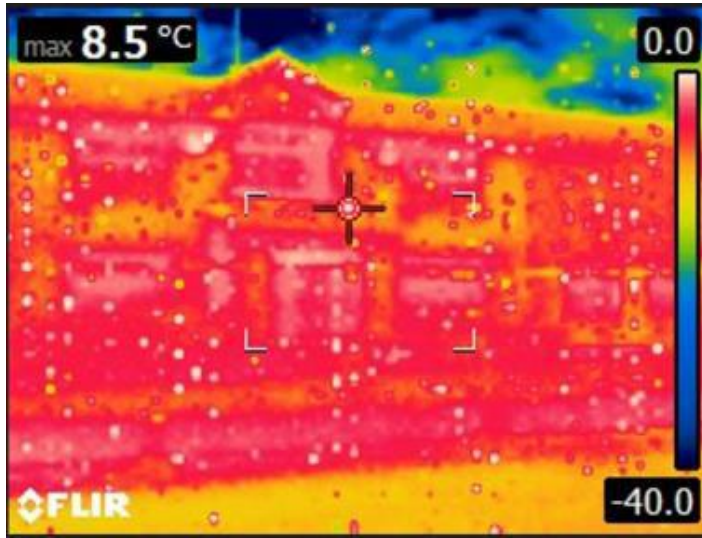
The main office building was constructed in 1970/80 and the operational building in 1940/60 and due to the age and lack of maintenance over the last 60 years are failing in the following areas:

- No thermal insulation with high levels of heat loss
- Condensation and DPC failure
- Pointing failure
- Internal facilities do not meet our standards of accommodation
- Buildings require full re-wires, improved welfare areas, toilet facilities, decoration and flooring.
- Improved layout to meet the needs of the teams that work from the buildings.

The images to the left were taken on a winters day with an air temperature of 1.3 degC and show the heat loss from the buildings of up to 18 degC and due to the lack of insulation cold bridging was recorded in all walls, floors, ceilings, windows and doors.



Buildings and Offices



- Thermal upgrade to main office and operational office buildings.
- New “A” rated windows and doors
- LED lighting
- ASHP replacing Gas, hot water and ventilation systems.
- Full new render and brick slip aesthetic finish to the buildings.



Solar Farm and Battery Storage

Issues

- Ecology (Newts)
- Power lines

Outcomes

- 3.062MW Solar Farm
- 2MW Battery Storage



Fly over



Battery Storage



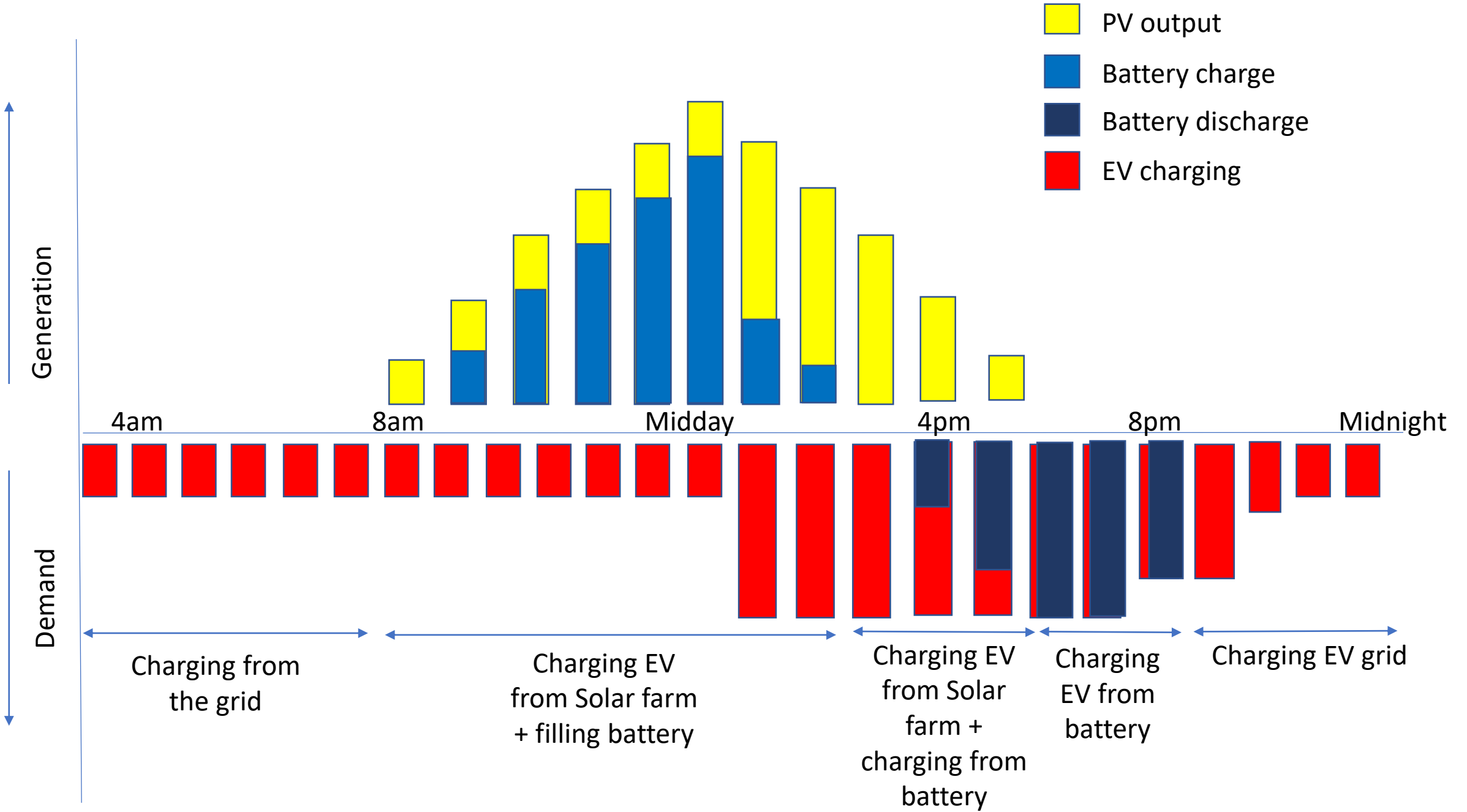
2MW Tesla Battery



EV Infrastructure

- 50KW and 7.5KW EV charging points and infrastructure that will meet the needs of the current anticipated EV fleet and the future needs within later phases of the proposals.





Upgrade heating within plant nursery from gas to electric ashp

The Problem

The current boilers which are 25>30 years old are very large and inefficient (2 x 2000kW gas) and even though they only run at full capacity over the cold months they use a high proportion of the gas used within the depot. Current facility (a large garden shed.....)

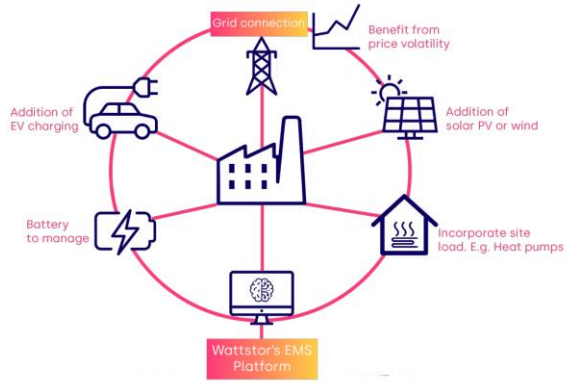
The Solution

Replace with 7No. 37KW ASHP's that will allow the gas to be disconnected and achieve a zero carbon depot. Thermal wrap around plant office/reception





What we do!



SOFTWARE

The EMS software is the brains behind the platform. By collating data on grid constraints, weather, load and EV charging forecasts, site operational parameters, and dynamic pricing signals, the algorithm calculates and schedules the most effective use of energy and creates the best ROI.

CLOUD PORTAL

The cloud portal is the end-user's window into their energy activity. From remote monitoring, scheduling, metering data download and savings figures, through to energy source drilldowns, consumption statistics, and alarms. This element of the platform delivers your day-to-day energy data insights.




Ecology

Bird nesting boxes
Pond improvement
Protection of newt habitat
Specialist Grasslands
To be maintained by sheep



Carbon Emission Estimates

	Scenario 1	Scenario 2	Scenario 3	Scenario 4a	Scenario 4b	Scenario 4c
	Baseline	Nursery ASHPs	PV & Batteries	5% EV	50% EV	100% EV
Electricity Consumption	263,244	437,721	437,721	483,258	1,240,564	1,985,127
Gas Consumption	794,815	-	-	-	-	-
LPG Consumption	69,851	-	-	-	-	-
Total	1,127,910	437,721	437,721	483,258	1,240,564	1,985,127
Diesel Consumption (Litres)	341,430	341,430	341,430	330,000	160,467	-
Generated Electricity Used on Site	-	-	406,707	443,279	888,714	1,009,434
Generated Electricity Sleeved	-	-	1,756,542	1,728,750	1,366,357	1,281,305
Grid Electricity Consumption	263,244	437,721	62,064	72,414	418,558	1,045,285
Grid Electricity Consumption	91,833	152,699	21,651	25,262	146,014	364,648
Gas Consumption	162,643	-	-	-	-	-
LPG Consumption	16,065	-	-	-	-	-
Diesel Consumption	887,774	887,774	887,774	858,053	417,240	-
Electricity Sleeved	-	-	-612,770	-603,074	-476,654	-446,983
Total Carbon Emissions kg CO2e	1,158,315	1,040,473	296,655	280,241	86,600	-82,336
Overall Saving		10%	74%	76%	93%	107%

Return on Investment

- Based on DCC Investment of £3,433,000

Costs	Revenue Savings (2020 costs)
Maintenance	Utility savings
Battery Replacement	PPA
Grazing	Fuel Savings
Interest on PWLB (3%)	

- 16 years



Headline Review

- 3MW Solar Farm
- 2MW Battery Storage
- Private Wire network
- Supply to Main office, Operational office and nursery heated by ASHP
- 50KW and 7.5KW EV charging
- Decarbonisation of Depot by 117% with full fleet electrification
- Avoid over 1,283,877 kg of CO₂ per year
- Refurbishment of 1940, 60, 70 and 80'S constructed buildings that if not improved were only 5 years away from being beyond economical recovery.
- Improved biodiversity
- 16 Year Payback (currently)
- **Within Budget**



Questions

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Climate Change and Sustainability
Intranet

<https://websites.durham.gov.uk/climatechange/>

