Presented by:
Date:

Decarbonising Heathfield Industrial Estate: Findings and Learnings for Replication

University of Exeter
Devon County Council

Why Heathfield?

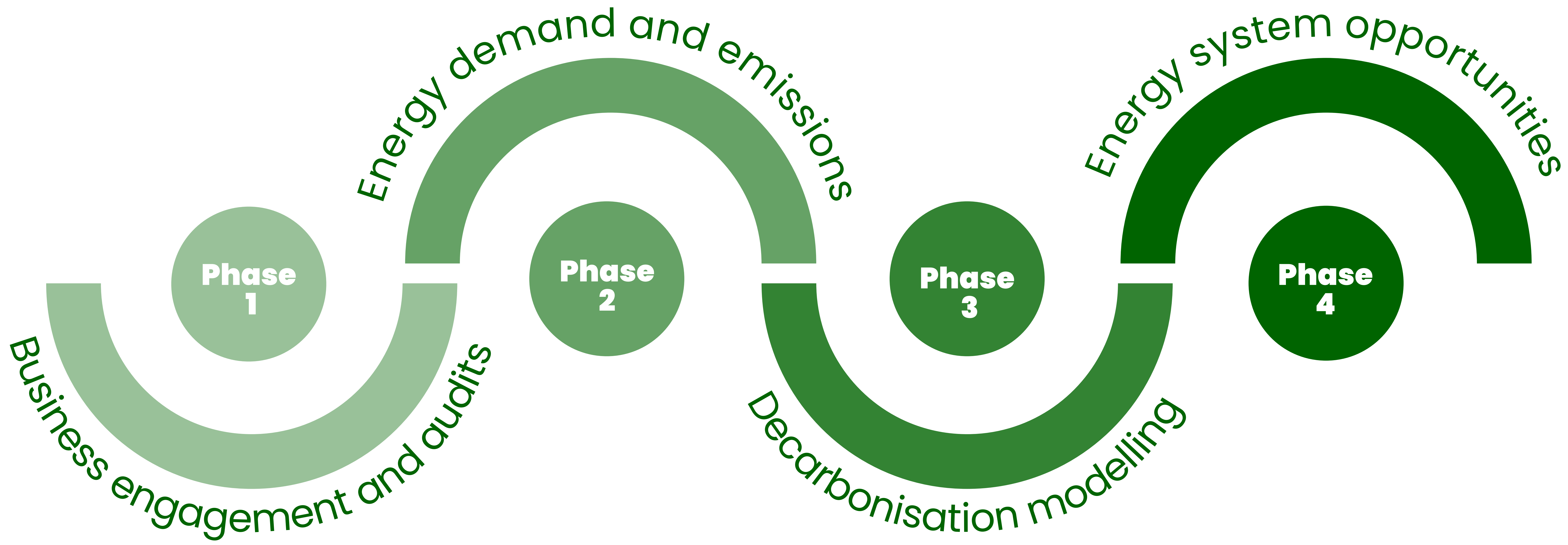
Devon has 126 industrial estates - Heathfield selected as a representative pilot.

The estate, home to 191 businesses, was studied to understand how industrial estates can transition to net zero by 2050.

Strategic location, business diversity, and replicability potential.

Project overview

Four-phase project structure:



Data challenges

Low business engagement - only approximately 3% of businesses provided energy data.

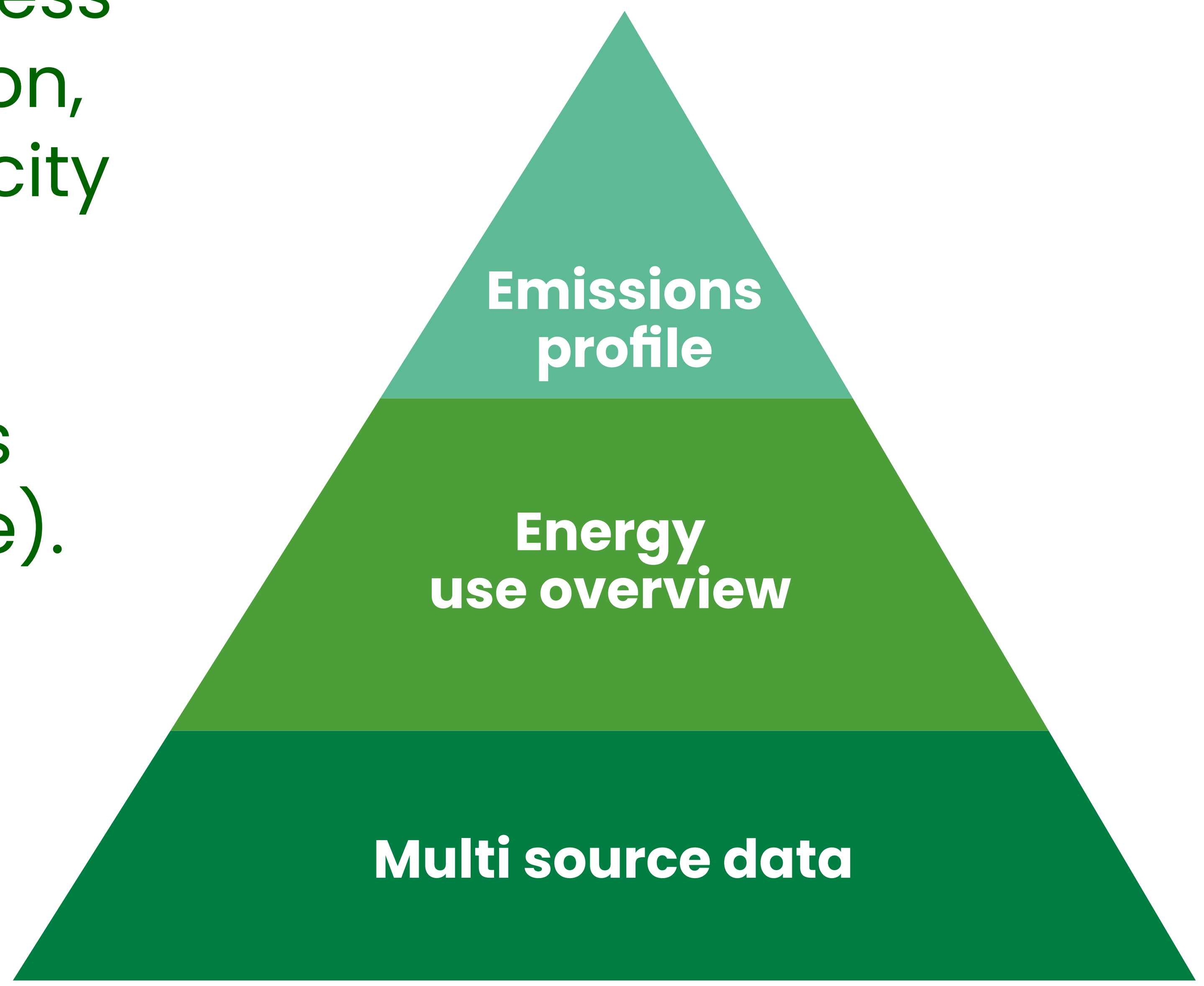
Complex occupancy and metering arrangements.

Lack of granular energy data, especially for gas. Electricity data was more accessible than gas data, with cooperation from National Grid Electricity Distribution (NGED). There were no hourly gas profiles available.

Methodology

Multi-source data weaving: BCR Field Data, Valuation Office Agency (VOA), Inter-Departmental Business Register (IDBR), Elexon, National Grid Electricity Distribution (NGED), Wales and West Utilities (WWU), EPCs (supplementary role).

Bottom-up modelling approach to estimate energy use and emissions



Total energy use

9.1GWh electricity

80% of this is used by just 27 businesses

14.4% of 191 businesses.

5.8GWh gas

80% of this is used by 26 businesses

13.6% of 191 businesses.

GHG Emissions

3.8ktCO2e

4% of Teignbridge's commercial/ industrial total

Sector insights

Food and drink sector dominates emissions

top 2 businesses = 39%

Largest end uses
Lighting (17.1%)
Process energy (14.6%)
Cooled storage (10.1%)

Decarbonisation Measures & Infrastructure

Four-phase project structure

Type of intervention	Intervention	Projected outcomes
Electrification Primary decarbonisation route	EV charging	324 EV chargers projected by 2050. EV charging could represent 55% total electricity demand by 2050
	Heat pumps and replacement electric appliances (e.g. ovens, boilers)	Electrification of heating where heat pumps replace gas heating reduces gas demand by three quarters by 2036.
	Hydrogen and heat networks	Ruled out due to low viability and efficiency in this context (does not provide the heat density required).
Efficiency	Lighting upgrades	Lighting retrofits could save 539 MWh annually by 2032.
	Fabric upgrades	Fabric upgrades are generally not cost-effective due to low heating demand and long payback periods (e.g. 38–243 years). May in time lead to older buildings with poor thermal efficiency moving to unheated uses.
	Cooled storage efficiency improvements (destratification fans)	Could yield 22% energy savings for relevant businesses.
	Heat recovery from refrigeration compressors	Could reduce heating loads by up to 93% for relevant businesses.
Renewable energy	Rooftop photovoltaic panels (PV). Current picture: 24 rooftop PV arrays across 19 buildings generate 623 MWh annually. 530 MWh is self-consumed; 93 MWh is exported. Current PV generation offsets 4% of the estate's gross GHG emissions. PV potential is significantly underutilised—only 5% of the estimated 12.3 GWh technical potential is currently deployed.	Rooftop PV potential is high: up to 24.6 MWp capacity by 2050. Could meet 24% of electricity demand and export 15 GWh annually by 2050 (increased EV demand impacts this). Potential barriers: • Building fabric quality • Mismatches in timing and location • Limited impact on winter peak demand

Decarbonisation Measures & Infrastructure
3 Intervention cases were modelled:

Four-phase project structure

1

Thermal Electrification:
Efficiency upgrades and heat pump rollout (no EV infrastructure or new PV included)

Case 1 reduces GHG emissions by 97% (35 tCO2e, to include 3 tCO2e from F gasses.) by 2050 (compared to a counterfactual case where consumption continues at 2025 levels and decarbonisation relies solely on decarbonisation of the grid).

2

Full Electrification:
Adds EV charging infrastructure.

Case 2 sees GHG emissions rise (76 tCO2e), due to EV electricity demand.

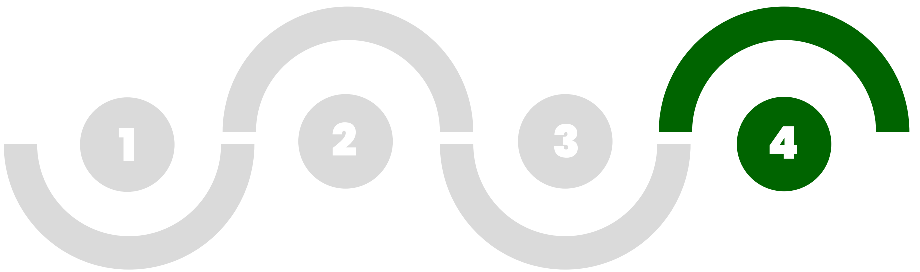
3

Solar-Assisted:
Adds full PV deployment.

Case 3 offsets some of this with PV, achieving 56 tCO2e GHG emissions in 2050.

- **Without EVs and PV, there is little change in peak demand over 25 years (at 2.9-3.0 MW).**
- **However, by 2050 EV's almost triple peak demand to 7.8 MW in 2050.**
- **Maximum PV (summer generation) nearly negates the additional EV load. However, PV has very limited impact on winter peak load (-0.5 MW or -7%).**

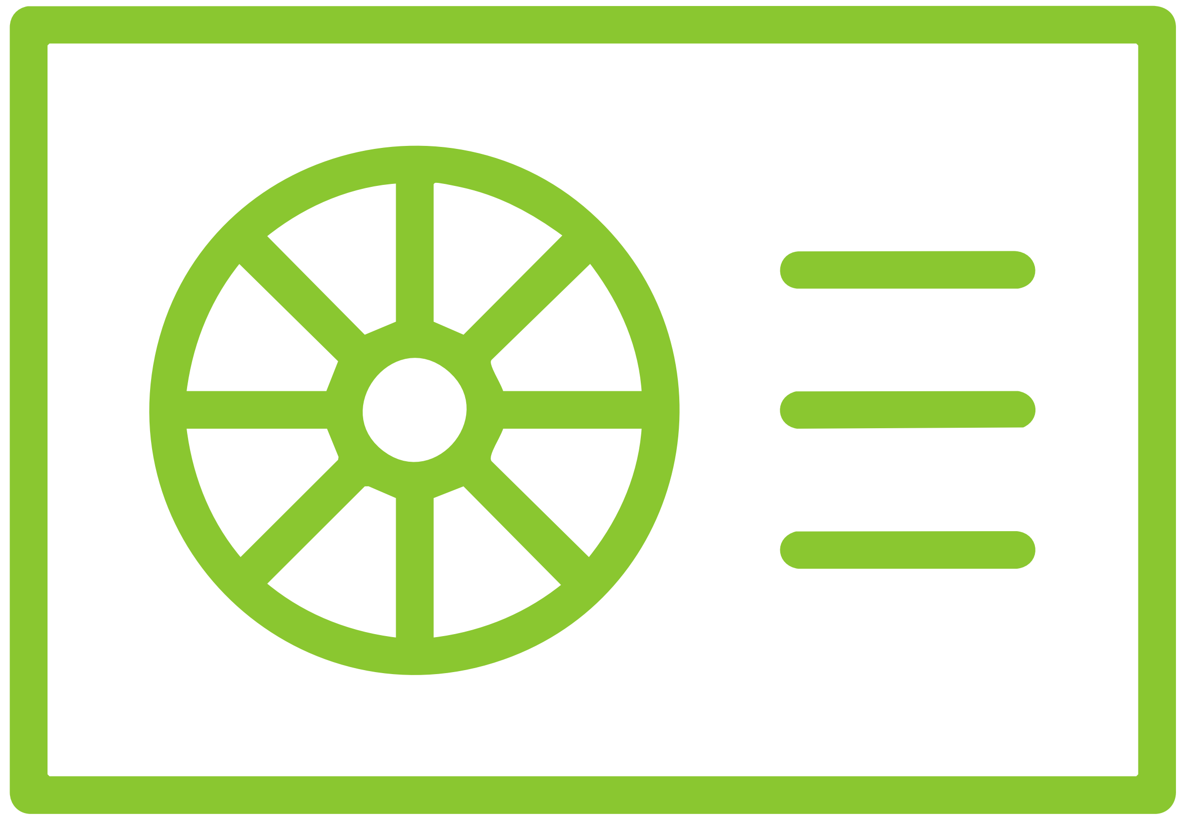
Energy System Opportunities for Decarbonisation at Heathfield



Four-phase project structure

Electrification Gains:

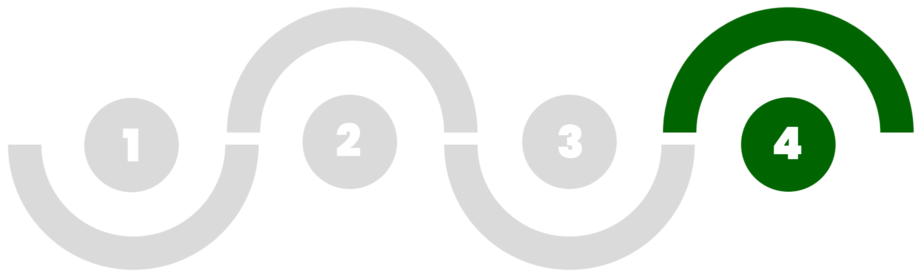
- Heat pumps + replacing gas with electricity in relevant industrial processes
- 74% reduction in energy use by 2050



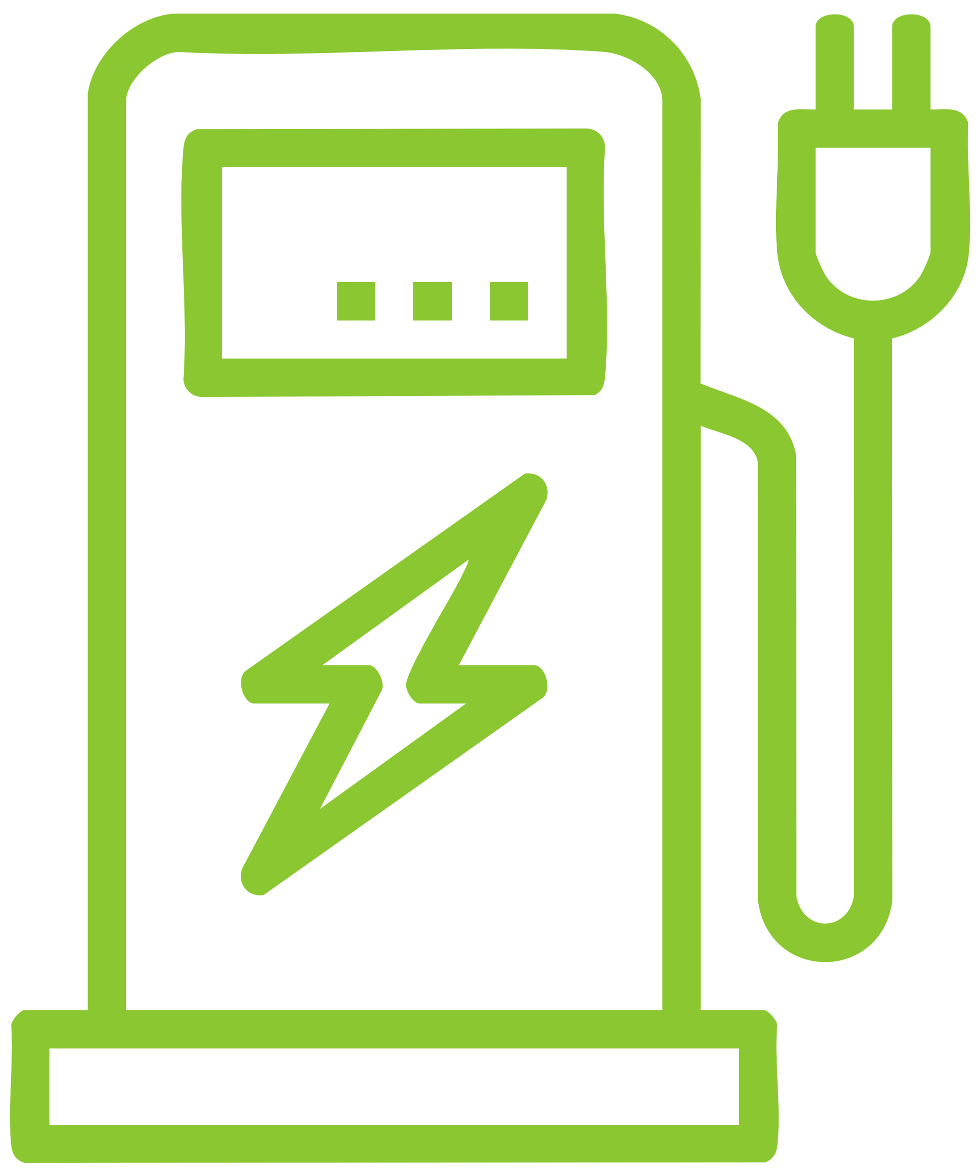
The challenges:

- **Levies on electricity bills** currently distort the retail price of electricity relative to gas. This disparity combined with the capital costs involved currently make it uneconomic to replace gas fired heating and hot water systems with heat pumps in existing non-domestic buildings.
- **Business engagement** on energy issues is low (as shown in Phase 1)
- **Land ownership** is fragmented and tenure is mixed. Heating systems often provided by the landlord in leased premises.

Energy System Opportunities for Decarbonisation at Heathfield



Four-phase project structure



EV Charging Infrastructure:

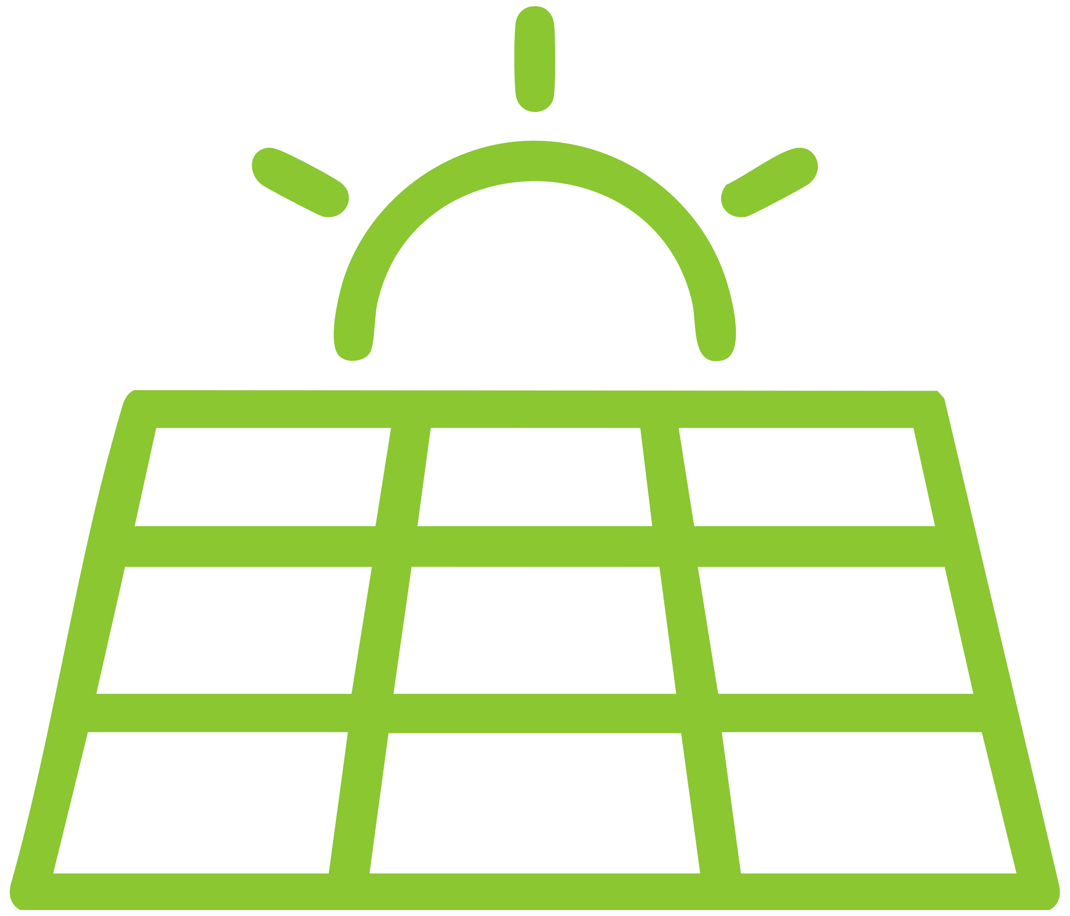
- 324 charge points
- 55% of electricity demand by 2050
- Presence of distribution businesses on HIE impacts on this

Opportunity: Significant Government support available to businesses. Possible role for local authorities to promote schemes to businesses to accelerate EV adoption.

Energy System Opportunities for Decarbonisation at Heathfield

Solar PV Deployment:

- 91% theoretical coverage
- 25% direct supply; 15 GWh exported



The challenges:

Mismatches in timing and location (e.g. most buildings with the largest PV potentials have low electricity demand). Only 25% of electricity generated directly consumed with remaining 15 GWh exported. Providing few incentives for businesses to invest in their own battery storage systems.

Battery Storage:

- Limited viability for individual businesses
- Shared systems show better performance but sufficient current and projected 2050 electricity supply capacity (modelled total peak HIE electricity capacity in 2024 is 21% of total substation capacity) = little financial incentive to invest

Opportunity and Impetus

The project does not identify significant specific energy system investment opportunities on the HIE that are likely to be financially viable currently. Future national policy change may create incentives.

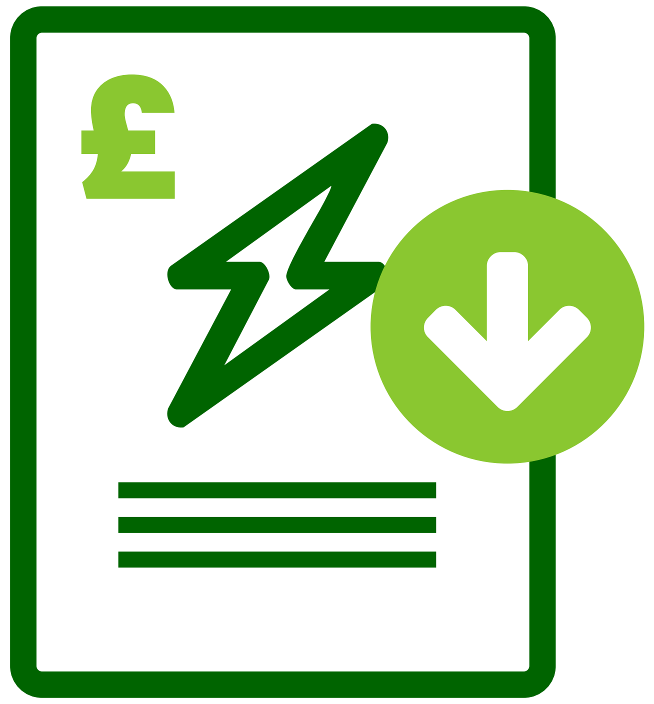
However, the project provides in depth and transferable insights on industrial estate decarbonisation potential and can feed into energy planning and policy making.

In summary – the **opportunity** is there. The **impetus** (at present) is not.

Potential future policy levers:

- Ban on gas boiler sales

- Removing levies on electricity bills, making electrification more financially attractive



Scaling the Heathfield Model Across and Beyond Devon

Benchmarking Approach:

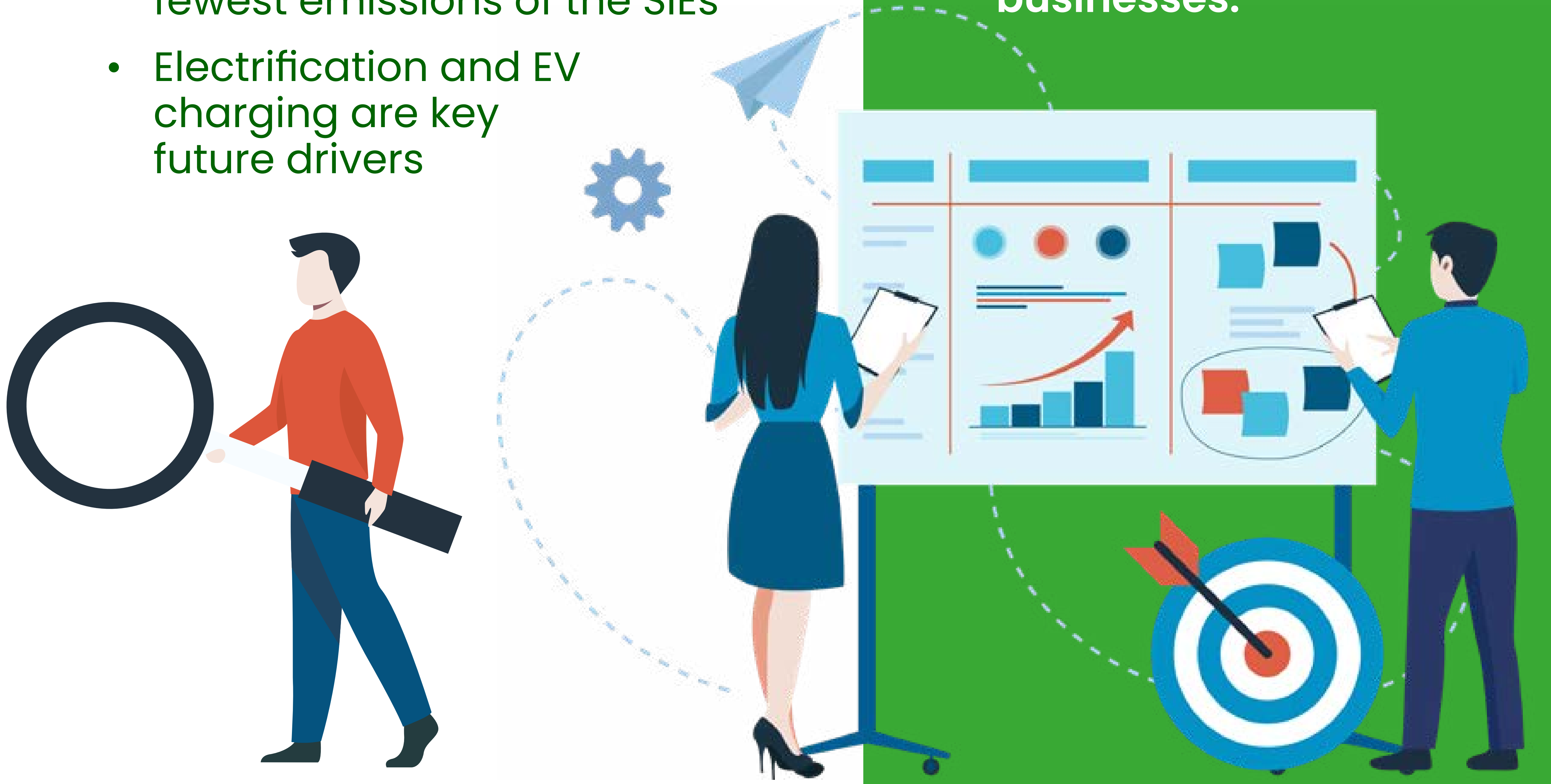
- Use class-based energy and emissions benchmarks
- Applied to 126 industrial estates across Devon
- Five estates selected for further data modelling

Identified Candidates – similar to HIE in age, size, type:

- **Walls End** – Plymouth
- **Lee Mill** – Ivybridge
- **Pottington** – Barnstaple
- **Newnham** – Plymouth
- **Pathfields** – South Molton

Infrastructure Insights:

- Data suggests that the generic decarbonisation trajectory established for the HIE can be applied to assess the approximate pathway for each estate for comparison with the HIE and each other
- Most estates have <25% capacity utilisation
- However Lee Mill has 43% electricity capacity utilisation (compared to the HIE at 16%) – an exception where businesses report supply shortages – potential appetite for engagement?
- Two estates had few industrial businesses (Walls End Industrial Estate and Pathfields Business Park) meaning low grid gas and electricity consumption resulting in them being responsible for the fewest emissions of the SIEs
- Electrification and EV charging are key future drivers



Potential Opportunities

- **Canvasing businesses about energy in Lee Mill may get significantly different responses to HIE.**
- **Lee Mill may be the place to assess the viability of early PV deployment.**
- **EV transition will present additional challenges for electricity supply on the estate potentially increasing impetus for decarbonisation among businesses.**

Implications for Local and National Energy Planning and Policy

Modelling and process

- What worked: data modelling, utility partnerships, PV mapping
- What didn’t: business engagement, gas data granularity

Local implications:

- Local area energy plans (LAEP) typically not resourced to undertake detailed analysis and modelling.
- Phase 2, 3 and 4 reports provide insights into the commercial and industrial sector which can be incorporated into LEAPs.

National policy issues:

- Access to meter level half hourly energy data
- Lack of half hourly gas meter data
- Timetable for a ban on commercial gas boiler sales
- Removing levies on electricity bills which currently distort the retail price of electricity relative to gas

Topline takeaways

Decarbonisation potential

- **Electrification is feasible and effective for decarbonising HIE.** However, for most businesses there are not sufficient special circumstances on the HIE to make the investment needed to progress decarbonisation before these policies are put in place.

- **Many of the barriers are generalisable across other Devon industrial estates** (e.g. capacity use (with the exception of Lee Mill), low business interest, low heating use, no incentive on electricity and gas prices).

- **EV charging is the dominant future energy load.**

- **PV can significantly reduce grid reliance, especially in summer.** Potential role for widespread PV deployment to provide local generation in industrial estate settings but little current incentive without policy changes.

- **Heat networks, hydrogen and fabric retrofit unviable** due to low heat density and long payback times respectively.

Replicability

- The modelling and benchmarking approach is applicable to other industrial estates.
- For Devon, Lee Mill is identified as a promising candidate for early PV and battery deployment due to higher capacity utilisation and anecdotal supply constraints.
- While Devon's industrial estates share similar challenges, these may well differ in other areas of the UK where the usage is significantly different.

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