Guidehouse

ade Research

Scottish & Southern Electricity Networks

RIDES – Rural Industrial DEcarbonisation Support

Show and Tell presentation

THURSDAY 22 MAY 2025

Scottish & Southern Electricity Networks

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Agenda

- Welcome and introductions
- SIF funding and addressing the challenge
- Project overview
- Project findings and insights
- What’s next
- Slido questions
- Questions please

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THE RIDES TEAM

Guidehouse	**Magali Aurand** **Alex Jakeman** **Motunrayo Ajia**	Guidehouse are a consultancy with a wealth of expertise in energy, infrastructure and data. Guidehouse had the idea to evaluate and address rural industrial decarbonisation as part of SIF.
ade Research	**Aaron Gould** **Philip Nicholson**	ADE is an industry association, that joined RIDES to contribute to their strategic goal of ensuring every household, business and industrial site has a commercially viable path to decarbonisation.
Scottish & Southern Electricity Networks	**Simon O'Loughlin**	SSEN are the distribution network operator for the north of Scotland and central southern England. SSEN project managed and brought energy system experience to RIDES.

SIF FUNDING

The Strategic Innovation Fund (SIF) aims to help transform gas and electricity networks for a low-carbon future.

For energy consumers, SIF projects:

- reduce costs and increase value for money
- create innovative products and services
- provide energy security

For businesses, SIF projects:

- finance growth and scalability
- help with collaboration
- encourage more investment

This is typically done over three phases:

1. **Discovery** – A two-to-three-month feasibility study
2. **Alpha** – up to six months to provide proof of concept
3. **Beta** – a longer-term development phase

ADDRESSING THE CHALLENGE

SIF entered Round 4 last year.
We worked on Innovation Challenge 3 which was to:

"Embed resilience by developing novel and replicable approaches to support rural decarbonisation in a timely, resilient and cost-effective manner."

RURAL DECARBONISATION

To **support rural decarbonisation,** we asked ourselves three core questions:

1. Which industry types emit most carbon?
2. How can they decarbonise?
3. What barriers will they face?

Helping rural industries to decarbonise was the natural place to start. Especially in the most rural area of the UK with miles of electricity network to serve smaller remote communities.

Rural industries are key employers, critical to rural economies, often tied geographically to a community and usually off gas grid with limited spare electricity capacity.

THE SCALE OF THE CHALLENGE

This wasn't going to be an easy task, especially when:

- 13.7% of UK's carbon emissions come from industry
- Gas and electricity network operators have usage data, but don't know how it will change as industry decarbonises
- Industries often lack clear decarbonisation strategies and aren't aware how their chosen pathways will impact networks
- Without knowing these pathways, network operators risk making inefficient network planning decisions. In turn, this would increase energy bills and risk energy infrastructure falling behind demand
- Many rural industrials are off-gas grid and rely on fossil-fuels like oil, LPG, and diesel
- Network companies don't currently have consumption data for off-gas grid sites, exacerbating the challenge of accurately forecasting network impacts from industrial decarbonisation

PROJECT OVERVIEW

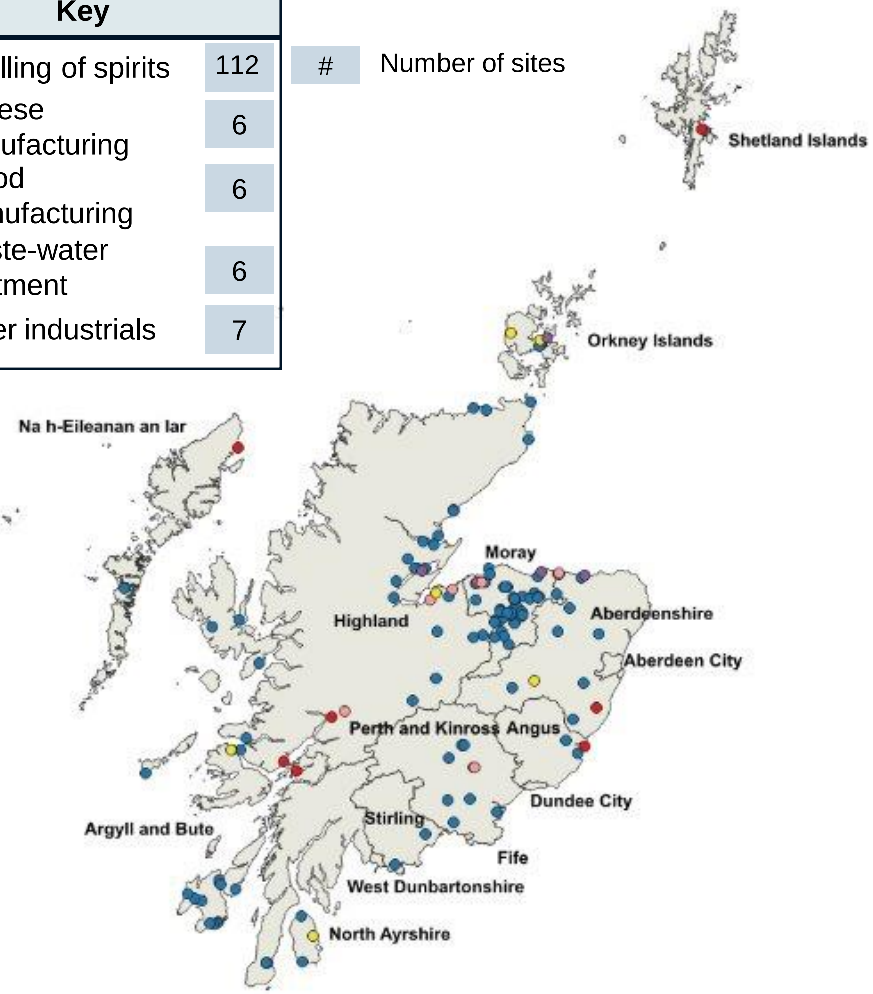
For the Discovery phase, we had a clear work plan with five work packages including project management. We focused on:

Topic	Lead
Research and Engagement	ade Research
Rural industrial energy user data mapping, decarbonisation pathway options and CBA	Guidehouse
Digital solution conceptual design	Guidehouse
Governance, policy and regulation	ade Research

WE FOCUSED OUR MAPPING EXERCISE ON SSEN'S SCOTLAND LICENCE AREA, IDENTIFYING AND CATEGORISING 137 SITES

Key	
Distilling of spirits	112
Cheese manufacturing	6
Wood manufacturing	6
Waste-water treatment	6
Other industrials	7

Number of sites



Data mapping of rural industrial sites in SSEN's SHEPD licence area

Key takeaways:

- The majority of rural industrial sites identified in this area were **distilleries**. Other key sectors include **cheese making**, **wood manufacturing**, **wastewater treatment**, **lime and cement manufacturing**, and **ceramics**.
- Some rural areas (e.g. Moray) show high concentrations of rural industrial sites which could be clustered from an electrical connection perspective.
- Data showed a high industrial consumption of petroleum products in the Highlands, likely due to a relatively low percentage of sites being connected to the gas grid.
- While we were able to find geolocation data for many sites, there was little publicly available data on energy usage or emissions, demonstrating there is a data gap.

GATHERING EVIDENCE

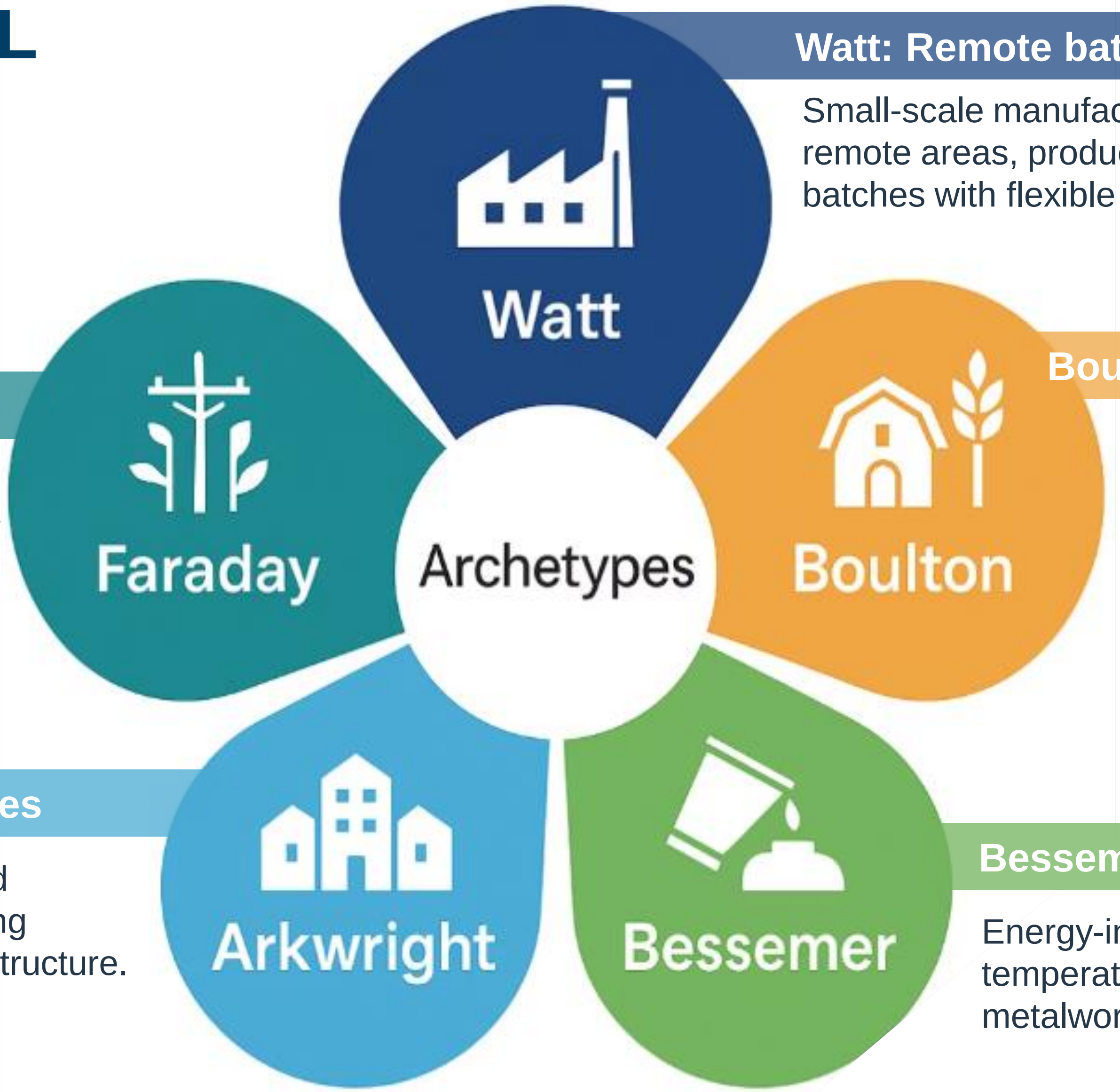
Interviews → Insight Mining → Policy Scan

- **15 in-depth interviews – 26 individual voices** drawn from food & drink, glass, chemicals, waste, LPG, DNO/GDN engineering, tech suppliers and regional net-zero bodies
- Each conversation probed grid pinch-points, cost hurdles, policy friction and innovation appetite; transcripts coded, themes validated in an expert round-table
- **18 key policy & regulatory papers** scanned – Net Zero Strategy, Industrial Decarb Strategy, RIIO-ED2, REMA, Hydrogen & CCUS funds, devolved plans – mapping the rule-book that shapes rural decarbonisation.
- Fusing field insight + policy scan created the evidence spine for our five-archetype model

EIGHT RED FLAGS SURFACED AGAIN AND AGAIN

- Connection timelines and the cost of connections can delay projects
- Spark-gap – electricity 4 to 6 times the price of gas and oil
- Funding and infrastructure skewed to big clusters
- Planning or permit drag can add ~9 months
- SMEs chase 3-year paybacks → CAPEX choke
- Skills/advisory vacuum in dispersed regions
- Limited awareness of feeder headroom information and data
- Policy uncertainty (H_2 vs electricity vs CCS) freezes decisions

THE FIVE RURAL INDUSTRIAL ARCHETYPES



Watt: Remote batch producers

Small-scale manufacturing sites located in remote areas, producing goods in discrete batches with flexible scheduling.

Faraday: Off-grid anchor

Diesel-dominant; logistics-heavy; candidate for renewable microgrids and containerised storage.

Boulton: Seasonal agro-processors

Facilities that process agricultural products in line with seasonal harvest cycles, often dependent on local crop availability.

Arkwright: Rural SME estates

Clusters of small and medium-sized enterprises in rural locations, forming industrial estates with shared infrastructure.

Bessemer: High-T heavy industry

Energy-intensive industries requiring high-temperature processes, often related to metalworking or chemical production.

CROSS-CUTTING CHALLENGES AND WHY THEY MATTER

Capacity first

Low-capacity rural circuits delay Watt & Boulton electrification, limiting the ability to connect new renewable energy and industrial loads. We need to find additional capacity using local flexibility, local generation and storage, or upgrading the network, to unlock progress across these rural industrial archetypes and enable reliable power where needed.

Fair power pricing

Spark-gap pricing blocks uptake by causing electricity costs to be 4 to 6 times higher than gas or oil alternatives. Introducing Supercharger-style relief mechanisms can reduce these price shocks, making electrification economically viable for rural industries and encouraging broader adoption.

Policy equity

Current policy and funding focus disproportionately on large clusters, sidelining Bessemer & Faraday archetypes, which represent high-temperature heavy industries and diverse rural SME estates, respectively. Ensuring equitable policy support is essential for balanced regional development and inclusion of all rural industrial sectors.

Capability lift

Without targeted SME advisory services, Arkwright estates remain fossil-locked and unable to transition to cleaner technologies. Building advisory capacity and skills in these dispersed regions is vital to support SMEs in navigating electrification pathways and accessing resources.

KEY FINDINGS FROM RIDES DISCOVERY ENGAGEMENT

Embed electricity levy relief:

Factor British Industry Supercharger savings into electrification ROI models

Promote flexible connections:

Integrate non-firm access options into RIDES optioneering pathways.

Streamline permitting:

Develop step-by-step regulatory guides and a rural "one-stop" permitting portal.

Support SME navigation:

Offer templated applications and advisory support for rural firms.

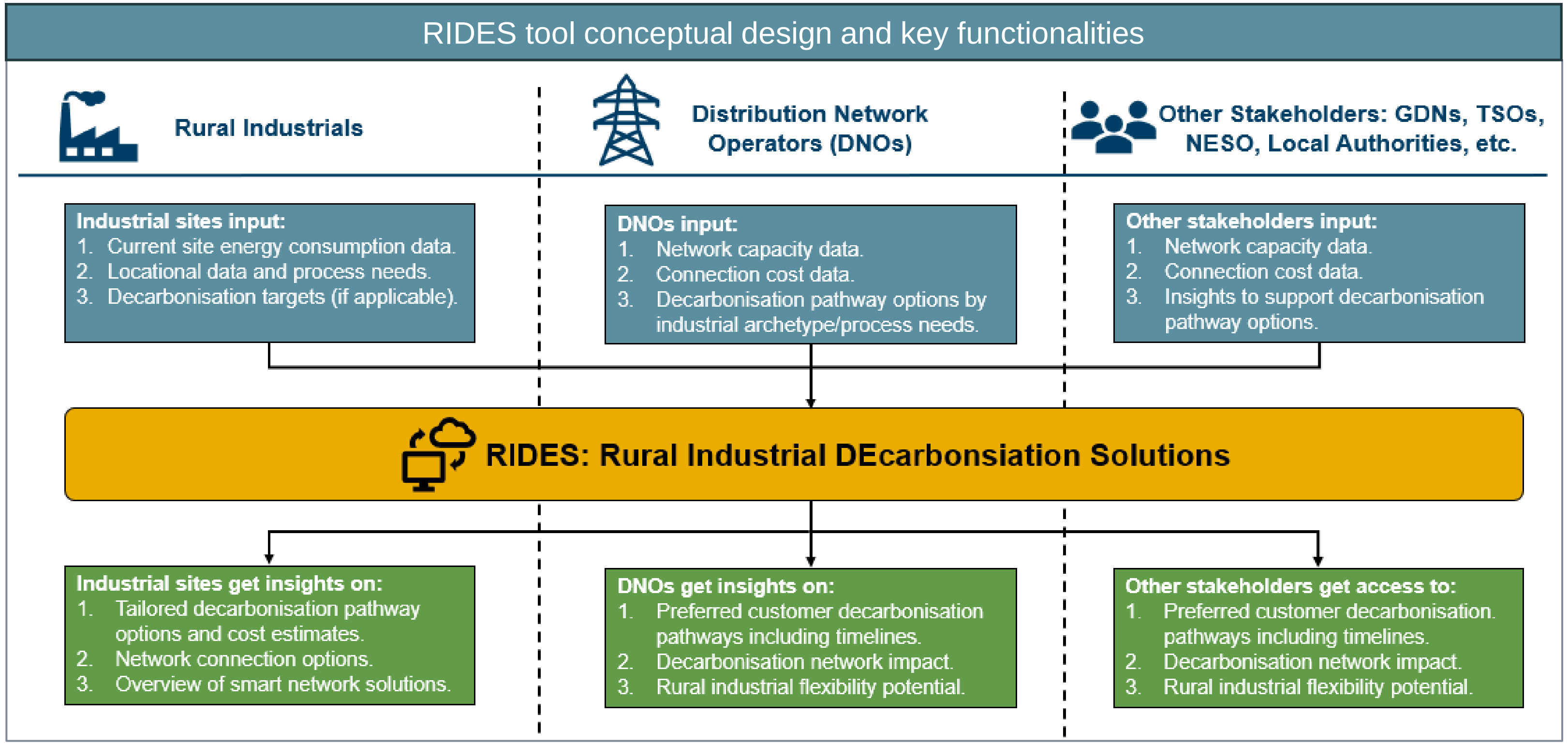
Champion rural equity:

Engage with REMA, RIIO-ED3, and NZIP reforms to secure strategic funding.

Highlight system value:

Emphasise balancing and resilience benefits of rural industrial electrification.

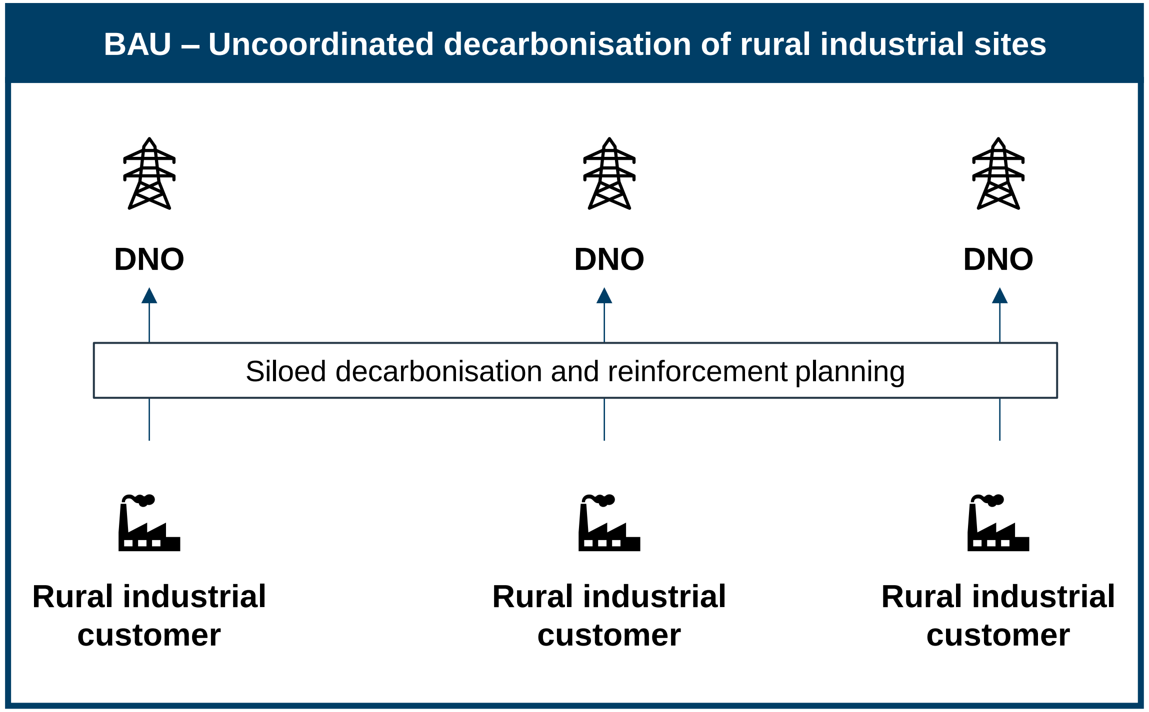
A CONCEPTUAL DESIGN OF THE RIDES TOOL WAS PRODUCED, AND ITS KEY FUNCTIONALITY DEFINED

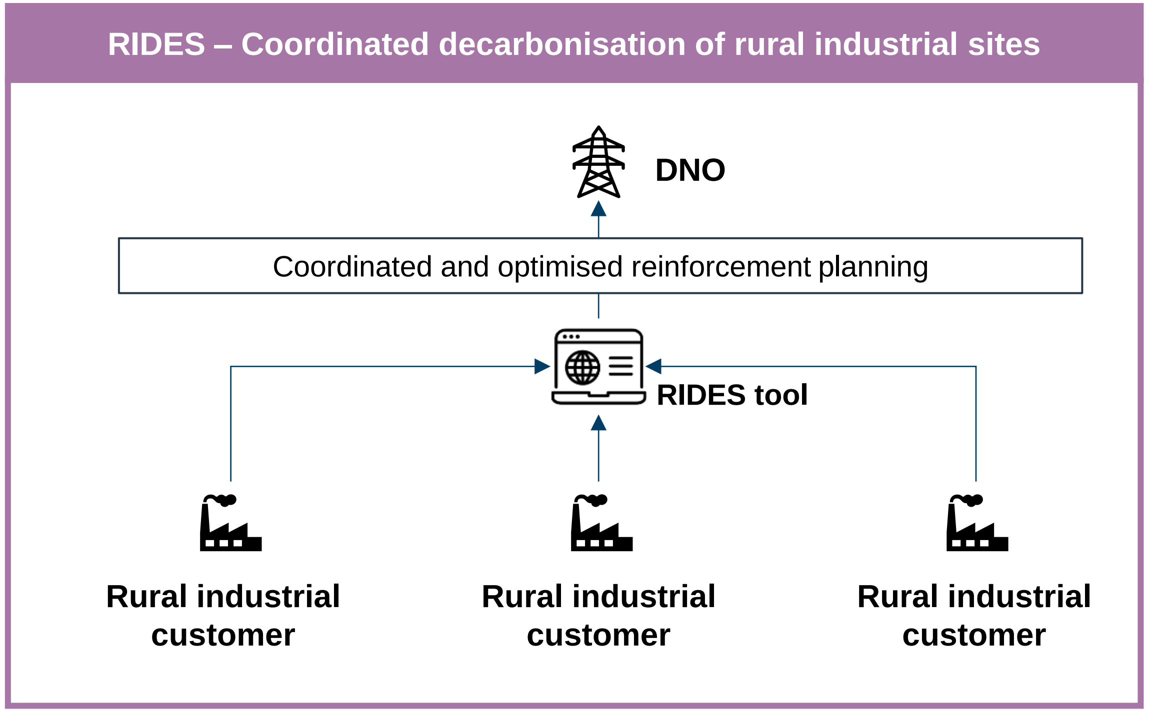


Ref	Requirement
1	Data upload and storage
2	Access control
3	User interface
4	Up to date network information
5	Up to date decarbonisation information
6	Data visualisation
7	Simple algorithms
8	Data exports
9	Open methodology

We also performed an impact assessment of the tool on various stakeholders and produced a user journey flow diagram from a rural industrial customer perspective

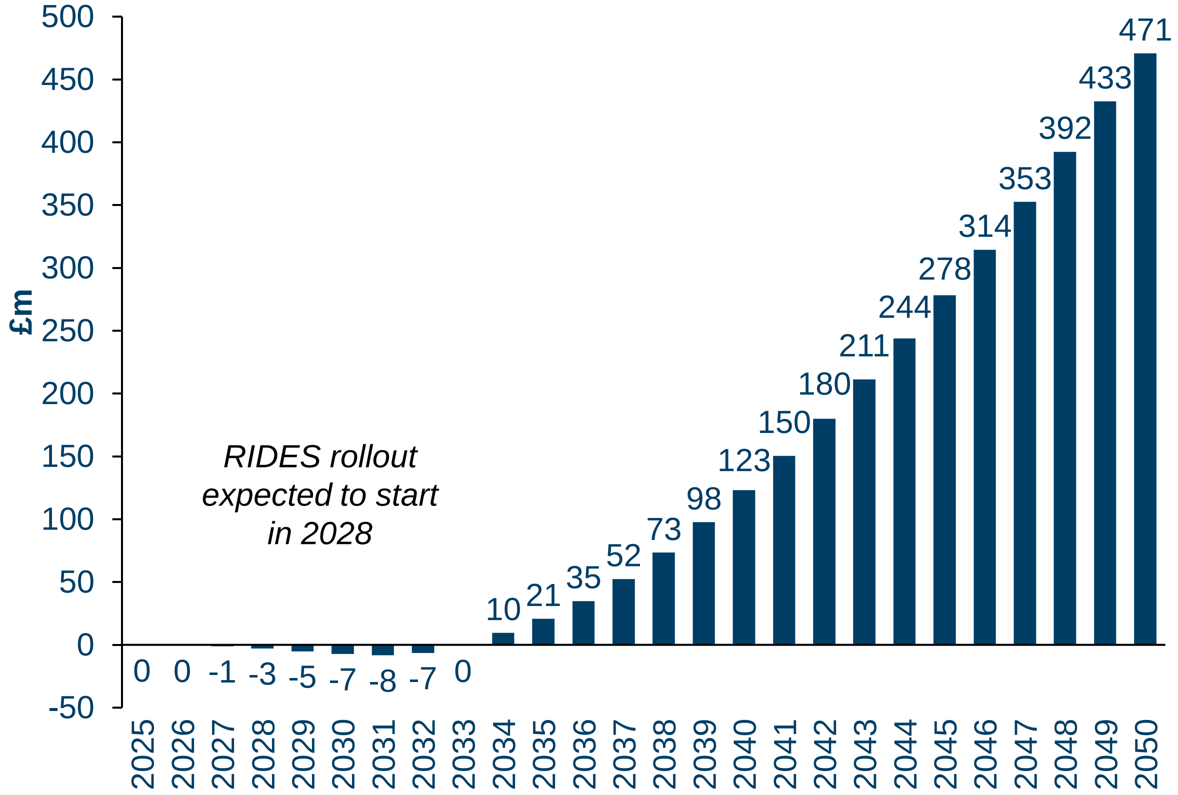
THE RIDES TOOL WILL HELP RURAL INDUSTRIALS SELECT THE RIGHT DECARBONISATION PATHWAY FOR THEM AND ALLOW THE DNO TO BETTER PLAN FOR FUTURE ELECTRIFIED DEMAND





A COST BENEFIT ANALYSIS SHOWED RIDES COULD DELIVER UP TO £470M OF BENEFITS BY ENABLING STRATEGIC REINFORCEMENT

Cumulative discounted net benefits of the RIDES tool in GB (£m)



GB Benefits	SSEN SHEPD Benefits	
£470m	**£34m**	of cumulative discounted net financial benefits by 2050
11ktCO_2e	**800tCO_2e**	of avoided carbon emissions by 2050
2,800 MVA	**200MVA**	reduction in required network reinforcement by 2050

Additional benefits of RIDES

- RIDES supports rural communities to decarbonise, helping to sustain local economies and reduce carbon emissions.
- RIDES assists rural industrials in providing flexibility which enhances grid resilience and also creates a new revenue stream for industrial customers

WHAT'S NEXT

The findings and reporting from RIDES Discovery will be available on the Energy Network Association Smarter Network Portal and from partner websites.

The complexities, barriers, multi-sector and whole energy system approach required to achieve rural decarbonisation will require additional work.

SSEN are reviewing their decarbonisation project portfolio to assess the best options for decarbonisation GB wide.

Other SSEN SIF decarbonisation projects include:

- **LEO-N** – Alpha complete
- **SeaChange** – Alpha complete
- **Fortress** – in Discovery
- **FARM** – in Discovery

Further reading:

- Strategic Innovation Fund (Ofgem)
- SSEN SIF Innovations
- ADE industrial electrification report

Call to action:

If you would like to be a partner, stakeholder or subcontractor on future decarbonisation projects please email:

futurenetworks@sse.com

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How useful do you think a RIDES tool would be?

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What other functionality would you find useful in a decarbonisation tool?

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Which of the following barriers do you think are most urgent to resolve for rural industrial decarbonisation?

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What other barriers do you think we need to consider in the next phase?

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Do the five industrial archetypes (Watt, Boulton, Bessemer, Arkwright, Faraday) reflect the types of sites you encounter in your work?

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What additional archetype(s) should we explore in the next phase?

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QUESTIONS PLEASE

THANK YOU