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HEAT SEMINAR

DRIVING STRATEGIC HEAT DECARBONISATION

26 FEBRUARY 2025 | GLASGOW

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WITH THANKS TO OUR SPONSORS AND SUPPORTERS

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State of the nation – the future of heat

Chaired by Helen Melone, Head of Heat & Solar, Scottish Renewables

Slido.com | #SRHEAT25 | @ScotRenew

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Esther Harris

Senior Analyst

Climate Change Committee

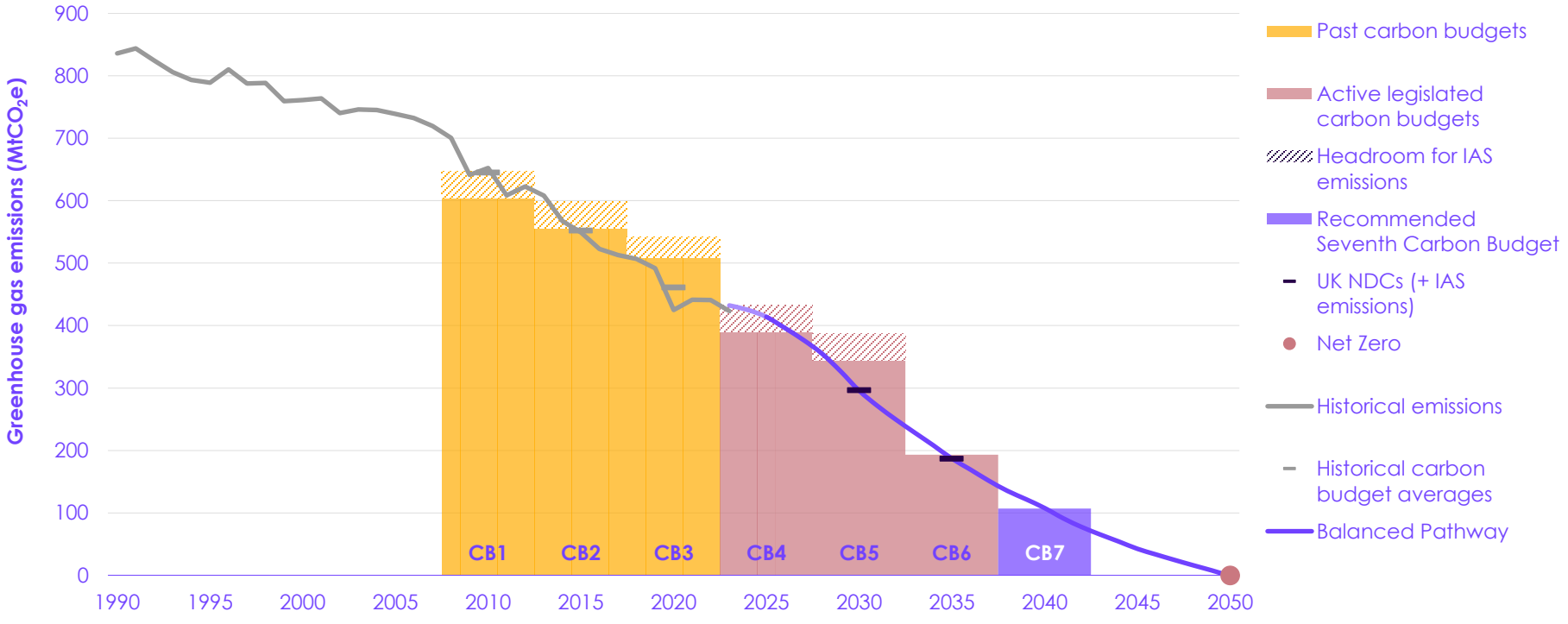
26 February 2025

Seventh Carbon Budget advice: Pathway for residential buildings

Esther Harris

The recommended Seventh Carbon Budget

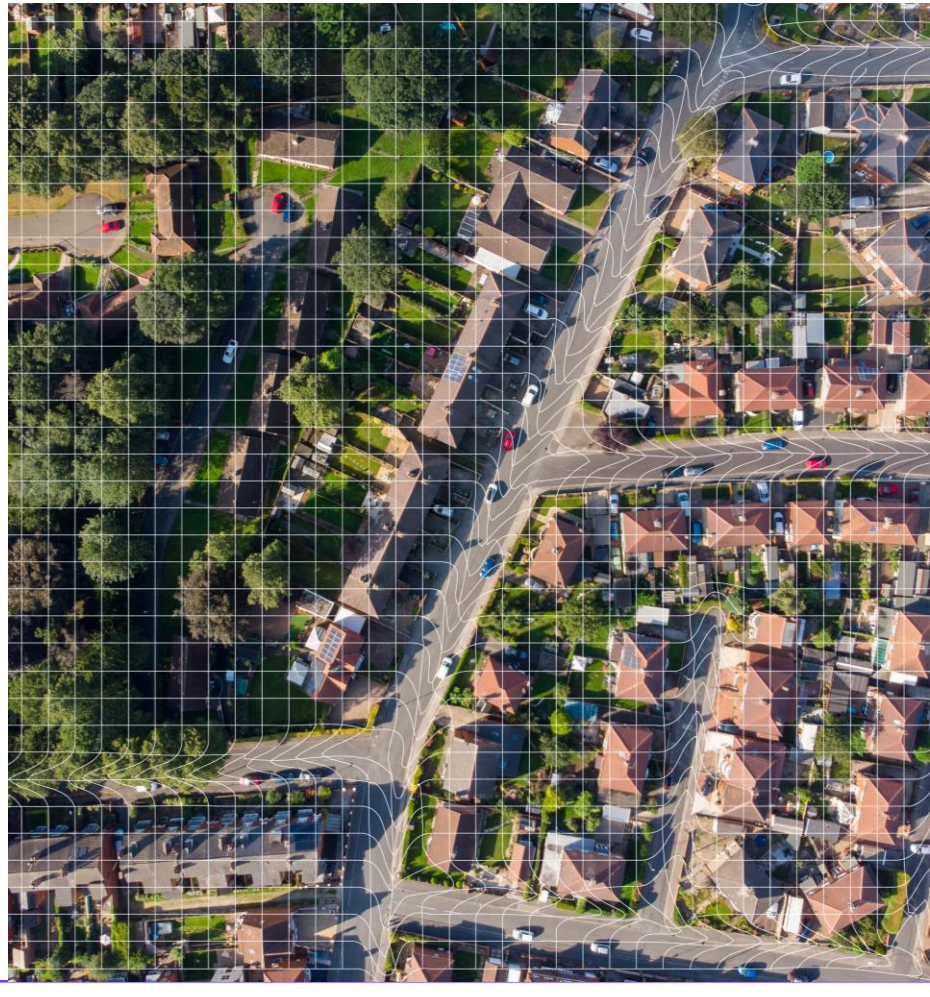
Our Balanced Pathway meets all existing carbon budgets, the UK's NDCs, and Net Zero



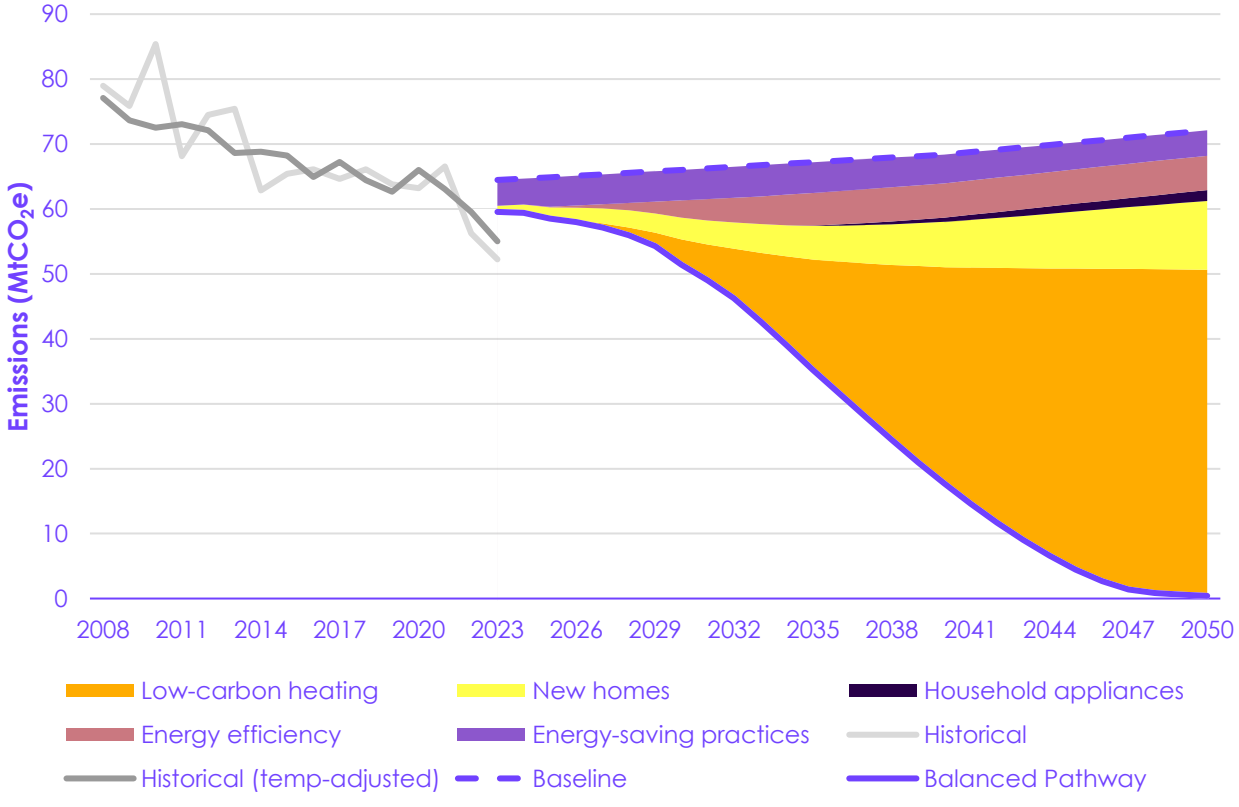
Source: CCC analysis.

Key messages for heating in the buildings sector

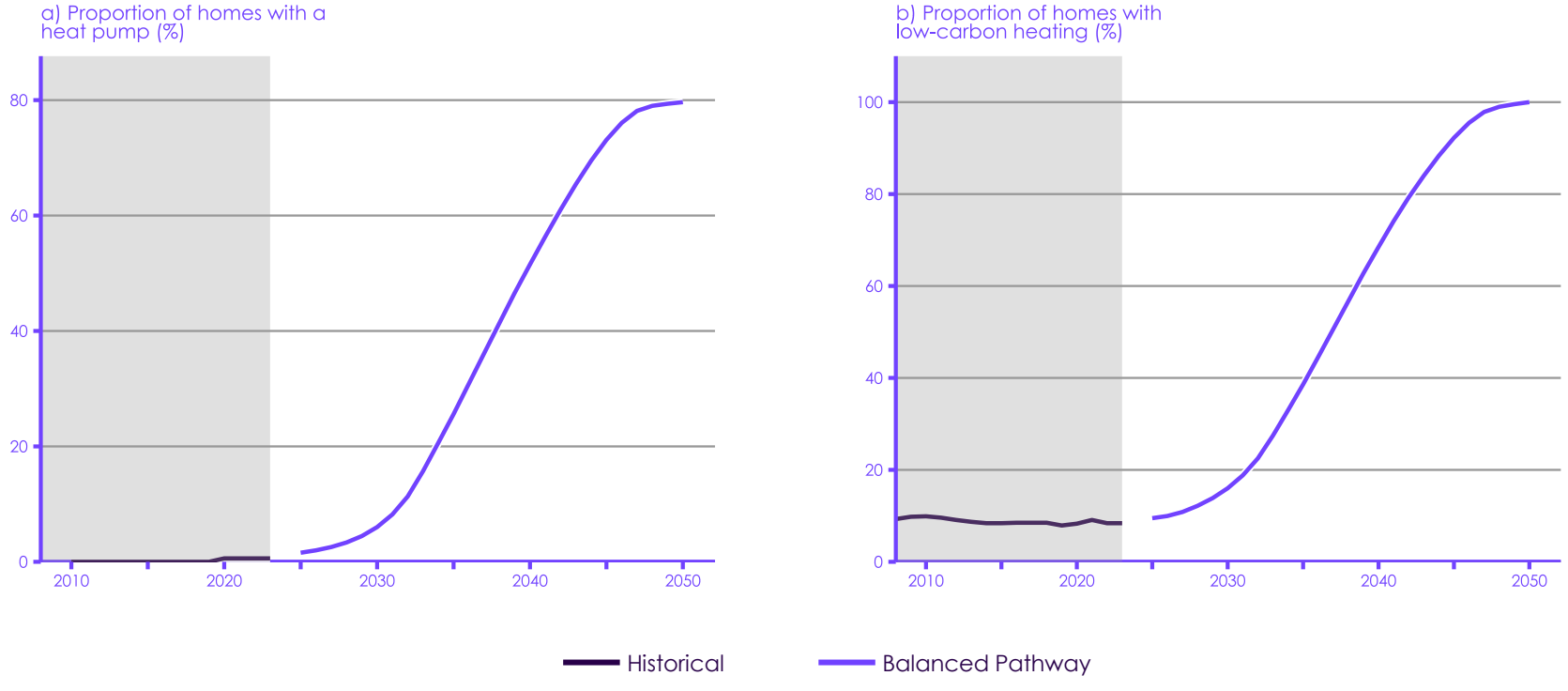
- Electrification of heating is essential to eliminating emissions from buildings.
- There is no role for hydrogen.
- Energy efficiency provides important near-term emissions reductions, delivering health benefits including reduced fuel poverty in the residential sector.
- Significant scale-up is required in the heat pump supply chain to reach required deployment rates for Net Zero.
- Households will need better incentives to adopt low-carbon heating, including cheaper electricity.
- The public sector decarbonises heat ahead of the commercial sector, with the Government leading by example.



Sources of abatement in the Balanced Pathway
Residential buildings



Key indicators for the buildings sector
Low carbon heat roll out



1st Floor, 10 South Colonnade
Canary Wharf
London, E14 4PU
www.theccc.org.uk

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Stewart Reid

Head of Future Networks

SSEN Distribution

SSEN APPROACH TO NET ZERO

STEWART REID
HEAD OF FUTURE NETWORKS
SSEN (DISTRIBUTION)

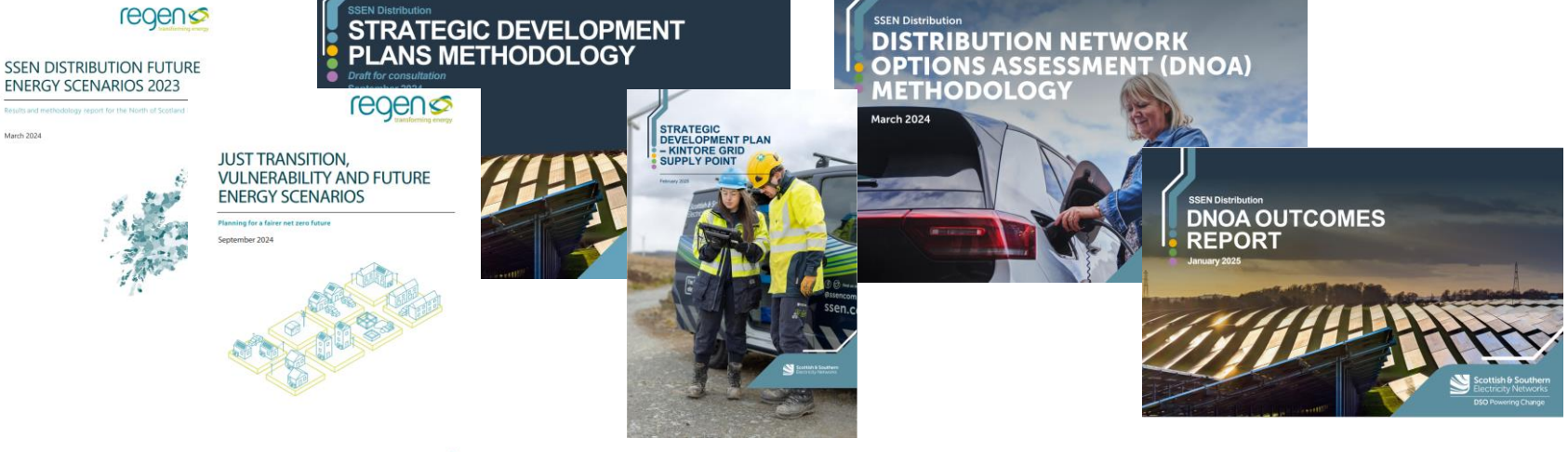
Scottish & Southern Electricity Networks

DSO Powering Change

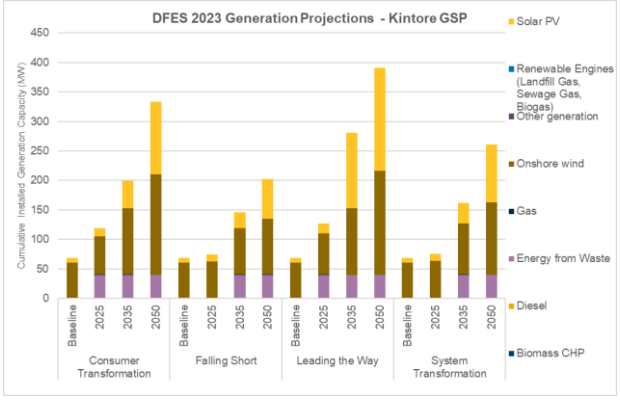
SSEN's STRATEGIC PLANNING PROCESS

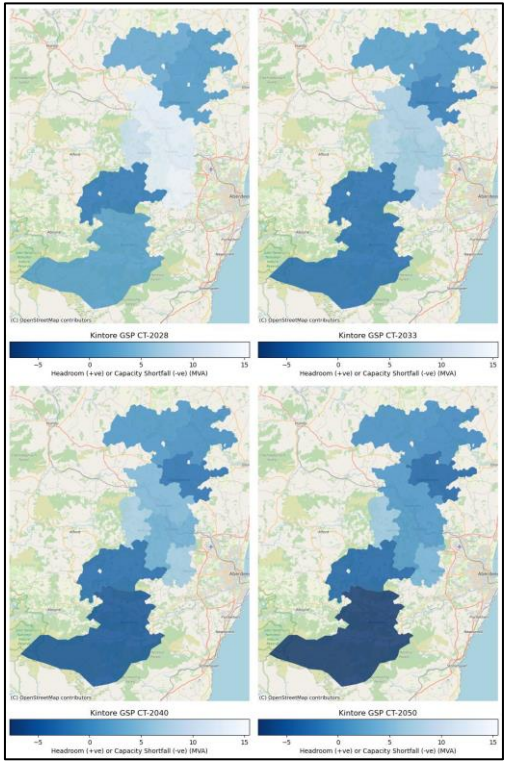
Making decisions today considering long-term and whole system needs.

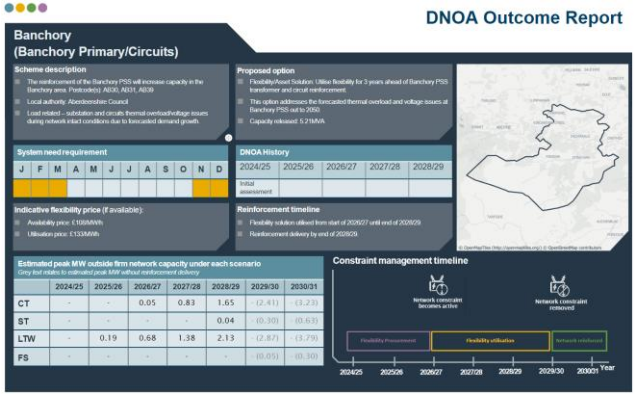
Forecasting needs → **Create strategic plan** → **Develop detailed options** → **Deliver projects**



KINTORE GRID SUPPLY POINT – CASE STUDY

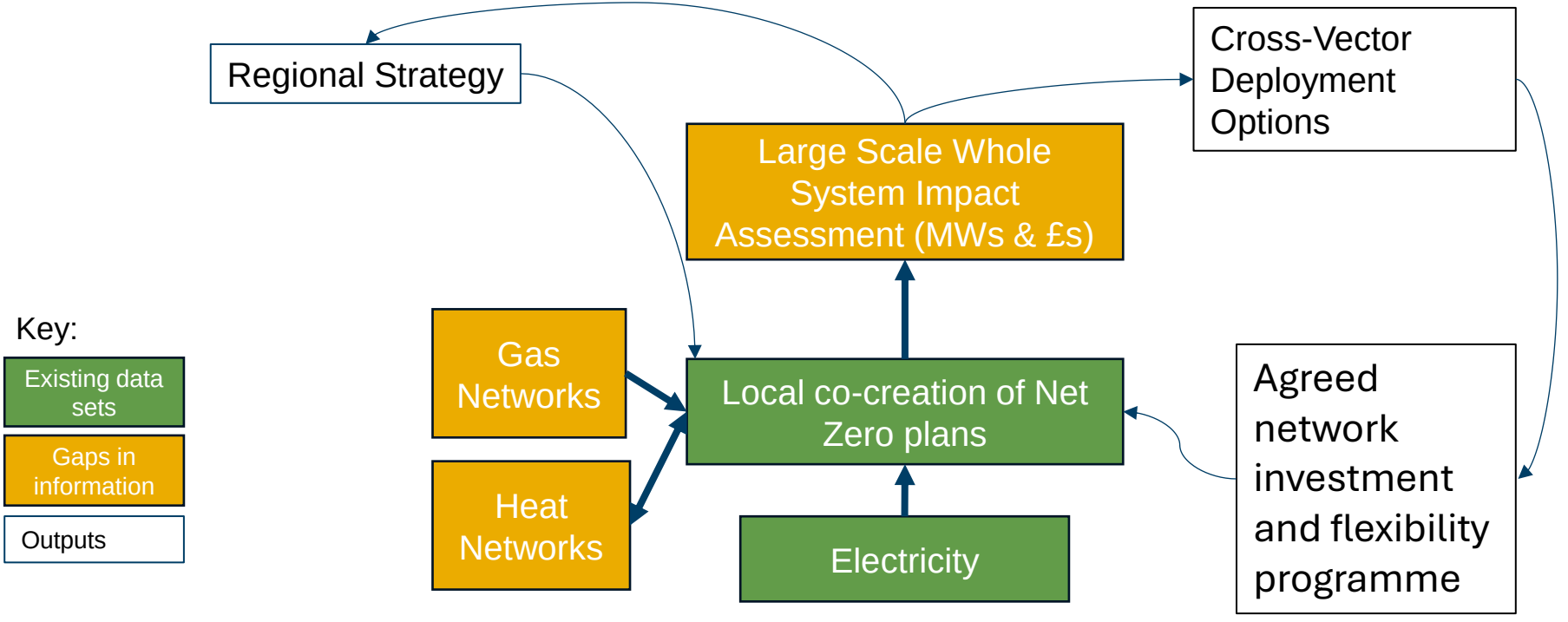






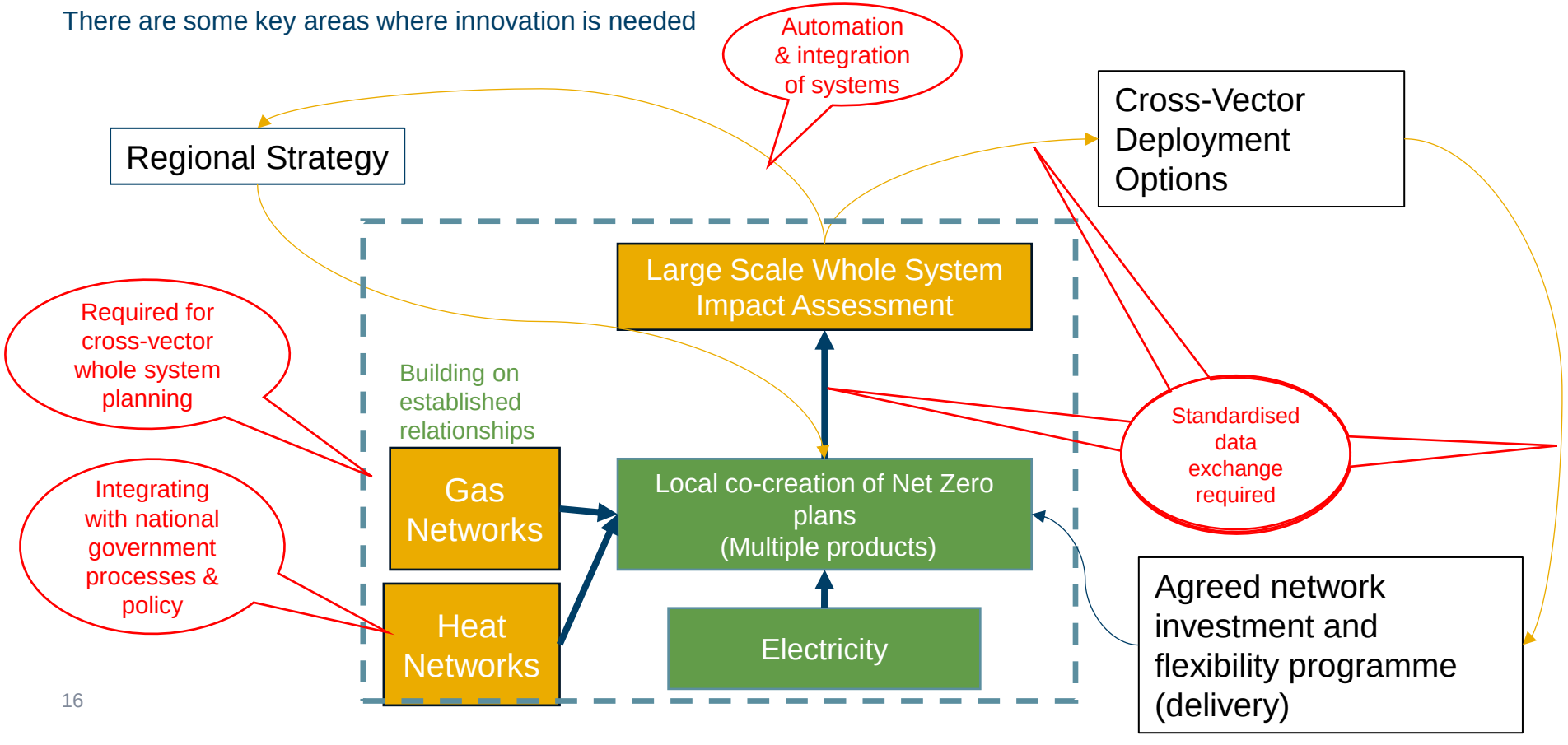
WHOLE SYSTEM DATA VISION

Our vision for **whole system coordination** sees network organisations (NESO, DNOs, GDNs, TOs etc) collaborating with Local Authorities to exchange standardised data for the development of local strategies and optimised plans.



WHOLE SYSTEM PROCESS VISION GAPS

There are some key areas where innovation is needed



THANKYOU

STEWART REID
HEAD OF FUTURE NETWORKS
SSEN (DISTRIBUTION)

Scottish & Southern Electricity Networks

DSO Powering Change

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Sheelagh MacGregor

Associate Director – Net Zero

Scottish Futures Trust

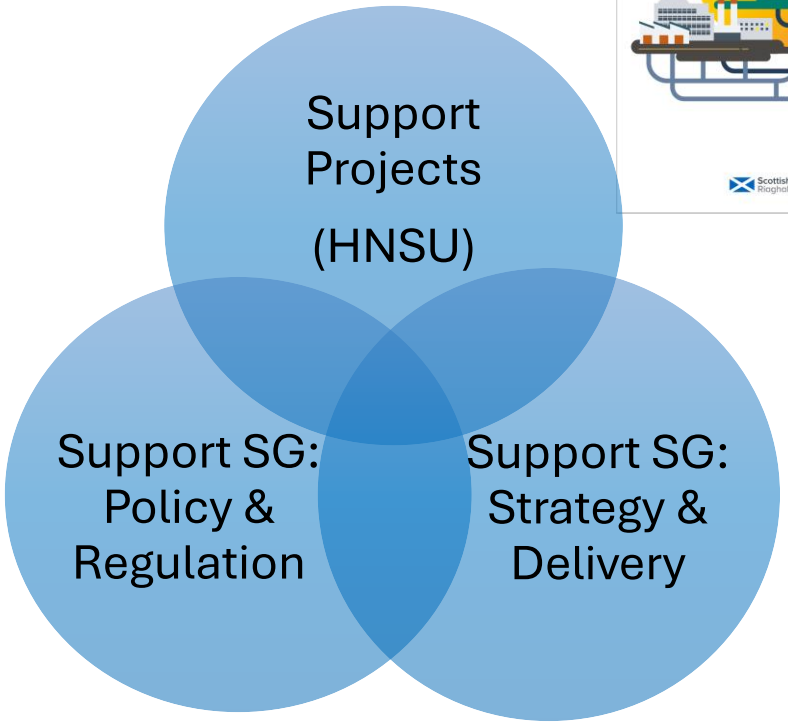
SCOTTISH FUTURES TRUST

State of the Nation: the future of heat

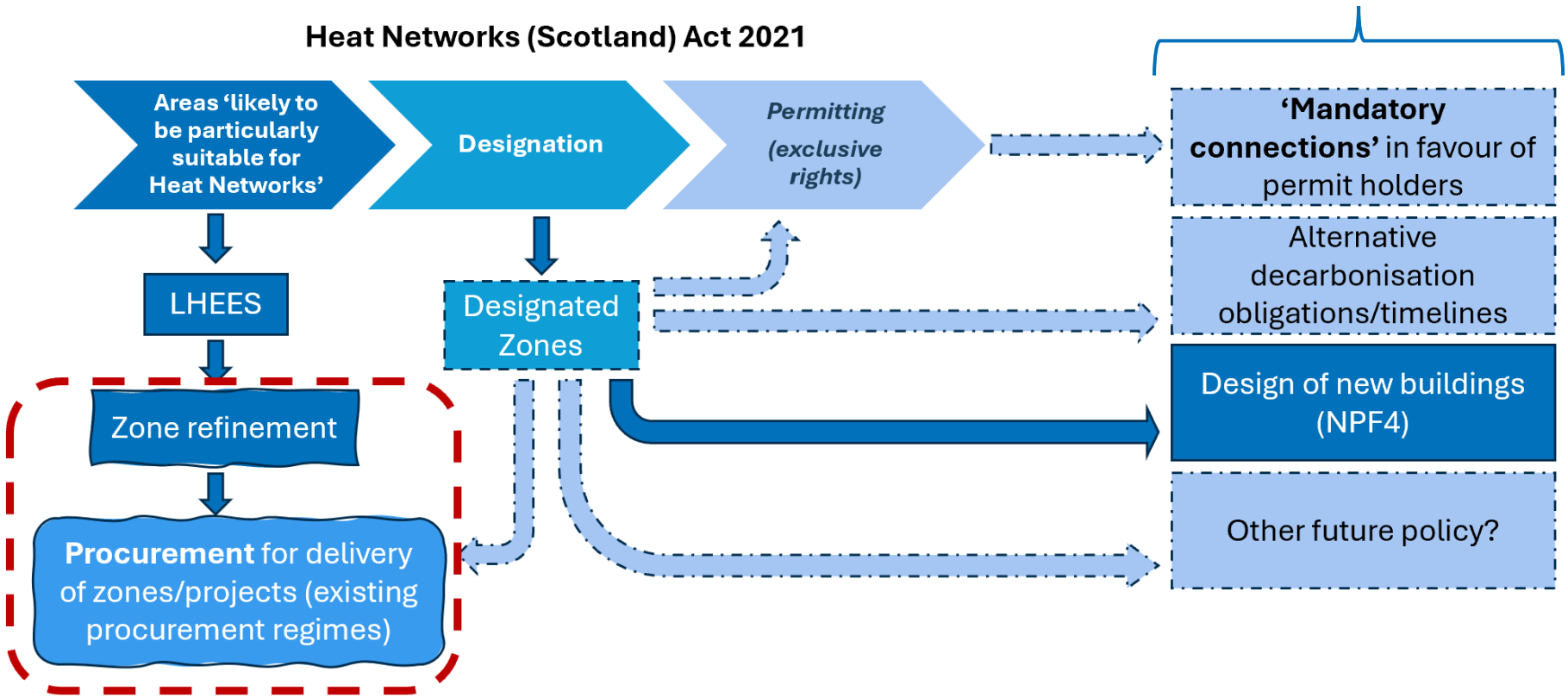
Sheelagh MacGregor
Associate Director
Scottish Futures Trust
26 February 2025

Scottish Futures Trust & Heat Networks

- **Scottish Futures Trust –** infrastructure ‘centre of excellence’, helping maximise the benefits from infrastructure projects
- Multi-disciplinary specialists supporting Scottish Government & the public sector with infrastructure **strategy**, **policy** and **delivery**
- **Net Zero Buildings team** – supporting decarbonisation of the built environment
- Part of the **Heat Network Support Unit** helping organisations create investable heat network projects

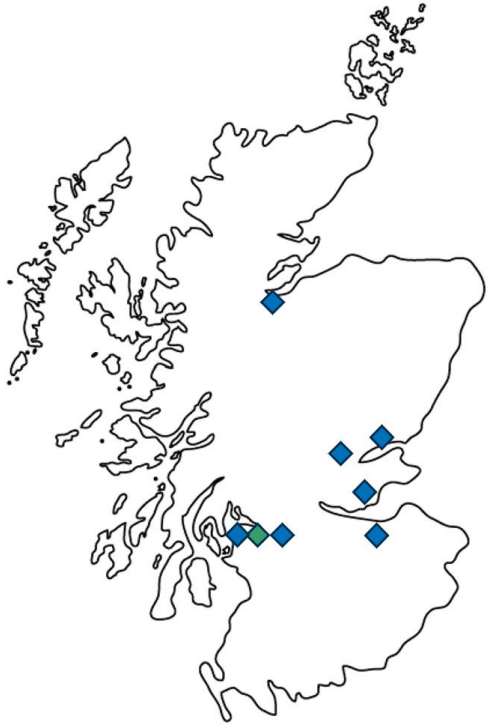


State of play: zoning & delivery



HNSU: ‘Critical friend’ support & development funding

- **Technical studies**: pre-feasibility, feasibility and addendums for specific heat network opportunities. Led by Zero Waste Scotland.
- **Outline Business Case:** Specific projects which have a completed feasibility (with promising outcomes) and are ready to proceed to outline business case stage. Support led by SFT (*Renfrewshire*).
- **Strategic Support:** Supporting local authorities in developing a strategic approach to deploying large scale Heat Networks in their respective areas;
  - Technical work to refine LHEES ‘areas’ and to try and understand potential of entire zones and cities/towns.
  - Legal/commercial support to consider delivery models and procurement routes.
  - Multi-year projects.
  - Joint support from ZWS and SFT (Edinburgh; Glasgow; Perth & Kinross; Dundee; Fife; Inverness; Inverclyde).
  - Materials & guidance being developed to share with Local Authority Forum e.g. Route Map (publication soon).

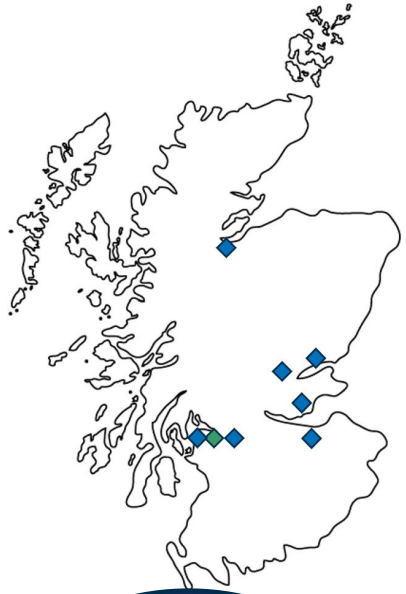


Some strategic questions…

How best to match heat demand & low carbon supply?

How do we determine the appropriate scope?

How can we get early private sector involvement **and** secure best value?



Procurement readiness: how much information is enough?

How can we address fuel poverty objectives?

Anchor load commitments: how far do we need to go?

Procurement: can existing routes meet the ambition?

Sheelagh MacGregor
sheelagh.macgregor@scottishfuturestrust.org.uk

SCOTTISH FUTURES TRUST

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Stuart Hallett

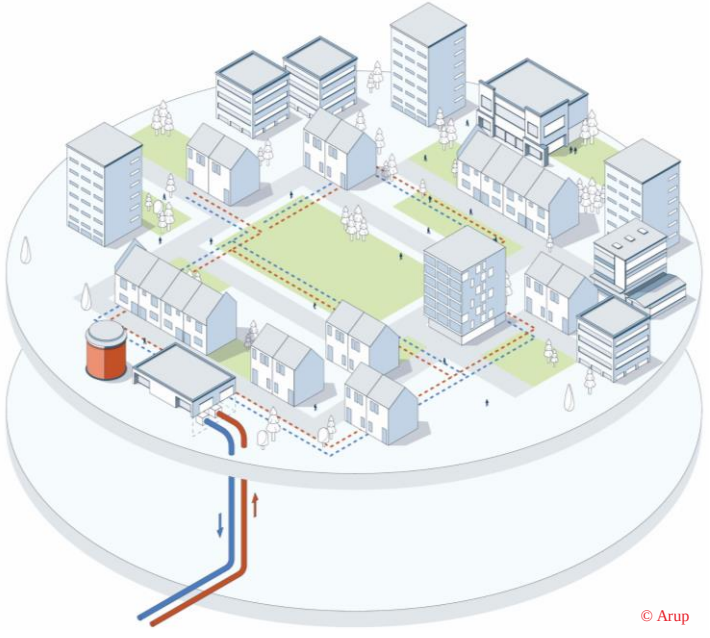
Urban Energy North Lead

Arup

ARUP

Think Bigger, Think Smaller

The Future of Heat in Scotland

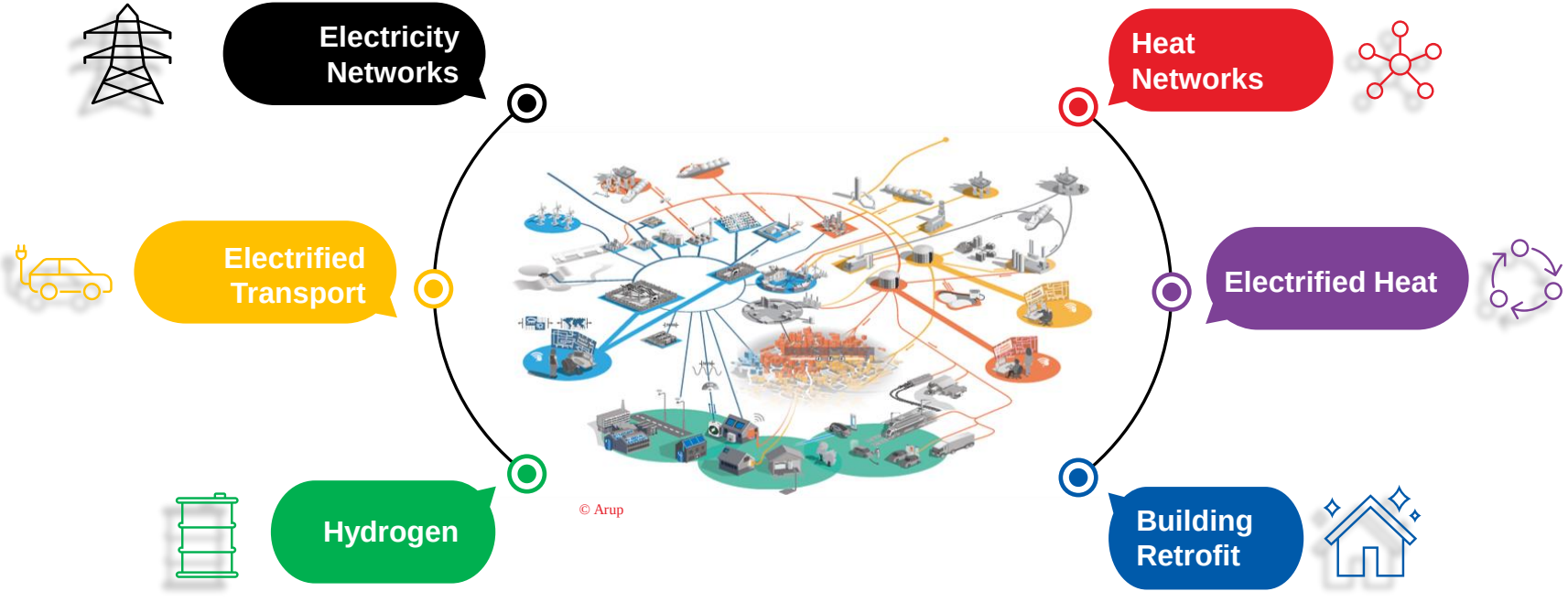


Stuart Hallett

Scottish Renewables: The Future of Heat (February 2025)

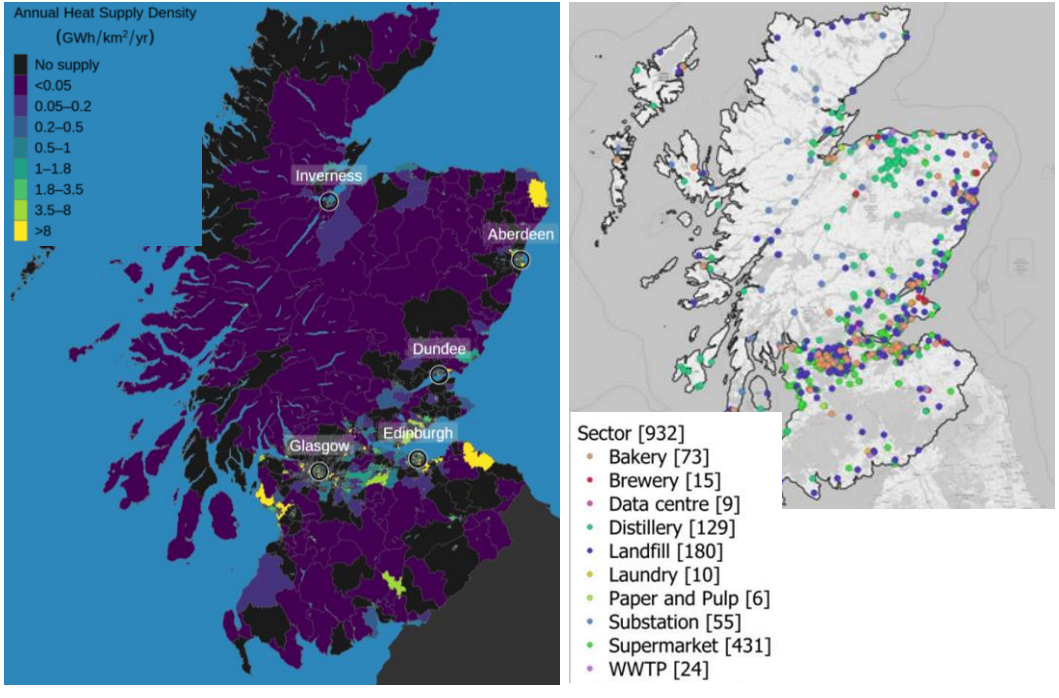
Systems Thinking

Heat is part of a future multi-vector, complex and interdependent system



Surplus Heat

An untapped opportunity input to the heat vector



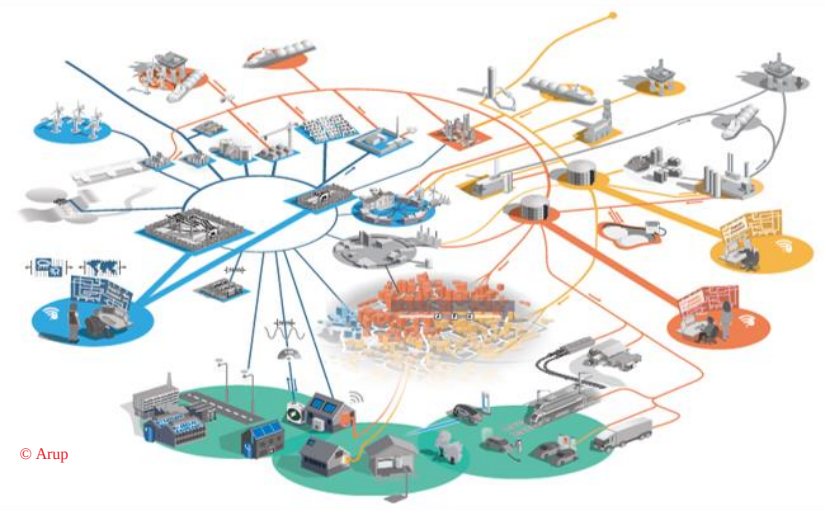
National Comprehensive Assessment © DESNZ (produced by Arup)

- Heat Networks Act (Scotland) sets statutory targets for the amount of heat to be supplied by heat networks:
  - 2.6 TWh (by 2027)
  - 6 TWh (by 2030)
- Previous research* has identified over 900 sites in Scotland with 1.7 TWh of waste heat potential.
- Can Scotland maximise the reuse of industrial waste heat as a source of relatively cheap heat for an expanding heat network market…

* The Scottish Government (2020)

System Solutions

At the heart of an integrated solution



Maximising waste heat offtake, generation and storge opportunities within the wider system to…

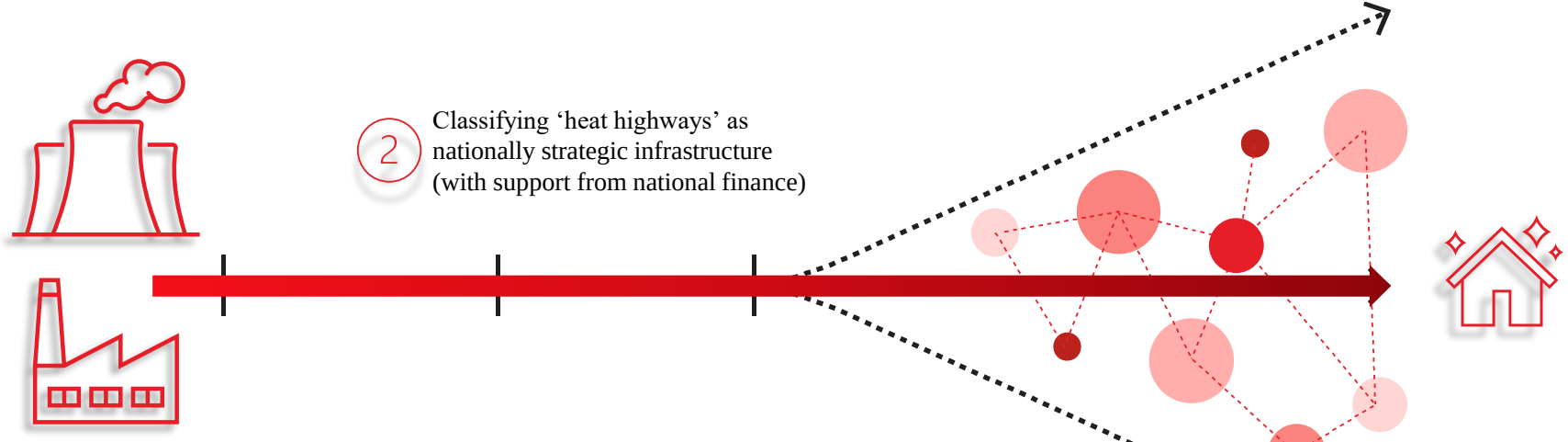
…deliver low-carbon heat to communities as part of a suite of technical interventions with long-term human and planetary outcomes

ARUP

Big Heat, Local Needs

Four steps

4 Embedding low-carbon heat within a portfolio of neighbourhood-level interventions



2 Classifying ‘heat highways’ as nationally strategic infrastructure (with support from national finance)

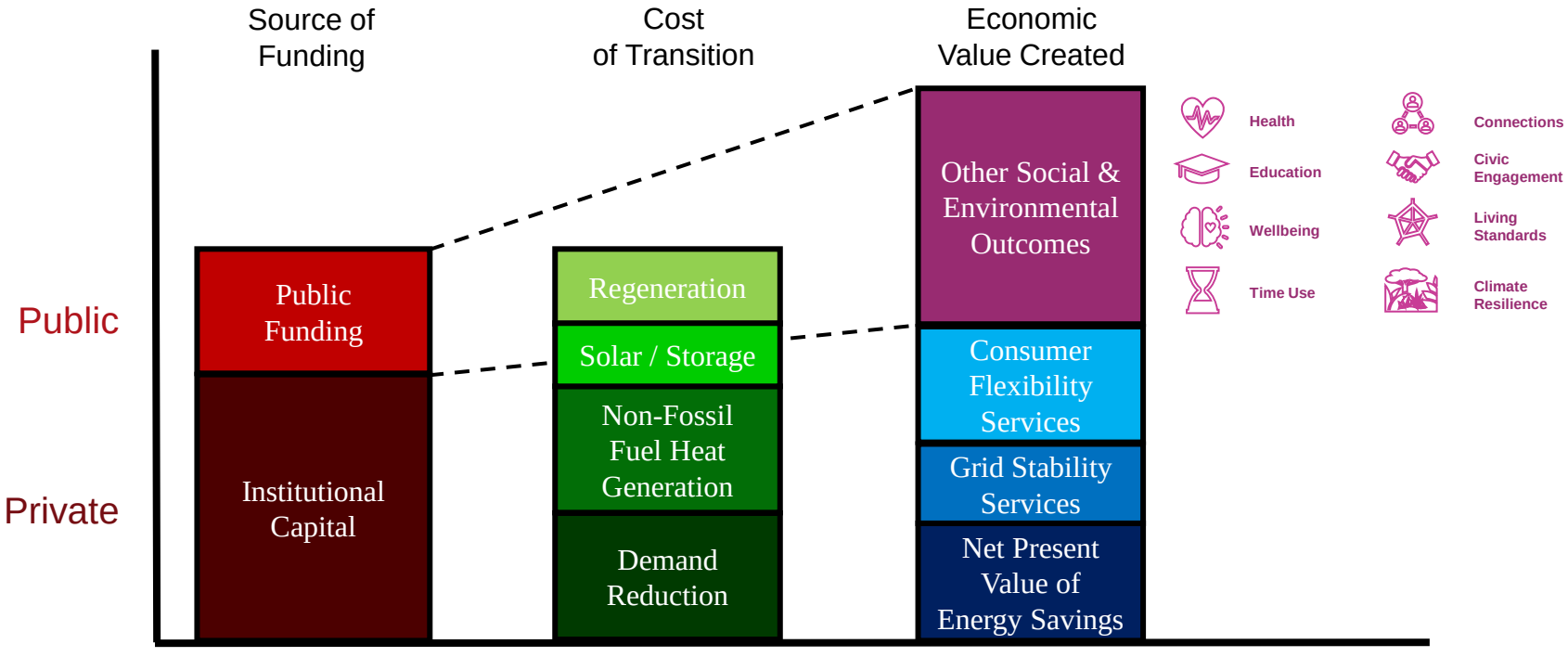
1 Implementing ‘requirement to supply’ policy, with supporting regulation and a market-based mechanism for pricing, e.g. a ‘heat exchange market’

3 Rationalising and refining demand zones to align with national and local priorities

ARUP

Total Value

Placing societal outcomes as the founding principle



https://www.arup.com/insights/how-retrofitting-homes-can-also-tackle-health-issues-and-inequality/ (Arup 2023)

Think Bigger, Think Smaller

A summary

Mandating surplus heat offtake through regulation, supported with a market-based pricing mechanism, could **lower the supplier barriers to entry and stabilise the market**

Heat ‘transmission’ systems to provide **strategic focus** and **appropriate financing**

Transmission scale heat to resolve the ‘piecemeal’ approach that zoning has yet to resolve and **mitigate major barriers to zonal development**

Refinement of HN zones with consistent prioritisation drivers, to **drive up confidence in customer connection and long-term viability**

Outcomes-based approach to urban decarbonisation

ARUP

Contact

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Urban Energy Lead Scotland & NE

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The cost of heat in a climate emergency

Chaired by Ben Carter, Account Director, Vattenfall Heat UK

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Nicola Mahmood

Head of Region (Scotland)

Aira


The cost of heat in a climate emergency
AIRA

residential heating is Europe's 3rd largest emitting sector, and electrifying it is a gamechanger for the environment

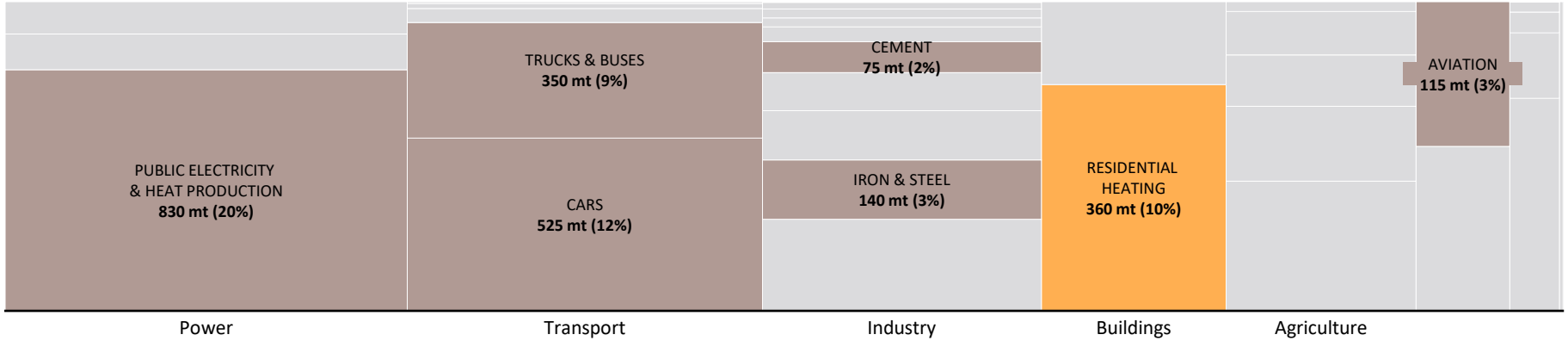
5.1x
cement production

2.5x
iron and steel production

0.8x
of Europe's passenger cars

0.5x
of Europe's public electricity & heat production

European scope 1 emissions, megaton (Mt) CO_2e and % of total emissions

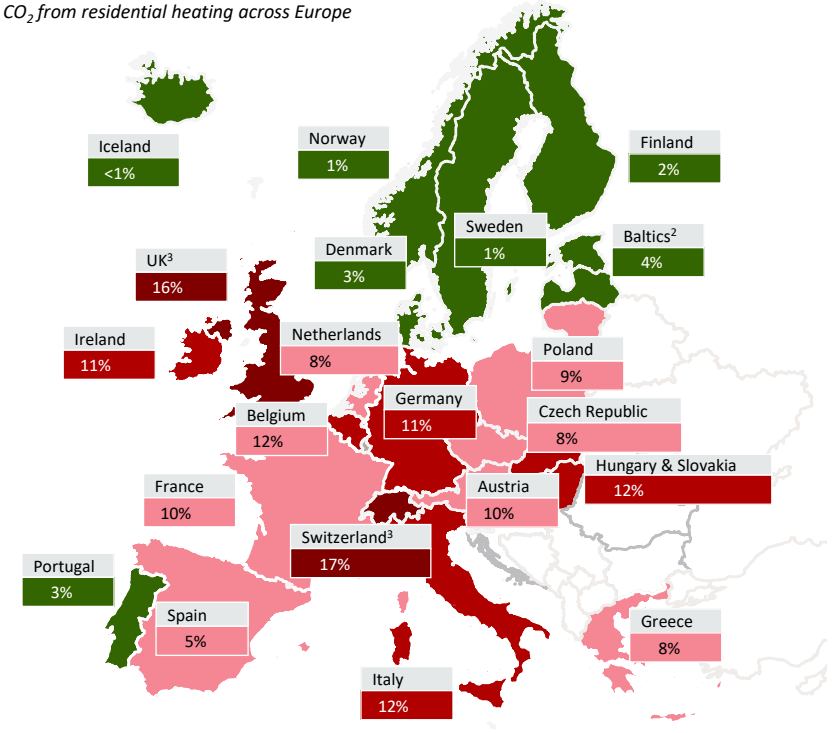


Source: Top tier consultancy firm

Heat pumps are well proven in the Nordics while the rest of Europe is lagging behind

Heat pump technology well proven in the Nordics since the 1990s…

CO_2 from residential heating across Europe



… with the rest of Europe lagging behind

Historical inhibitors

- **Low consumer awareness & education**
- **High upfront costs**
- **Complex installation journey**
- **Artificially low gas prices**

Aira offers an end-to-end customer journey

PRODUCT
& SUPPLY

CUSTOMER
ACQUISITION

INSTALLATION
& LOGISTICS

FINANCING

CUSTOMER
LOYALTY

Scottish Policy Recommendations

The spark spread

One of the major barriers to heat pump adoption in the UK is the artificially low gas prices. Levies and taxes need to be shifted from electricity to gas bills immediately.

HES grant and loan application process

The current grant and loan process is cumbersome and complex. Aira customers are taking on average three months to navigate the process. Customers who only want the grant still need to complete loan information.

HES grant and loan funding drawdown process

The process for drawing down the funding is long, with cashflow implications for installers.

Stable Policy landscape

A stable policy landscape would have strong influence on investor and consumer confidence, underpinning growth in the heat pump sector with robust mechanisms to move Scotland closer to its net zero targets.

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Adam Ben-Hamo

Principal

Asper Investment Management

Who are Asper?

>15 years of experience building platforms that build energy transition infrastructure

2014-2020

VASA VÄRME

- Six district heating assets with combined heat sales of 176GWh p.a.
- M&A aggregation and brownfield turnaround + greenfield growth
- Biomass

Exited

2013-2021

VASA VIND

- Small pipeline of development projects and team partnered with Asper in 2013
- Growth to leading developer in onshore wind sector in Sweden
- Ongoing management on behalf of pension fund investor

Under Management

2012 - today

INVIS ENERGY

- Leading player in Irish onshore wind with 454 MW operational assets and advanced pipeline of 300MW
- Presence in Scotland since 2020 with pipeline of ~500MW onshore wind in development

Active investment

2020 - today

Energie voor elkaar

- Dutch greenfield district heating platform with 3 operational networks (1 in construction) delivering 190GWh p.a.
- Target growth to 500GWh p.a. across 5 core networks in 2030
- Biomass + DC Waste Heat

Active investment

2022 - today

1energy

- UK greenfield district heating platform with 4 advanced development projects (1 in construction)
- Target pipeline of 700GWh demand across 10 locations
- Heat Pumps + Waste Heat

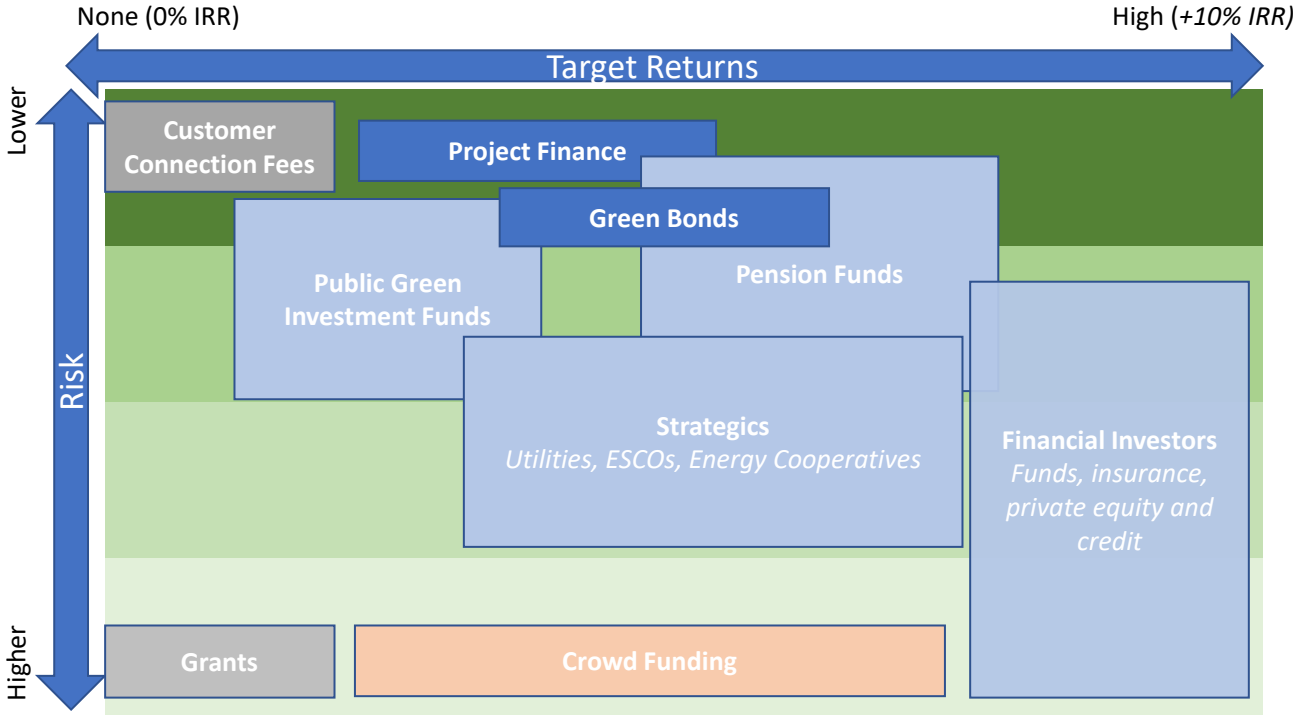
Active investment

Onshore Wind

Heat Networks

The Cost of Heat in a Climate Emergency

Reducing the cost of securing investment is part of the puzzle



Source: Asper Investment Management, Interreg NW-Europe D2Grids

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Kate Mulvany

Principal Consultant

Cornwall Insight

About Cornwall Insight

Established in 2005, Cornwall Insight is one of the most respected voices in the energy industry. We provide research, analysis, consulting and training to businesses and stakeholders in the Great British, Irish, Australian, Japanese, and German energy markets.

Our Insight

Our independent experts work across the energy market and provide high quality and actionable insights on which to base your business decisions. We look to facilitate positive market and policy change, whilst also advising customers on how to navigate and comply with energy market dynamics, rules and regulations.

Our Expertise

Our experts in-depth working knowledge of energy market design, including policy and regulatory changes, means we are perfectly placed to advise on changes to the future market design and help businesses achieve their net zero goals.

For more information about our services, please contact us on:

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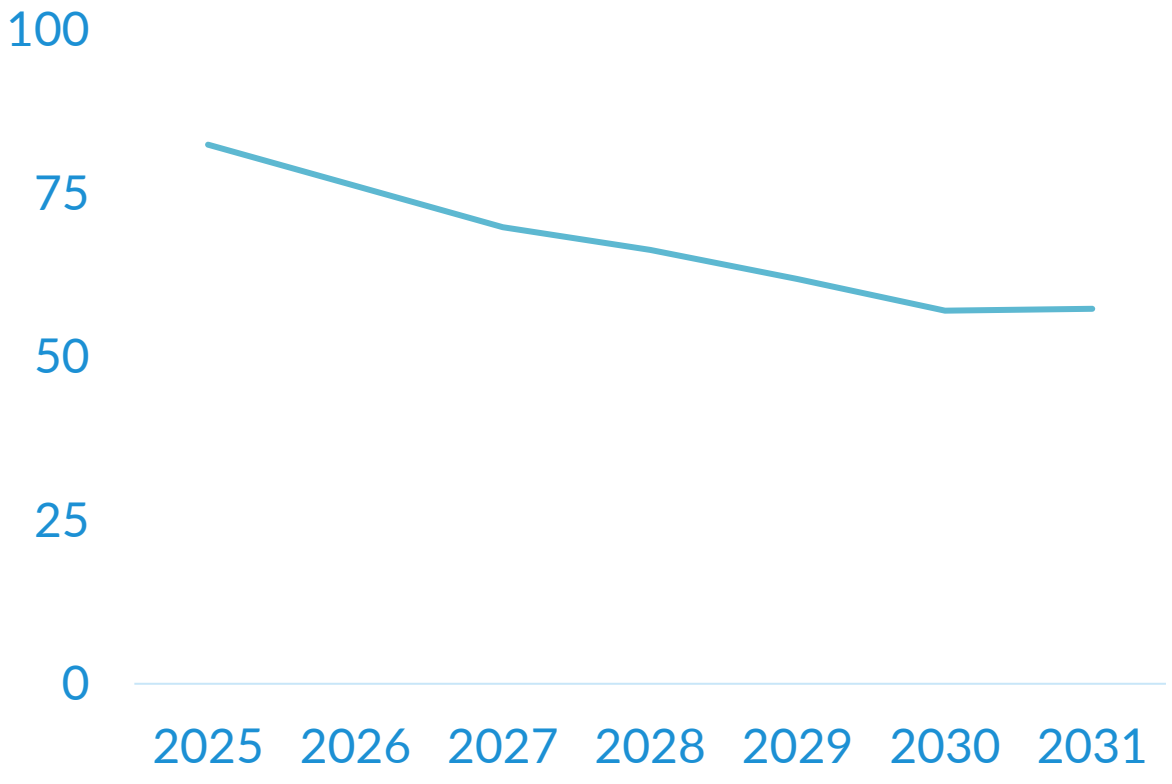
Baseload electricity price forecast (£/MWh)

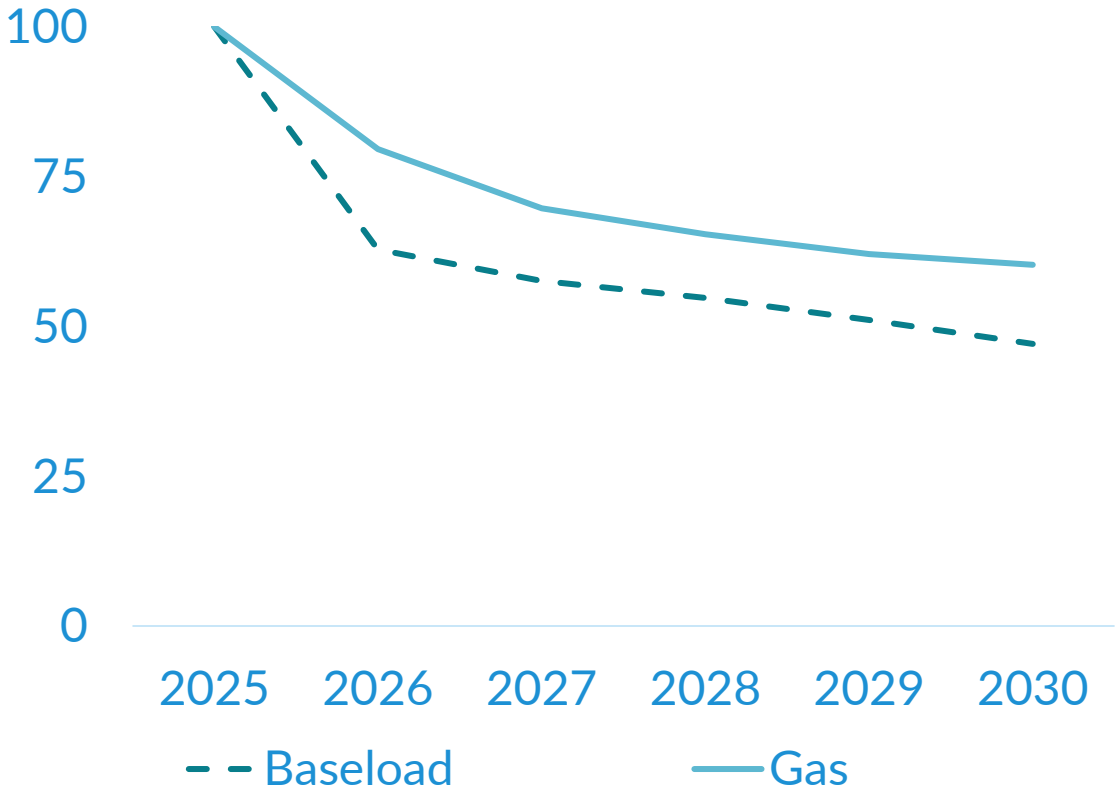


Looking ahead, electricity prices are expected to fall

Volatility will remain throughout the energy transition, with gas and power prices vulnerable to geopolitical shocks

Source: Cornwall Insight Baseload Power Curve (BPC), Central Case, annualised average

Wholesale energy price forecast (2025=100)



GB dual fuel domestic bill under the price cap ~

- 45% wholesale costs
- 10% policy costs
- 20% network costs
- 5% VAT
- Supplier operating costs, EBIT, other makes up remainder

Source: Cornwall Insight Baseload Power Curve (BPC), Central Case, annualised average

REMA continues to dominate investment decisions

- GB has a national wholesale electricity price
  - Existing network charges don't signal costs to generators and consumers, and don’t incentivise efficiencies
- Zonal pricing under consideration Review of Electricity Market Arrangements (REMA)
  - Marginal plant in each zone sets wholesale price, reducing inframarginal rent
  - Concerns about deterring CP2030
  - Scotland likely most affected with lower generation prices and potentially reduced consumer bills
  - Likely to attract political interest
- Pending policy detail: connections reform (underway), planning (expected soon), heat

Single national price (current)

Same price within regions/zones. Different charge to export

Source: DESNZ

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Eddie McAvinchey

Banking & Investments – Scotland National Wealth Fund

NATIONAL WEALTH FUND

National Wealth Fund

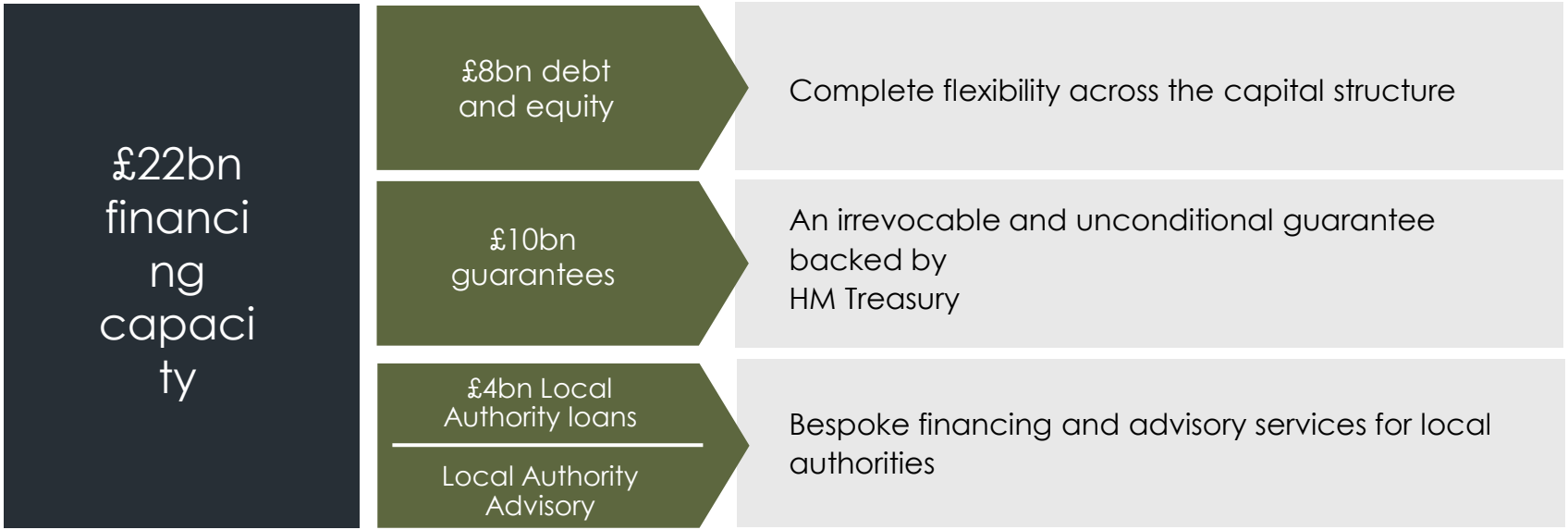
Scottish Renewables

The Cost of Heat in a Climate Emergency

26 February 2025

Mission	To partner with the **private sector and local government** to increase UK infrastructure investment in pursuit of our two strategic objectives
Objectives	• **Tackling climate change** – helping to meet government's 2050 net zero emissions target • **Supporting regional and local economic growth** – providing opportunities for new jobs and higher levels of productivity through better connectedness
Principles	• Investing in **infrastructure assets or networks**, or in **new infrastructure technology** • Delivering a **positive financial return**, in line with our financial framework • **Crowding in significant private capital over time**

Investing £22bn across the capital structure



A **further £5.8bn** of capital has been allocated for deployment on becoming the NWF

We focus on five priority sectors; mandate will evolve to align with industrial strategy

Renewable electricity, hydrogen, CCUS, **heating**, storage and supply chain.

EV and hydrogen transport infrastructure, SAF and ports

Enhancing recycling infrastructure and decarbonising energy from waste

Increasing water security and resilience, and investing in nature-based solutions

Investment in fibre to the premises,5G and digital economy infrastructure

Steers from HM Treasury have encouraged us to explore wider sectors for which we can provide support including retrofit, nature-based solutions, semiconductor manufacturing and critical minerals

NWF's investments have a material impact

£4.8bn

invested across the UK

15m tonnes

of CO_2e emissions avoided

17,400

direct jobs created and supported

£12.3bn

of private finance mobilised

Figures as at 24 October 2024

NWF has flexibility across the capital structure

Equity

- ✓ Ordinary or preferred equity and convertible loan notes
- ✓ Target TRL 7 and above
- ✓ Typically, Series C, D and later financing
- ✗ Grants
- ✗ Controlling stakes

Debt

- ✓ Senior debt
- ✓ Mezzanine debt
- ✓ Bridge finance
- ✓ Fixed or floating rate
- ✗ RCFs

Guarantees

- ✓ Loan or bond 'wrap'
- ✓ Index linked
- ✓ Credit enhancement
- ✓ First-loss guarantees
- ✓ Performance guarantees (in due course)

NWF invests a minimum of £25m for UK deployment on commercial terms appropriate for risk taken

Accelerating nascent technologies

CCUS

Hydrogen

EV Charging

Heat Networks

Zero Emission Buses

Short Duration Energy Storage

Port Infrastructure for Floating Offshore Wind

A selection of our strategy documents can be accessed using the QR code

Our involvement brings down the cost of capital and provides confidence for commercial investment in first of a kind technologies

Heat Networks – Investment & Financing Options

Long-Life Assets
Capital intensive in early phases
Low Return
Commercially Challenging

Equity Investors

- Large Utilities, investing through corporate balance sheet
- Specialist heat investors, relatively small, relatively capital constrained
- Traditional infrastructure investors increasingly interested in the sector

Debt Financing

- No functioning debt market in the UK
- Too much uncertainty, too much risk
- Projects require long-term, infrastructure style debt, but early phase finances cannot sustain it
- Some large funders have expressed interest, but no commitments yet…
- **NWF is the only source of long-term debt to the sector**

Grant – How much is available? What comes next?

Implementation viability
Development complexity, supply chain immaturity

Revenue uncertainty
Penetration rates, credit quality, end-user proposition

Regulation
Zoning in development but early stage

Technology
Green heat source makes projects more expensive

Small niche market

Grant reliance

Limited private sector investment appetite

NWF interventions

- **Risk appetite** to lean into uncertainties around initial construction, roll out and market take-up
- **Flexible capital** to calibrate repayments to the uncertainty of net cashflow generation
- **Tailored finance** to suit the requirements of individual opportunities - with pricing reflecting existing international track-record and benchmark asset classes
- **Scale contribution** with the ability to provide a meaningful proportion of a project's cost (minimum ticket size £25m)
- **Local Authority focus** with a specialised advisory and funding arm to help Local Authorities develop schemes

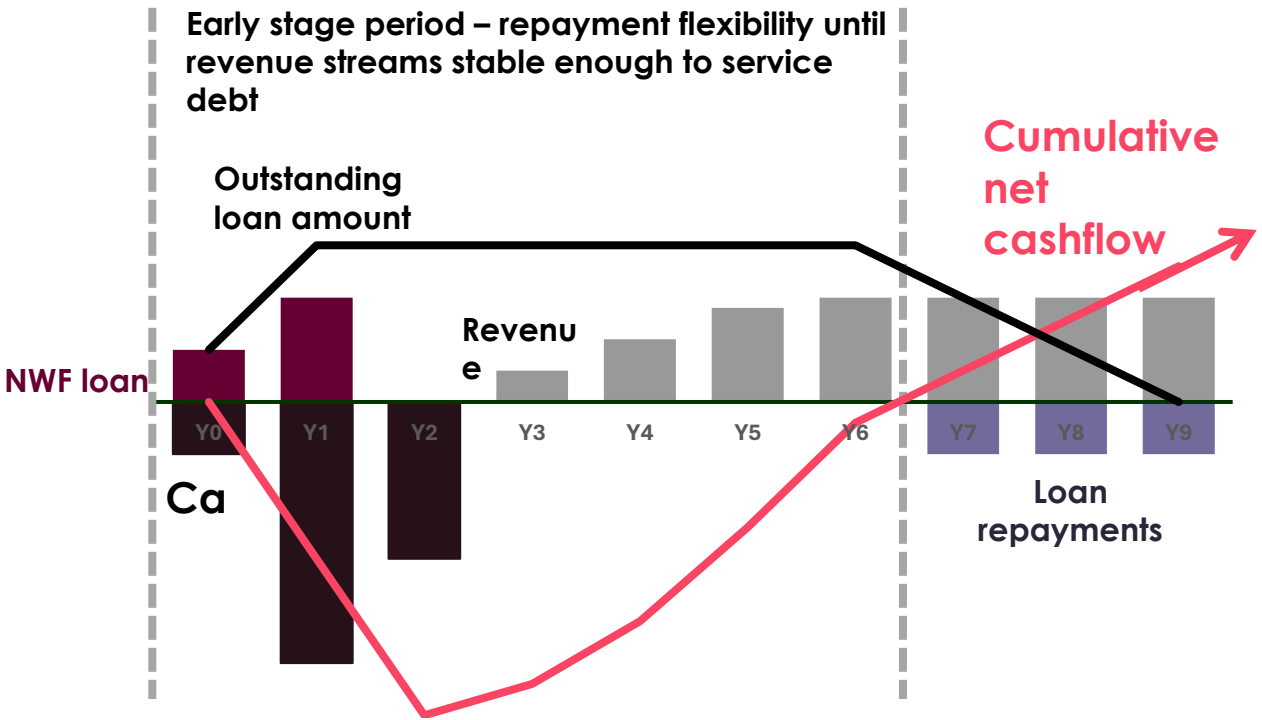
Mature infrastructure asset

Wide access to capital markets

Utility-style stable long-term returns

We are here → **We want to be here**

Patient debt facility - *stylised example*



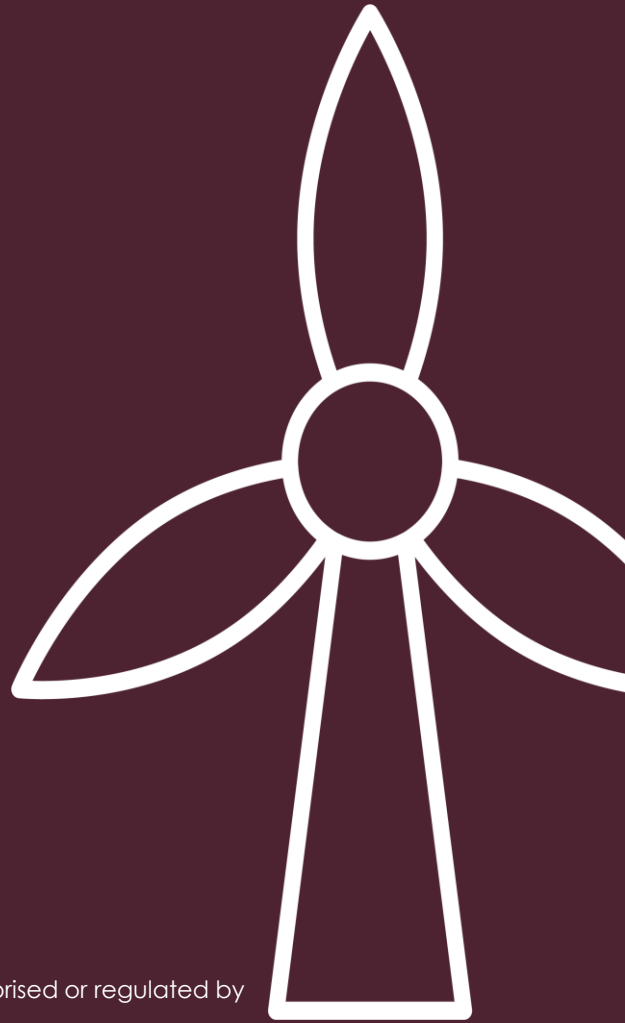
A patient debt facility could achieve its objectives in helping create a sustainable, long-term debt market for the Heat Networks asset class whilst overcoming the key barriers:

1. **Construction & ramp-up risk**: Bank facility would come in prior to revenue streams coming online
2. **Connection charges:** Provision of debt can reduce reliance on up-front connection charges to fund capex, and allow developers to offer more payment flexibility to consumers
3. **Project economics:** Senior debt is a cheaper product than equity, and therefore could help reduce the overall funding costs of the project

The NWF Offer

- Based on sound investment principles, generate positive financial return.
- However, can take more risks that other investors are willing to take (note subsidy control).
- **Here to provide problem-solving, facilitative capital:**
  - **Patient Equity** (based on a differential dividend approach during the project's initial phase)
  - **Specific, shorter term Debt, or flexible CAPEX facilities** (accommodating construction and ramp-up periods, providing longer repayment periods, sculpted repayment profiles and/or cash sweep repayment basis)
  - **Guarantees (financial, credit enhancing/first loss, performance)** are also available.
- **Ticket Size: min £25m** proportionate to our capitalisation, sector coverage, and resourcing BUT interested in opportunities to aggregate
- **LA offer: min £5m** @ gilts + 40bps (ie 40bps lower than PWLB rate). Flexible interest payments and flexible repayment profile to match project characteristics. Up to 50 years tenor and roll up initial payments during construction phase. Supported by advisory role.

For more information about the National Wealth Fund,
or to contact us, visit **nationalwealthfund.org.uk.**



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VIEW ALL UPCOMING EVENTS

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DRIVING STRATEGIC HEAT DECARBONISATION

26 FEBRUARY 2025 | GLASGOW

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