# Assessment of Scotland's opportunities within digital heat technologies

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# A framework was developed to analyse the present industry state and assess the factors required for future growth

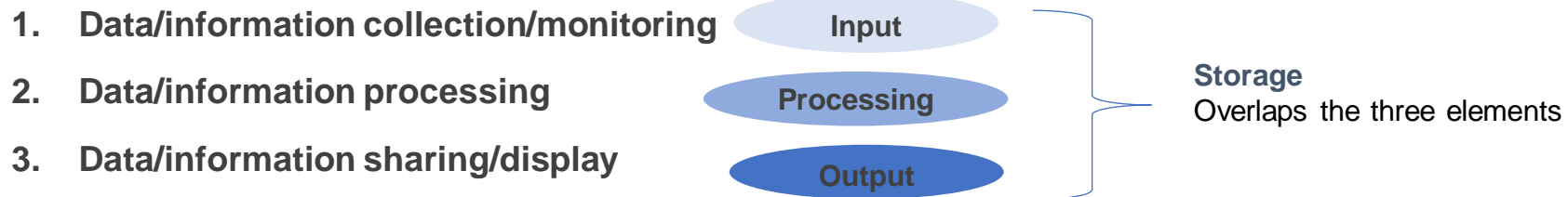| General Technology Development | Regulations, Policies & Incentives | Industry, Capabilities, & Structure | Society & Infrastructure | Demand for Technology |
|---|---|---|---|---|
| Identified technologies | Climate Policy | Key industry players | Availability of digital and engineering skills | Market demand in Scotland |
| Technology types within the heating system | Regulatory Framework | Company capabilities | R&D and pilot projects in Scotland | Demand drivers depending on the sectors |
| | Funding Schemes | Product offering and target market | Infrastructure and data development | Funding |
| | Tax Incentives | Supportive & network organisations | | |

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# What is Digital Technology in a Heating Context

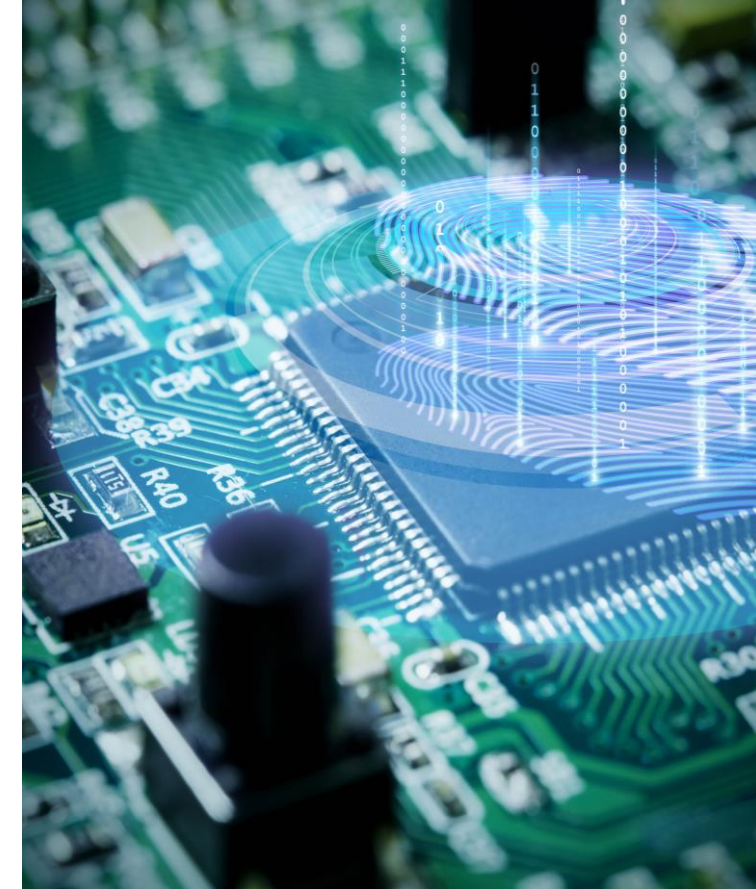**The role of digital technology in heat**

- Enable **connection** between system components

- **Optimisation** of system operation

- Additional **control** over individual components

- Increased **functionality** for users

- Data **collection** to gain understanding of building stock and user behaviour

Digital technology consists of **electronic tools, systems**, and **devices** that **collect, generate, store, process, and share data.**

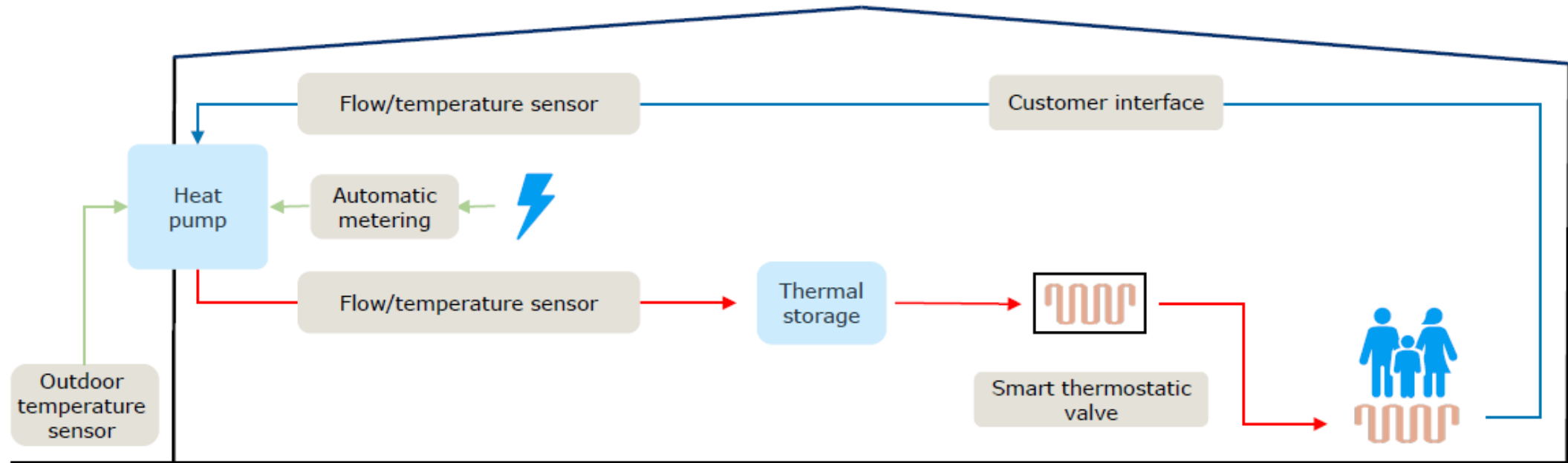Digital technologies can be divides into the following key elements:

1. **Data/information collection/monitoring**

2. **Data/information processing**

3. **Data/information sharing/display**

Input

Processing

Output

**Storage**
Overlaps the three elements

These elements can be further classified into **hardware** and **software**

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# Digital Technologies implemented in the residential sector

The objectives of using digital heating technologies in domestic heating systems include:

- **Reduce energy consumption and cost**
- **Ensuring thermal comfort and desired living conditions**
- **Operating energy system to optimise energy use in the context of a wider energy network**
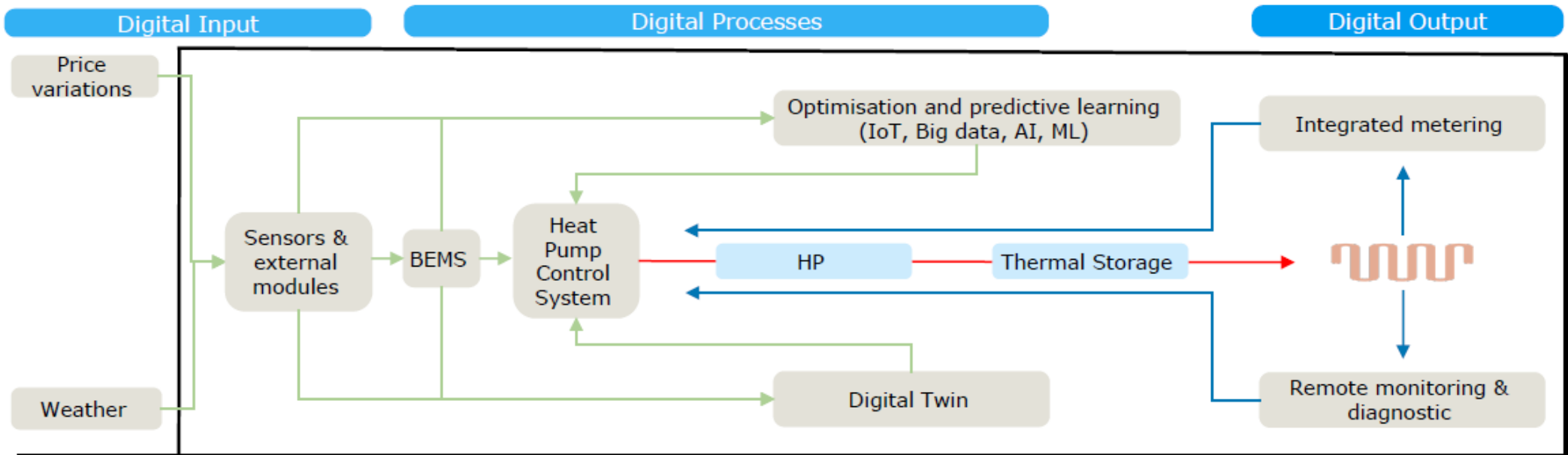
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# Digital Technologies in use in the non – residential sector

The objectives of using digital heating technologies in domestic heating systems include:

- **Reduce energy consumption and cost**
- **System optimisation and smart learning**
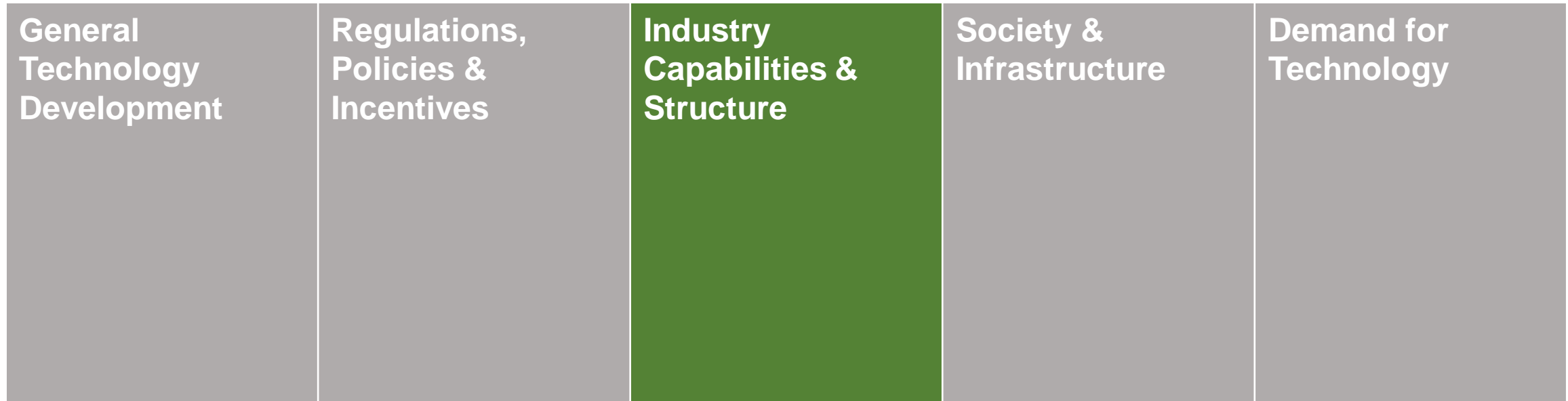- **Flexibility and grid integration**

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# Focus areas to allow heating optimisation and future grid integration

| | **1** Data Gathering | **2** External integration and self-optimisation | **3** Whole system integration |
|---|---|---|---|
| **Trends** | • This enables **increased optimisation** of heating for thermal comfort and a **better understanding of building stock** for future retrofit and national policy planning. | • Increased **interconnectivity** to **external systems** including weather data, variable cost tariffs, and available grid capacity.<br>• Advanced control systems to **minimise poor performance**.<br>• This enables more **advanced operation of systems to optimise the cost of heating and help balance the national grid** | • Digital technology aims to **connect the individual elements of a heating system together** while optimising operation.<br>• This will bring many technologies together to achieve the aim of digital technology in **net zero heating systems**. |
| **Technologies Involved** | • Sensors (humidity etc)<br>• Smart/Integrated Metering<br>• Smart thermostat<br>• System components - Smart controls for thermostatic radiator valves and electric heating | • External Systems (look at weather data, variable cost tariffs & grid capacity)<br>• System components - Smart controls for thermostatic radiator valves and electric heating | • City-wide digital twins/energy modelling<br>• Peer-to-peer trading from renewable energy sources attached to homes (e.g. solar panels) |
| **Scotland** | • Strong private interest<br>• Smart meter role out<br>• Strong regulatory support | • Reduced cost of operation<br>• Effective operation independent of user inputs<br>• Connectivity to external energy networks | • Fully optimised system<br>• Grid balancing through supply/demand matching |

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| General Technology Development | Regulations, Policies & Incentives | Industry Capabilities & Structure | Society & Infrastructure | Demand for Technology |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

# Scotland Company Capabilities

| Logo | Name |
|------|------|
| nesta | NESTA |
| WARMWORKS | Warmworks (Connected Response) |
| STAR RENEWABLE ENERGY | Star Renewable Energy |
| CENSIS | CENSIS |
| BE—ST | BE-ST |
| IES | Integrated Environmental Solutions |
| hysopt | Hysopt |
| ThermaFY GROUP | Thermafy |
| DELTA-EE | Delta-EE |
| PNDC | PNDC |
| SAV | SAV Systems |
| HERIOT WATT UNIVERSITY | Heriot-Watt University |

**47**
Identified stakeholders

**27**
"Essential" or "high-priority for the interview" companies

**12**
Interviewed organizations

**4**
Expert interviews

**37**
Companies

**4**
Universities

**4**
Digital technology & innovation centres

**2**
Network organizations

**Growing, young sector** dominated by SME's

**Remote diagnostics** missing from the market

Application of advanced technologies is at a very **early stage** and mainly developed by SME's

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# R&D Sector for Digital Technologies is growing

| Area | Relevant Research Activity |
|---|---|
| **Aberdeen Cluster** | • The **Centre for Energy Transition** at the **University of Aberdeen** is developing systems to monitor and analyse energy generation, distribution, and demand data. |
| **Edinburgh Cluster** | • **University of Edinburgh** has been collaborating with **Hysopt** to develop Digital Twin technologies for HVAC systems. |
| **Glasgow Cluster** | • The **University of Glasgow** and **IES** developing the Digital Twin of the university's western campus and the district heating system.<br>• The **PNDC**, part of the **University of Strathclyde**, tests and demonstrates low-carbon thermal technologies, systems, and digital solutions. |
| **Dundee Cluster** | • **Digital Dundee** is a cross-sector collaboration between academia, industry and the public sector to support and promote growth in the digital technology sector and related applications. |

A need to develop dedicated R&D centres to accelerate the universities contribution to the sector and to combine R&D capabilities through collaboration between existing low-carbon heat and digital tech centres.

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# Scotland has strong innovation centres but lacking a clear focus on digital heat tech

## Innovation Centres

| Built Environment — Smarter Transformation | CENSIS Sensing · Imaging · IoT | THE DATA LAB | UKRI UK Research and Innovation |
|---|---|---|---|
| Provides connections, infrastructure, and culture needed to solve the construction sector's most pressing challenges | Sensing, Imaging, and Internet of Things (IoT) technologies | Data and AI with a network of over 1,500 companies, public sector organisations and universities | UK's National Innovation Agency, supporting business-led innovation in all sectors, technologies and UK regions |

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# Growth Opportunities for Scottish Companies

### Focus on Advanced Technologies

Only Scottish SMEs are currently offering advanced process technologies, and no large domestic company is active in this sector.

Currently no players developing tools for remote diagnostics

A need for larger organisations with more resources to invest in further development of the market

### Developing Scottish Organisations

Building the capabilities in Scotland relies on the internal market and the international positioning of domestic corporations.

Industry is currently dominated by large international players

Strengthen the innovative software providers

### Increased Interoperability

Legal structures allowing for the data collection and sharing between separate private entities and private customers

**Focus in software and techniques enhancing the connectivity between different systems that can further contribute to the whole grid integration**

www.scottish-enterprise.com

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# Green Heat Innovation Support Programme

Designed to unlock the barriers to the deployment of new manufacturing processes, new business models and technologies, accelerating the roll-out of low carbon heating.

## Accelerate Innovation

- Research and Development
- Capital Investment
- Feasibility Support
- CAN DO procurement support
- European Funding

### Funding available

- £17.6m available from Nov 2022- Mar 2026

### Areas of focus

- Heat Network Component Manufacture
- Heating Product and component Manufacturers (including all types of heat pumps, thermal storage etc)
- Energy Efficiency Product and component Manufacture
- Enabling Product and component manufacturing such as heat storage, smart controls and/or digital

### Eligibility

- A company is eligible to apply if they are:
- Any size, based in Scotland, or looking to invest in Scotland
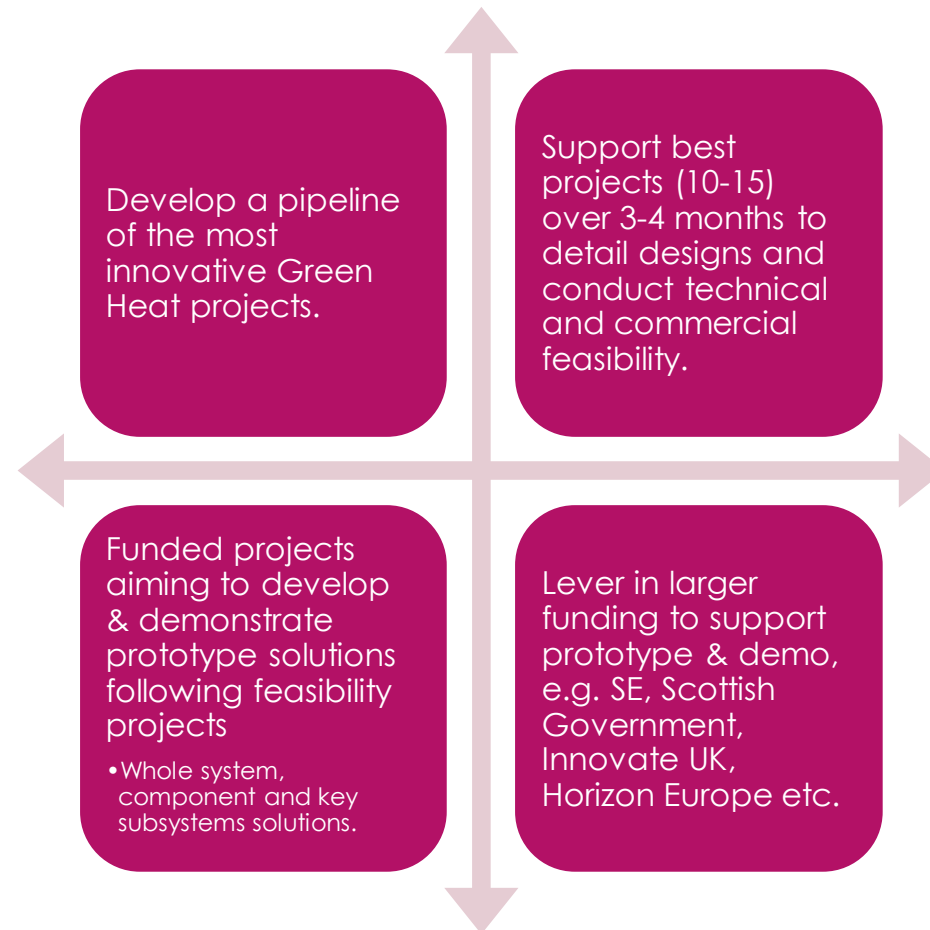- Plan to use existing green heat technology in an innovative way.

Apply on www.scottish-enterprise.com

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# Call part of the Green Heat National and Green Heat Innovation Support Programmes

▶ We are seeking innovations which:

  ▶ Develop and commercialise products and processes

  ▶ deliver a decarbonised heat supply

  ▶ improve the thermal performance of the buildings being heated

  ▶ at a price which is affordable to consumers.

▶ It is aimed at domestic and commercial buildings, new or retrofit.

# Green Heat(R&D feasibility) challenge aims

Develop a pipeline of the most innovative Green Heat projects.

Support best projects (10-15) over 3-4 months to detail designs and conduct technical and commercial feasibility.

Funded projects aiming to develop & demonstrate prototype solutions following feasibility projects

- Whole system, component and key subsystems solutions.

Lever in larger funding to support prototype & demo, e.g. SE, Scottish Government, Innovate UK, Horizon Europe etc.

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# Green Heat (R&D feasibility) challenge scope

**Green Heat Challenge Areas**

- Heat Pumps
- Green Heat Systems
- Geothermal
- Data and Control Management
- Energy Efficiency
- Thermal Energy Storage



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# Green Heat (R&D feasibility) challenge eligibility

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- ▶ Project Eligibility

  - ▶ Type: Only R&D Feasibility projects that clearly address the challenge brief will be considered.

  - ▶ 3-4 months, £30K - £50K (100% funded), complete by 22 December 23.

- ▶ Business eligibility

  - ▶ Any business in Scotland, registered companies house, committed to fair work principles, single applicant

- ▶ Eligible Project Costs.

  - ▶ Eligible costs for the feasibility projects include: Employee wages, Contractors, Consultants, Supplies and materials, Travel costs, etc.

# Green Heat Application Process

▶ **Download Application Form from challenge page ([CAN DO Innovation Green Heat Feasibility Call - Scottish Enterprise (scottish-enterprise.com)](#)).**

▶ **Complete Application form.**

▶ **Send completed application form to enquiries@scotent.co.uk, with challenge title as subject header in email.**

▶ **2 additional single page A4 appendices allowed.**

▶ **Multiple applications allowed but must be separate application forms.**

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# Green Heat Timeline

- Call Opens – 9th May 2023.

- Call closes - noon on 7th July 2023

- Notification of results – 31st July 2023

- Contract issued by – 25th August 2023

- Earliest project start date – 28th August 2023

- Latest project end date  22nd December 2023

# European Funding

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## Our role

Set up in 2009 to facilitate innovative, collaborative, low-carbon, infrastructure projects

Helping to attract European funding to Scotland in the critical growth areas of energy and low carbon by supporting businesses and key stakeholders

The centre engages with institutions, networks and technology platforms, identifying opportunities for collaboration across industry sectors

SEGEC maximises the potential to contribute to Europe's energy and emissions targets.

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# Keep in touch

Sign up to the Green Heat newsletter

Sign Up to the European Low Carbon Funding Newsletter

Scottish Industry Directories    Appear on the Scottish Industry Directories

Subscribe to the HeatSource newsletter

Email:
Rachel.mccaw@scotent.co.uk

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# Thank you

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